

2008

South African
Reserve Bank

Challenges for Monetary Policy-makers in Emerging Markets

South African Reserve Bank
Conference Series

2008



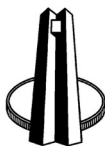
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Enquiries relating to the papers in this publication should be addressed to the respective authors at the contact details provided.

ISSN (print):	1993-0895
ISSN (online):	2073-6770
ISBN (print):	978-0-9585044-7-8
ISBN (online):	978-0-9585044-8-5

To access this publication electronically, please go to: <http://www.resbank.co.za> and follow these links: Publications & Research\Conference Papers

Produced by the Publishing Section

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This book contains the proceedings of the conference on “Challenges for Monetary Policy-makers in Emerging Markets”, which was hosted by the South African Reserve Bank at Zebula Lodge near Bela-Bela in Limpopo Province from 29 to 31 October 2008. This conference was the second in a series of biennial conferences. In this scenic setting, several leading contributors to the literature on monetary policy presented their research findings and entered into debate on monetary policy issues that are of particular relevance for emerging markets.

A mere six weeks before the conference a major investment bank in the United States with strong global linkages failed, creating severe shock-waves and an intensification of the international financial crisis. Although not planned as such, the conference therefore turned out to be exceptionally well-timed, providing an opportunity to assess the extraordinary policy challenges that have been confronting policy-makers, and the important linkages between financial stability and monetary policy.

Several emerging-market economies, including South Africa, have adopted an inflation-targeting framework for conducting monetary policy. Accordingly, due attention was given to this framework, thrashing out how suitable it was for emerging-market economies, and how the changed global outlook for growth and inflation could be dealt with under inflation targeting. The degree of flexibility incorporated into the inflation-targeting framework was discussed and alternative frameworks for monetary policy were also explored. The impact of rapid structural changes on policy-making was examined, and so too particular country experiences, successes and challenges.

I should particularly like to thank each presenter for the diligent work he or she put into writing the papers for the conference. I trust that this set of conference proceedings will continue to provide food for thought on issues that are relevant to monetary policy-makers in emerging markets.

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Laurence Harris

Inflation targeting as a regime governing the conduct of monetary policy has, as its central features, the setting of an announced, forward-looking numerical target level or range for an inflation measure, and a commitment by the central bank to operate monetary policy with that target as its overriding objective. South Africa formally adopted inflation targeting in 2000, setting a 3 to 6 per cent target range for inflation to be achieved in 2002. Although the South African Reserve Bank (the Bank) already had a constitutional and statutory obligation to maintain the value of the currency, the new framework set out in the Governor's statement marked a turning point in the way monetary policy was to be conducted (South African Reserve Bank, 2000).

South Africa's decision to switch to inflation targeting followed New Zealand's 1990 innovation, and an increasing number of countries that have taken similar decisions. Following New Zealand, several developed market economies adopted inflation targeting and since the late 1990s they have been joined by emerging-economy countries. By 2007, eight developed and sixteen emerging economies had adopted formal inflation targets (IMF, 2005; Portugal, 2007), and the 2006 appointment of Ben Bernanke, a proponent of inflation targeting, as Chairman of the Federal Reserve Board, raised the possibility that the United States (US) might join the trend.

A significant body of statistical evidence shows, with rare exceptions, that countries adopting inflation targeting have obtained benefits in terms of inflation levels, inflation and output volatility, and other macroeconomic measures. Nonetheless, its value for any particular country cannot be taken for granted and in any country the framework should be re-examined as circumstances change.

The papers in this volume examine inflation targeting at a time when circumstances were evidently changing. High growth in the world economy since 2001 had generated inflationary pressures, particularly through global commodity prices, as discussed in the paper by Logan Rangasamy. By late 2008, several inflation-targeting emerging countries were experiencing inflation higher than their target. In September 2008 the banking crisis, centred on the US and United Kingdom (UK), had developed into an unprecedented crisis of financial firms and markets with global impact and strong recessionary effects. As David Llewellyn,

Dennis Dykes and Hendrik Nel make clear, the financial crisis had both proximate and ultimate causes, and was partly attributable to regulatory failures and poor incentive structures. Global macroeconomic imbalances and the resulting flows of liquidity were contributory factors. Such a financial system shock, real recession and possibly interruption to the trend of increased global integration would test the value of inflation targeting.

Recognising that changing circumstances made an evaluation of policy lessons timely, the Bank initiated a focused examination of policy issues related to inflation targeting in South Africa and the papers in this volume, delivered in October 2008, are the result.

As well as contributing to the country's policy discussion, the arguments are likely to be relevant to other countries, especially those economies with similarities to South Africa. Moreover, as the papers here recognise, other countries' experience could have valuable lessons for South African policy. Relevant characteristics of South Africa's economy during the period under investigation have been a highly developed financial sector, a respected tradition of central banking, fiscal discipline, a liberal trade regime with minerals and other commodities contributing a high proportion of export revenue, openness to foreign capital, and a formal labour market based on a high degree of employer and employee organisation. What lessons can be drawn from South Africa's experience?

Brian Kahn's comprehensive paper provides the framework for thinking about inflation targeting, drawing upon both theory and experience. Most critics of international moves towards inflation targeting have argued that it too rigidly forces central banks to achieve inflation targets at the cost of growth, medium-term output and employment. In South Africa, where unemployment has been chronically high and productive investment in important sectors has been low, a perception that inflation targeting hinders growth has fuelled arguments for changing objectives. Concern over the medium-term effect of inflation targeting has focused on the susceptibility of South Africa's open economy to supply shocks – the danger of a rise in the world price of oil being a paradigmatic concern – for a rigid inflation target would be procyclical, magnifying the output effect of the shock by forcing a tightening of monetary policy. A central theme of Kahn's paper is that inflation targeting does not usually act as a rigid corset preventing monetary policy from having regard to variables such as a measure of the output gap; in Bernanke's phrase it should best be seen as a framework for constrained discretion.

An important mechanism allowing inflation targeting to adjust to medium-term output fluctuations is that, without changing the inflation target itself to accommodate deviations, the time horizon for achieving it can be chosen to allow tolerance of short- or medium-term above-target

inflation. Kahn argues that this is not only desirable, but also that South Africa's monetary policy, like that of other countries, has operated with the flexibility conferred by having a target with temporary deviations permitted. As Kahn concludes, "The target itself is an anchoring device, and the central bank should take credible action to get back to within the target. However, there is always a difficult trade-off between flexibility and credibility." The evidence on inflation targeting in South Africa, summarised in the papers by Kahn and Stan du Plessis, suggests that it has been broadly successful in terms of macroeconomic outcomes. Between September 2003 and April 2007 inflation was kept well within the target range. Since 2000 inflation rates have been lower than in the decade before the introduction of inflation targeting, and targeting has been consistent with high output growth and low volatility until 2008. It has been broadly countercyclical, although evidence of a procyclical effect in 2004 and 2005 illustrates the difficulty of judging the optimal degree of flexibility.

Colen Garrow argues that South Africa's inflation targeting has been less successful, particularly since the beginning of a monetary-tightening cycle in 2006, which has not brought inflation down to its target range. Garrow argues that global supply shocks and structural transformation in South Africa created conditions that required inflation targeting to be more flexible than it had been. While the target range had remained unchanged at 3 to 6 per cent, infrastructure investment and consumer credit growth associated with social change warranted adopting a target of 3 to 7 per cent temporarily in order to ease the effects of high interest rates on the real economy.

The effectiveness of a forward-looking inflation-targeting regime depends, to a large extent, on the ability to forecast inflation accurately. Forecasts of macroeconomic variables in any country have generally suffered from a notable weakness, namely their poor record for forecasting turning points. As Janine Aron and John Muellbauer point out, the papers in this volume were written and discussed at a historic juncture as a global boom had ended and economies were on the edge of a severe downturn. That posed a significant problem for forecasting price-level changes, as high inflation rates were likely to give way to low or negative rates. Simple time series models, using vector autoregressive (VAR) techniques, are not well suited to forecasting inflation, especially at turning points, and Aron and Muellbauer argue that a structural approach is superior.

Their method uses fundamentals (i.e., unit labour cost; output gap; and measures of international adjustment in goods and capital markets) as explanatory variables and attempts to take account of long lags and structural breaks. An indicator of the value of such an approach, applied to disaggregated data, is their finding that forecasting inflation in the

components of the overall consumer price index (CPI) and then aggregating produces more accurate results than estimating CPI forecasts directly. As Johannes Fedderke argues, such structural models of inflation are promising, but the modelling and estimation results have to be judged against other estimates of related structural models and, as Aron and Muellbauer suggest, their work should be seen as a stimulus to further structural modelling of inflation.

Aron and Muellbauer's approach brings into sharp focus an issue that is of wide significance for successful targeting, namely the need for good statistical series. It is illustrated by their discussion of measures of housing-cost inflation as one component of CPI inflation. More generally, it illustrates one difficulty that emerging economies, which may have relatively weak data, face in implementing inflation targeting.

Nonetheless, however imperfect the data underlying macroeconomic modelling, the Bank has to make policy judgements in the face of changing macroeconomic circumstances. For South African policy, one major challenge has been the increase in the current-account deficit since the start of inflation targeting, continuing a trend that started earlier and, by the first quarter of 2008, resulted in a deficit at 8,9 per cent of gross domestic product (GDP). The increased deficit was linked to a worsening of the balance of trade, and, as Logan Rangasamy and Roger Baxter show, fluctuations in world commodity markets and the response of South Africa's mineral producers to them are of key importance for the evolution of both the trade deficit and inflation.

Inflation targeting has been accompanied by a relatively clean float of the rand and a decline in the trade-weighted real exchange rate, but the real depreciation did not reverse the current-account trend and had been moderated by strong inflows of foreign capital. The papers by Ben Smit, Elna Moolman and Khathu Todani address the implications of the balance of payments for policy, largely by considering the sustainability of the deficit and the implications of a reversal of the current-account deficit, whether produced in response to a sudden reversal of capital flows ("sudden stop"), the likelihood of which was heightened by investors' "flight to safety" in the global crisis, or by policy measures in advance of such a shock. Based on both comparative international experience and the authors' calculations of likely South African outcomes, they find no reason to change monetary policy, or use the flexibility that Brian Kahn highlights as inherent in inflation targeting, in an attempt to adjust the current-account deficit. In any case, with free external capital flows, inflation targeting would be inconsistent with engineering a current-account adjustment by targeting a nominal exchange rate depreciation. That raises the question of whether capital controls should have a role, giving monetary policy more room to manoeuvre. The papers by Laurence Harris

and Eric Schaling conclude, on the basis of international comparisons and South Africa's own experience, that there is no case for renewed capital controls in South Africa.

The papers in this volume engage with macroeconomic challenges facing inflation targeting. As is well established in the literature, necessary conditions for the success of inflation targeting include the institutional and political economy framework in which it is embedded. More specifically, the dissemination of information and the transparency of the reasoning behind policy decisions can have important effects. This volume is a contribution to such transparency in the context of South Africa.

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Financial innovation and a *new economics* of banking: Lessons from the financial crisis

David T Llewellyn

Derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal to the financial system. — Warren Buffet, *Financial Times*

If risk is properly dispersed, shocks to the overall economic system will be better absorbed and less likely to . . . threaten financial stability.

— Alan Greenspan, "International financial risk management"

Not everything that counts can be counted, and not everything that can be counted counts. — Albert Einstein (1936)

Introduction

The financial crisis that erupted in the middle of 2007, which has intensified to alarming proportions since then, is the most serious since at least the Great Depression of the 1930s, and it brings with it a serious recession in the world economy. The sequence of the crisis has been put well by Berk (2008: 4): "International markets are currently in a state of turmoil. What started out as a potential problem in a particular segment of a particular market in a particular country, by now has spread to large parts of the world adversely affecting not only financial but real outcomes."

The crisis is different from the many others that have occurred over the past 20 years: it is global in nature rather than being located in a single country; it focuses on a wide range of financial instruments (notably credit risk-shifting instruments) that have become a new feature in the world of banking; a wide range of different markets and asset classes has been affected; it has caused major disruption to wholesale financing markets in general and interbank markets in particular; and it has already transformed the financial landscape (e.g. the demise of the independent investment bank model that had become a defining feature of Wall Street). Furthermore, it has been systemic in nature and not confined to a particular type of institution, though inevitably, the centrepiece has been the position of banks. In the process, household names have disappeared from the landscape and the crisis has forced a rethink of several banking models that had become a feature of the twenty-first century of finance.

In addition, the crisis has forced an unprecedented degree of intervention by central banks and governments, both with respect to individual banks and systemically: in some countries banks have been taken into public ownership; assets have been insured by governments; banks around the world, notably in the United States (US) and United Kingdom (UK), have

been forced to re-capitalise; and in some cases banks have been partly nationalised, with governments injecting public capital, and governments have intervened to guarantee a wide range of bank deposits and debts. Around the world governments and central banks have intervened drastically by buying a wide range of financial assets (including commercial paper and asset-backed securities) to inject liquidity and ease the liquidity problems faced by banks. In addition, central banks have radically changed the way they intervene in money markets to inject liquidity by extending the range of counterparties; the asset classes they will accept as collateral; the amounts of intervention; and the maturity of the assets accepted as collateral. Overall, taxpayers have come to absorb bank credit risk with credit risk in effect being socialised. In the face of weakening banking systems, in some countries (notably the UK) the taxpayer has effectively been forced to absorb credit risk generated by banks. State ownership stakes in banks represent a socialisation of credit risk as do asset purchases, guarantees and public insurance arrangements.

A major ingredient of public intervention has been the forced recapitalisation of banks. In the UK banks have been required to inject £50 billion of new capital, of which £37 billion has been provided by the government in the absence of private market capital raising. Two of the largest banks (Royal Bank of Scotland and the Lloyds Banking Group) have received large injections of capital from the government, which now has a substantial ownership stake in both. The forced recapitalisation can be regarded as a public good in two respects: (1) it obviates the need for asset sales by banks at sometimes fire-wall prices and (2) it enables banks to continue lending to support the economy.

A wide range of policy measures has been adopted in many countries, largely because of a systemic market failure that, because of capital impairment and uncertainty, means that banks have ceased to perform their basic financial intermediation role in the economy. In the UK, for instance, official measures have been designed to maintain the flow of bank lending in the face of the serious financial fragility of the banking system.

This paper presents a holistic approach to the causes of the financial crisis by emphasising the multidimensional nature of the causes. Because financial innovation is a central part of the crisis (and what will be termed its '*ultimate* cause'), the analysis considers the nature of financial innovation, with special reference to the emergence of instruments and business models that purport to shift credit risk in an important way. It is argued that this has changed the traditional economics of banking in an important way and that a key element in the crisis has been the new business models that have evolved as a result of financial innovation. In the process banks stopped behaving like banks. The holistic approach also focuses on the incentive structures faced by various agents such as banks, shareholders and managers, and bank supervisors and central banks.

Antecedents

Crises never emerge in a vacuum and the antecedents need to be considered. Seven structural changes in the global financial system set the background to the current financial crisis: (1) a defining feature of recent financial history has been the sharp rise in the pace of financial innovation; (2) an increasing 'financialisation' of economies (sharp growth in the volume of financial assets and liabilities relative to gross domestic product (GDP)); (3) a more market-centric structure of financial systems (an increase in the role of financial markets relative to institutions in the financial intermediation process); (4) a sharp rise in the use of derivative instruments and markets; (5) so-called (and largely unregulated) shadow banks (such as hedge funds and structured investment vehicles (SIVs)) emerged as major new players in the financial intermediation process (Tett, 2008); (6) an increased globalisation of finance and financial markets and systems; and (7) a sharp rise in gearing both by banks (including intra-financial-sector gearing) and households in many countries.

It is also relevant to consider the ideological context since, for a long time, the dominant ideology in the industrialised world (most especially related to the world of finance) has been one of deregulation of banking, and a general belief in rational expectations and the efficient markets hypothesis. This dominant ideology came to overwhelm both the regulatory ethos and strategies in financial markets.

The impact of globalisation has been particularly powerful in the propagation of the current financial crisis: in particular, and as noted at the outset, what started as a local mortgage problem in parts of the US has been generalised to a wide range of asset classes, the interbank market, a wide range of countries, and to several different and varied types of financial institution.

A central theme is that, as with many previous financial crises, a major ingredient in the current crisis has been the role of financial innovation. The new dimension has been the emergence of instruments (e.g. securitisation, collateralised debt obligations (CDOs) and credit default swaps (CDSs)) and new vehicles; all of which purport to shift credit risk from loan originators (mainly banks) to other counterparties, including investors in SIVs.

The unique feature of the most recent period of financial innovation has been the emergence of credit risk-shifting instruments (for a fuller discussion of these instruments, see Llewellyn, 2009). Such instruments have several important properties with respect to bank business models, the distribution of credit risks, the generation of credit, the structure of financial intermediation in the financial system, a more market-centric financial system, and *adverse selection* and *moral hazard* problems. In particular,

instruments that have been designed to shift credit risk have produced new banking models (e.g. *originate and distribute*) that change the underlying economics of banking in a fundamental way and in a way that, under some circumstances, makes the system more crisis-prone. I argue that such business models have been central to the origin of the current financial crisis. It is also evident that the implications of new models have not been fully understood by originators, users or supervisors.

Paradigm of causality

The causes of the financial crisis are multidimensional and came together in the middle of 2007. An analysis of the causes is considered at six levels (summarised in Table 1) and considered in detail in later sections after the economics of financial innovation have been outlined:

- *Proximate* causes: The proximate causes were defaults on US sub-prime mortgages, and weak risk analysis and management systems within banks.
- *Ultimate* causes: The ultimate underlying causes are identified as financial innovation, which purported to shift credit risk away from the originators of loans; the new business models of banks that resulted from this and which exposed banks to low-probability-high-impact (LPHI) risks; failures of corporate governance; weakening lending standards; and a resultant systemic under-pricing of risk. These factors operated in a context where, around the world, banks became more focused on shareholder value business strategies in an environment where competitive pressures in traditional banking business had become more intense.
- *Environmental* factors operated in a structure of large global financial imbalances; a global savings glut; asset price bubbles; massive growth of global liquidity; low and less-volatile inflation; and low and stable interest rates and bond yields. Strong and more stable world economic growth, in turn, induced sharp growth rates in bank lending and excess leverage, and pressure to maintain returns in a low interest rate environment.
- *Incentive structures* of key agents in the system (e.g. bank managers, shareholders, rating agencies and supervisors) also became dysfunctional. Some of the new financial instruments and the new business models developed by banks brought with them *adverse selection* and *moral hazard* problems. Furthermore, banks' internal remuneration structures created a bias towards excess risk-taking and herd behaviour (see Llewellyn, 2009b)
- *Supervisory failures*: These are the failure of supervisors to act on identified concerns and to act against excessive risk-taking by banks. While several central banks and international agencies had been

warning for some time about hazardous trends (e.g. under-pricing of risk and asset price bubbles), little action was taken to address their concerns.

- *Prevailing ideology*: The dominant ideology of deregulation and financial liberalisation, rational expectations and the dominance of variants of the efficient markets hypothesis set a powerful intellectual climate that influenced bankers, market participants and supervisors. This was a view often expressed by the former Chairman of the US Federal Reserve System (the Fed), Alan Greenspan, and in the UK it manifested itself in, *inter alia*, the concept of ‘light touch’ regulation by the Financial Services Authority (FSA).

In each case, the specific factors identified within each ‘layer of causation’ can be categorised as internal to banks or external or systemic (see Table 1).

Table 1: Crisis matrix

Cause	Internal	External/Systemic
Proximate cause	<ul style="list-style-type: none"> • Risk analysis and management systems 	<ul style="list-style-type: none"> • Sub-prime defaults
Ultimate cause	<ul style="list-style-type: none"> • Business models • Corporate governance • Weak lending standards • Under-pricing of risk 	<ul style="list-style-type: none"> • Financial innovation • Wholesale funding markets
Environment	<ul style="list-style-type: none"> • Pressure for returns • Credit growth and excess leverage • Optimism and collective euphoria • Excess ‘financialisation’ of economies • Shadow banks 	<ul style="list-style-type: none"> • Asset price bubbles • Global liquidity expansion • Interest rates: Levels and stability • Low bond yields • Global financial imbalances • Excess savings in emerging-market economies • Inflation: Levels and stability • World economy: Growth and stability • Perceptions of low risks • Financial liberalisation
Incentive structures	<ul style="list-style-type: none"> • Remuneration systems • Low-probability-high-impact risk • Business models <ul style="list-style-type: none"> – Adverse selection – Moral hazard 	<ul style="list-style-type: none"> • Competition

The central theme is that, while many factors played their part (and that it is the combination of pressures that proved to be decisive in the

emergence of the crisis), none would have had the impact that it had, had it not been for financial innovation, the new business models that this made possible and, in particular, the emergence of credit risk-shifting instruments. For instance, many factors contributed to the sharp rise in bank lending and an under-pricing of risk. However, their impact would have been limited had banks been forced to hold assets on the balance sheet, absorb the associated credit risk and hold expensive capital against this risk. In other words, had banks not deviated so far from the traditional model of banking.

I The role of financial innovation

Given the central importance of financial innovation in the crisis scenario and, as argued in this paper, being the 'ultimate' cause of the crisis, the nature and role of financial innovation are reviewed before considering their special role in the current crisis. In many respects, financial innovation (in particular the development of structured instruments and credit derivatives) became a defining characteristic of national financial systems over the past decade or so. A central theme is that some aspects of financial innovation (notably those that purport to shift credit risk from loan originators) changed the underlying economics of banking and the financial system, and led to the emergence of new banking models. In particular, I consider the economics of financial innovation in general and its implications particularly with respect to four key issues: (1) how it might contribute to enhancing the efficiency of the financial system, (2) its implications for risk management, (3) how it changed the underlying economics of banking and (4) its implications for financial stability. A key issue is the impact that financial innovation has on two key aspects in the financial system: (1) its *efficiency* and (2) *stability*. As indicated in the quotations at the outset of this paper, opinion is divided on these central issues.

The main focus is on credit risk-shifting instruments, which enable credit risk to be shifted, traded, insured and taken by institutions without the need for them to make loans directly to borrowers. This, in turn, changes in an important way the underlying economics and traditional model of banking.

In the following sections, I apply a *functional* approach to financial innovation with a focus on the underlying functions of the financial system. In adopting such an approach, financial innovation and instruments may be classified according to their contribution to the basic functions of the financial system: risk transference; pricing of risk; liquidity enhancement; credit generation and financial intermediation; insurance; asset and liability management; an efficient allocation of financial resources; and the funding of financial institutions.

A central feature of financial innovation is the unbundling of characteristics of different instruments and either keeping them separate or combining them in different ways (Llewellyn, 1992). This enables investors or borrowers to maintain those characteristics of an asset they particularly want, but give up those features that are not desired. This illustrates three central features of financial innovation: (1) it increases the range, number and variety of financial instruments; (2) it combines characteristics in a more varied way and widens the combination of characteristics; and (3) it has the effect of eroding some of the differences between the various forms of intermediation. As part of this process, financial innovation often enables different risks to be unbundled so that each can be priced separately and redistributed to those who are most able and willing to absorb them.

Financial innovation and efficiency

A key dimension of financial innovation is the extent to which it contributes to *efficiency* and *stability* in the financial system. When a *functional approach* to financial innovation is applied, many new instruments and techniques have the potential to enhance the efficiency of the financial system in the performance of its basic functions (e.g. financial intermediation and risk shifting). In principle, financial innovation, and credit risk-shifting instruments in particular, has the potential to shift risk optimally to those who are most able and willing to absorb it. However, the stability implications of these instruments are ambiguous in that, while innovation may enhance the stability characteristics of financial systems in the face of small and uncorrelated shocks, it also has the effect of reducing stability in the face of large and correlated shocks.

Although I argue that financial innovation, and credit risk-shifting instruments in particular, has been a central factor in the emergence of the financial crisis, this is not to lose sight of its potential efficiency benefits. Greenspan (2004: 3) has argued that “[c]redit derivatives and other complex financial instruments have contributed to the development of a far more flexible, efficient and hence resilient financial system.” The Bank for International Settlements (BIS) (2003: 172) has argued that

the development of credit risk transfer [CRT] has a potentially important impact on the functioning of the financial system. It provides opportunity for more effective risk management, promises the relaxation of some constraints on credit availability, and allows more efficient allocation of risk to a wider range of entities. The pricing information provided by new CRT markets is also leading to enhanced transparency and liquidity in credit markets.

The efficiency dimension to financial innovation can be summarised by considering, in general terms, the benefits of financial innovation to the financial system.

Costs of financial intermediation: The costs of financial intermediation can be reduced in two ways: (1) by giving borrowers access to a wider range of markets and facilities, and (2) in some cases by allowing different institutions to exploit their comparative advantages in the lending value chain. Thus, a bank might have a comparative advantage in originating loans, while an insurance company might have a comparative advantage in taking the associated credit risk.

Wider access to credit: These arguments can equally apply to the issue of access to credit. For instance, by enabling banks to shift credit risk to others, their lending capacity is enhanced because it eases capital and risk constraints on further lending. Indirectly, the lending capacity of risk absorbers is also enhanced as, through credit derivatives, they are able to acquire credit risk without the necessity of making loans directly.

Matching portfolio preferences and enabling optimal portfolio selection: By the same argument, innovation is presumed to increase efficiency as the wider range of facilities and instruments increases the probability that different portfolio preferences can be met. New instruments facilitate a greater ability to unbundle transactions so that various parties are able to construct the risk-return structure most appropriate to them (Italian Bankers' Association, 2008). Equally, to the extent that new instruments are created to reflect changes in portfolio preferences, the financial system becomes more responsive to consumer requirements and those of the suppliers of financial services.

Pricing of risk and efficient allocation of resources: Some instruments allow risks to be priced more accurately which, in turn, enables the financial system to contribute to greater resource efficiency in an economy. To the extent that innovations (and especially derivative instruments) enable component risks to be identified, separated and priced accurately, funds are allocated more efficiently in the economy.

Unbundling of risks: Many instruments allow various risks to be unbundled, separately priced and 'sold', allowing different risks within a given instrument to be separated, priced and held separately. It also enables agents to choose the particular combination of risks that suits their requirements and to change the combination of risks to which they are subject. The ability to unbundle transactions means that various parties are able to acquire risk-return structures that are most appropriate to them (Masala, 2007).

Arbitrage potential: New instruments facilitate arbitrage between markets which, in principle, erodes pricing anomalies and reduces market imperfections through greater integration of markets. A later section also suggests that, through the use of credit derivatives, anomalies in the pricing

of credit risk may be eroded. If an investor judges, for instance, that a particular credit risk is overvalued, (s)he can earn premium income as a protection seller in the CDS market.

Risk transfer and management: Financial innovation widens the range of instruments available for risk management, and enables various types of risk to be managed and shifted optimally to those who have a greater ability and/or willingness to absorb risk. The wider range of financial instruments now available has become an integral part of risk management, both for the suppliers of financial services and their customers.

Risk more dispersed: One of the properties of some new financial instruments is that risks can be dispersed optimally throughout the financial system, which reduces the concentration of, for example, credit risk on a particular type of financial institution. This could have the effect of enhancing the stability of the financial system. By the same token, some instruments enable a bank to maintain a customer relationship without incurring an excessive credit risk exposure. Credit derivatives offer an attractive mechanism for managing exposure concentrations.

Liquidity in credit risk: The traditional bank model is that loans are non-marketable and hence the lender is effectively locked in to the borrower for the maturity of the loan. This limits the ability of a bank to change the composition of its loan portfolio if it is constrained in expanding its overall balance sheet. Many instruments (e.g. securitisation and CDOs) remove this constraint and effectively create liquidity for loans that have traditionally been illiquid. Some instruments create a market in credit risk.

Information efficiency: Some financial instruments have the potential to increase informational efficiency through the market prices of derivative contracts and instruments, including indexes.

Portfolio management: In addition to their risk management potential, to the extent that innovations create secondary markets, they facilitate the management and adjustment of portfolios. Furthermore, in many ways and for some investors the cost of creating a CDO can be less than the cost of assembling a portfolio of loans and/or bonds to achieve the same risk-return objectives.

Clearly, there are potential efficiency benefits to be derived from financial innovation in terms of enhancing the underlying functions of the financial system. However, a decidedly more sceptical note is sounded by the Chairperson of the FSA in the UK (Turner, 2009):

Not all innovation is equally useful . . . If the instructions for creating a CDO squared have now been mislaid, we will I think get along quite well without it. And in the years running up to 2007, too much of the developed world's intellectual talent was devoted to ever more complex financial innovations,

whose maximum possible benefit in terms of allocative efficiency was at best marginal, and which in their complexity and opacity created large financial stability risks.

Whatever the welfare and efficiency benefits of financial innovation, they will not accrue under all circumstances and the potential efficiency advantages may be compromised if, for any reason, they threaten financial stability. This leads to a consideration of the systemic stability implications of financial innovation, and credit risk-shifting instruments in particular.

Financial innovation and stability

The previous section considered the characteristics of financial innovation in terms of their potential contribution to the efficiency of the financial system in performing its core functions. The main, though not only, potential benefits were found to derive from the risk-shifting characteristics of financial instruments. Conversely, the impact of financial innovation on stability is more ambiguous.

Until 2007 financial innovation, particularly with respect to credit risk, developed in a largely stable and benign economic environment of strong and reasonable growth in the world economy, strong profitability of banks, and low and reasonably stable rates of inflation. This benign combination meant that credit risks *appeared* to be low, which required low pay-outs on credit instruments and credit insurance. In essence, the new credit risk-shifting instruments had not been tested in a more demanding market environment. The decade before the onset of the crisis was one of historically high stability in many dimensions: the macroeconomy, inflation, interest rates and so on. In formal terms, the distribution curve of risks became taller and narrower with small tail risks. It was also during this period that data were taken for the purposes of stress tests within banks and this necessarily produced skewed results as the sample period was atypical. In other words, stress tests were being undertaken on the basis of data taken from an exceptionally low-risk environment.

However, circumstances changed with the financial market turmoil that began in the middle of 2007 when banks around the world began to report substantial losses (and the need for re-capitalisation) on some of their derivative instruments and credit exposures.

Two contrasting views have surfaced regarding the stability characteristics of financial innovation, and credit risk-shifting instruments in particular. One school argues that because they have the potential for risks to be shifted optimally, they enhance the stability of the financial system. Against this, others argue that they have the potential to undermine financial stability, not the least because they facilitate substantial leveraging of risk. A possible resolution of this apparent conflict focuses on the nature

of shocks, in that the increased use of derivative instruments (notably with respect to credit risk) may enhance the stability characteristics of the financial system in the face of small and low-correlated risks, while they may make the system more vulnerable to large systemic shocks, such as the drying up of liquidity in international markets as in 2007 and 2008. In this regard, Rajan (2005: 40) offers the following perspective: “Have these undoubted benefits [of financial innovation] come at a cost? Have we unwittingly accepted a Faustian bargain, trading greater welfare most of the time for a small probability of a catastrophic meltdown?”

There are several routes through which financial innovation might enhance the stability characteristics of the financial system, and through which structured finance may make financial systems more resilient to shocks:

- To the extent that financial instruments spread risks more widely within the system (and to those who are more willing and able to absorb them), stability is likely to be enhanced.
- In many ways, such credit risk-shifting instruments enable banks to respond more easily to certain types of shocks. Several years before the onset of the crisis, the former Chairman of the Fed (Greenspan, 2002: 3), proposed that
[these episodes] suggest a marked increase over the two or three decades in the ability of modern economies to absorb unanticipated shocks . . . this has doubtless been materially assisted by the recent financial innovations that have afforded lenders the opportunity to become considerably more diversified and borrowers to become far less dependent on specific institutions or markets for funds.
- A further perspective has been offered by the BIS (Knight, 2004: 6): “The ability to switch smoothly between balance-sheet financing and market-based financing contributes to the robustness of a financial system and improves its ability to deal with strain.”

The overall assessment of the former Chairman of the Fed (Greenspan, 2002: 4) is that “these increasingly complex financial instruments have especially contributed to the development of a far more flexible, efficient, and resilient financial system than existed just a quarter-century ago”.

By contrast, there may be a degree to which the instruments that enhance efficiency might, under some circumstances, threaten financial stability. Borio (2008) suggests that three particular characteristics of these instruments may have contributed to the current financial turmoil: (1) their payoffs may be highly non-linear (Fender et al., 2008) in that they tend to produce a steady stream of returns in calm times, but in bad times can produce disproportionately heavy losses; (2) the risk profile of structured

products can be very different from that of traditional bonds in that they can be subject to high “tail risks” (i.e., higher probability of large losses); and (3) as noted by Fender and Kiff (2004), modelling the future default and risk profile of some structured instruments is subject to considerable uncertainty, not least because of the limitations of current valuation models, which often underestimate the correlation of risks within the instrument.

Credit derivative instruments may either increase or decrease financial stability, depending on the different types of shock that may occur. The negative stability characteristics of financial innovation may be summarised as follows:

- The introduction of multiple layers between borrowers and lenders may increase the channels for the transmission of shocks within financial markets.
- To the extent that financial innovation has accentuated the market-centric nature of financial systems, shocks in one market may spread to a wider range of markets than was the case before. The experience of the middle months of 2007 and in 2008 illustrates how this can occur. Globalisation, coupled with financial innovation, means that markets have become more closely linked and shocks can be spread more widely.
- The enhanced leverage potential of credit derivatives may increase the vulnerability of the financial system to certain types of shock.
- The use of credit derivatives tends to be inherently procyclical through accentuating credit growth in the upswing of an economic cycle, but equally accentuating the opposite trend in the downswing.
- Financial innovation has a general effect of enhancing competition in the financial system as all suppliers of financial facilities face competition from a wider range of channels. While this is generally a beneficial outcome, competition can sometimes have the effect of inducing financial institutions into hazardous and risky behaviour as they strive to maintain market share and rates of return on equity.
- The experience of the financial turbulence since mid-2007 has been that, in practice, credit risk is not always shifted as much as might be thought through the use of securitisation and credit derivatives. This in itself can introduce a higher element of instability in the system to the extent that, in the event that risk has not been shifted, banks may need to take back on to their balance sheets credit risks they thought had been shifted. This, in turn, may induce funding and capital problems for banks.

These considerations suggest a tentative conclusion regarding the stability implications of financial innovation. It seems that financial instruments that enable risks to be shifted, and that enhance the market-centric nature

of financial systems make the financial system less vulnerable to small shocks and enable such small shocks to be handled more easily. In this sense, the stability characteristics of the financial system are enhanced. However, it may make the system more prone to large, highly correlated and systemic shocks, and make it more difficult for them to be handled. One such event would be the type of systemic liquidity shock experienced in financial markets during 2007. Rajan (2005: 28), for instance, concludes that “[while] the financial system is more stable most of the time, we may also have the possibility of excessive instability in really bad times (as well as higher probability of such tail events)”. He argues further that “the linkages between markets, and between markets and institutions, are now more pronounced. While this allows the system to diversify across small shocks, it also exposes the system to large systemic shocks – large shift in asset prices or changes in aggregate liquidity (p. 4)” A further dimension is that in some complex credit derivative instruments, correlations that are zero (or even negative) in normal times can turn out to be positively correlated in abnormal times (see Chan et al., 2005).

The Financial Services Authority in the UK (FSA, 2008: 47) has argued that

[s]tructured finance and the way in which firms have used associated finance vehicles, such as SIVs and conduits, are central to the instability that affected financial markets and financial institutions in the second half of 2007 . . . Liquidity more or less disappeared from the asset-backed commercial paper market after several years of unprecedented growth . . . The lack of liquidity caused significant problems for many products, most notable SIVs, ABCP conduits, CDOs and CLOs.

In effect, all credit derivative markets were badly affected by the crisis to an extent that led some commentators to doubt their long-run viability. Gorton (2008) argues that interlinked and nested unique security designs necessary to make sub-prime mortgages function resulted in a loss of information to investors, especially regarding the location of risks. They were also based on the assumption (requirement) that house prices would continue to rise so that maturing mortgage loans could be rolled over.

What is new in recent financial innovation: Credit risk shifting

Instruments for the shifting of credit risk are a recent development and raise particular issues, both of analysis and practicality. There is a clear difference between a bank protecting itself against price rather than credit risk as the former is systemic in that the risk associated with a price movement is not influenced by the behaviour of the protection buyer: the probability is exogenous to the bank. Issues of asymmetric information, *adverse selection* and *moral hazard* therefore do not arise. The probability of these

risks emerging is determined independently of the behaviour of the protection buyer. Thus, the probability of a currency depreciation or a rise in interest rates is not in any way determined by the fact that a bank might have protected itself against these risks by, for instance, conducting forward transactions or buying option contracts.

Credit risk and its protection, conversely, raise different issues. The relationship between a credit-risk protection buyer and seller is fundamentally different from that between two counterparties in a swap or forward transaction. One of the features of credit risk is an asymmetric information dimension in that the lender has more information about the quality of loans than does a protection seller or a purchaser of a bank’s asset-backed securities. The traditional theory of banking is that this asymmetric information, and the potential for *adverse selection* and *moral hazard*, acts as a bar to credit insurance or the shifting of credit risk. As with standard insurance theory, there is a potential for banks deliberately to select high-risk loans to be insured (*adverse selection*) and deliberately to make high-risk loans or to fail to monitor borrowers (*moral hazard*) because the risk is passed to others.

However, the emergence of securitisation and, more recently, credit derivatives challenges this traditional paradigm. Notwithstanding the problems outlined above, it is now possible for a bank to shift credit risk either through asset sales of one sort or another, or through an insurance contract such as a CDS. These recent innovations mean that credit risks can be shifted, traded and insured. Furthermore, they can be used by a bank or other financial institution to acquire a credit risk without making a loan by, for instance, being a credit-risk protection seller. The main characteristics of the different credit risk-shifting mechanisms and instruments are summarised in Table 2.

Table 2: Credit risk-shifting instructions

	Credit guarantee	Credit insurance	Loan trading	Loan Syndication	Securi- tisation (ABS)	Conven- tional CDO	Synthetic CDO	Single name CDS	Portfolio CDS
Funded			✓	✓	✓	✓			
Unfunded	✓	✓		?			✓	✓	✓
Asset transfer			✓		✓	✓	✓		
Insurance		✓						✓	✓
Tradeable			✓		✓	✓	✓	✓	✓
Risk transfer	✓	✓	✓	?	✓	✓	✓	✓	✓
Single name	✓	✓	✓	✓				✓	
Portfolio					✓	✓	✓		✓
Counterparty	✓	✓						✓	✓

There are several advantages to banks in securitising some of their loans: credit risk is shifted; the need for regulatory capital is lowered; banks are able to exploit their comparative advantages in initiating loans, even if they have no such advantage in funding loans or holding loans and credit risk on the balance sheet; the cost of funding is lowered as investors are attracted by the particular assets being securitised rather than the bank itself; and it enables customer relationships to be maintained, even if their loans cannot be held on the bank's balance sheet. Overall, it is an instrument of balance sheet and capital management for banks.

A key dimension is the extent to which credit derivatives achieve a genuine transfer of credit risk. In this regard, the issue arises as to whether this risk shifting simply replaces credit risk with counterparty risk: the risk that a counterparty becomes unable to honour its obligations in a credit derivative transaction.

The Financial Stability Forum report (BIS, 2005) identifies three issues with respect to the stability characteristics of credit derivatives: (1) whether they create a clean and total risk transfer; (2) whether all participants understand the full nature of the risks involved in derivative transactions; and (3) whether they produce a concentration of risks, either inside or outside the banking system. A key dimension therefore is the extent to which credit derivatives achieve a genuine transfer of credit risk.

A further issue is the extent to which complex instruments are fully understood by the transactors. New complex products might have consequences that are not fully understood by the initiators, users or supervisors (Masala, 2007). The full risk implications of some instruments are sometimes determined by the application of complex mathematical models, and these models have to be appreciated as much by the users and supervisors as by the institutions making use of them. The FSA (2002, 2008) has argued that complexity and the lack of transparency of many credit derivative instruments (and notably CDOs) make it difficult for investors to determine precisely how exposed they are to particular risks. In particular, losses may be determined by the correlations of the risks within the portfolio and these are difficult to calibrate in practice. Furthermore, banks have also become less transparent in that it is difficult to know the extent to which credit risks have been shifted through, for instance, credit default swaps.

A major issue with credit derivatives is that they tend to be opaque. Santomero (2007: 22) has raised doubts about some aspects of the use of financial derivatives, most especially with regard to transparency:

Perhaps recent events . . . suggest that, while we have made assets more tradable, we have not necessarily made their value more transparent. Indeed,

the added complexity associated with current asset portfolios drawn from various types of credit and credit derivatives cries out for better transparency and better reporting. This ought to be the agenda for the next decade.

In essence, there has been a proliferation of opaque and complex financial derivative and structured instruments, which are traded by opaque off-balance-sheet vehicles such as SIVs.

The true extent to which risks are shifted through various instruments may also be brought into question, most especially at times of systemic crisis as in the second half of 2007 and in 2008. In practice, what appears to be a risk-shifting instrument may have limitations. Thus, in the turbulence of 2007 many banks found that, in practice, credit risks had not been shifted because, for instance, they had committed lines of credits to their special-purpose vehicles (SPVs) and conduits which, because of funding difficulties, were subsequently called upon. Furthermore, because of funding problems, several banks were induced either to take back securitised assets onto their balance sheet or were unable to securitise loans they had made in anticipation of securitisation.

Difficult valuation problems also arise with some instruments. Because they may not always be traded in secondary markets, it becomes difficult for accurate market valuations to emerge. The alternative that is commonly used is for valuations to be made by investors on the basis of complex mathematical formulae which, as noted in Ayadi and Behr (2009), may not always account for the true risk and which may apply over-simplistic methods to assess the risk profile (see also BIS, 2003). In particular, as noted in Masala (2007), there is uncertainty about how new products, instruments and markets might interact in the face of extreme stress and shocks. The familiar 'tail problem' (low-probability-high-impact risks) has, from time to time, caused severe difficulties for some institutions trading in complex derivative instruments.

The alleged 'normal distribution' of risks (upon which many business and risk management strategies are based) is misleading in that empirical evidence suggests that extreme events (fat tail risks) tend to occur more frequently than is implicit in the normal distribution curve. This means, for instance, that if decisions are based on 99 per cent probabilities, risks are ignored that, in practice, are more common than implied by a normal distribution and that can impose substantial losses. The problem is that it is not feasible to model extreme events as was found in the current crisis. Problems arise when key risks turn out to be highly correlated (as they often are in a crisis) because when crises occur, the correlations of risks tend to be greater than was assumed. It may also be the case that the widespread use of derivative contracts (which have the effect of optimally spreading risks in 'normal' times) accentuates risks in 'abnormal' times. This is a difficult trade-off for both banks and their supervisors to manage.

In some respects, and as a result of the development of complex instruments, the financial system has become more opaque. The lack of transparency of some credit risk-shifting instruments came to the surface during the current financial turmoil. In particular, some markets, such as the CDO and securitisation markets, have virtually closed altogether, while conditions in some others (e.g. the interbank market in London) weakened considerably, largely because of the difficulty of transactors in assessing counterparty risk exposure to mortgage-backed securities and CDOs. Banks began to report substantial losses in these instruments and it became difficult for market participants to assess with any degree of accuracy who was holding what risks. The failure of Northern Rock demonstrates that excessive reliance on some credit risk-shifting instruments may cause a bank to become exposed to a particular funding risk: the bank became dependent on securitisation and financing through short-term securities (Llewellyn, 2008).

Credit risk shifting can also be undermined by a seller of credit risk protection itself becoming insolvent or in any other way being unable to honour its obligations. This is particularly the case with unfunded risk transfer instruments (see Llewellyn, 2009). In this sense, while a bank may be able to shift a credit risk, it becomes exposed to a different counterparty risk. In this event, the original credit risk reverts to the protection buyer. This arose in 2007 with respect to bond monoline insurers in the US that had been guaranteeing structured bonds backed by mortgages, which subsequently lost value.

Asymmetric information risks

There are several asymmetric information risks attached to the change in the banking model implied by credit risk-shifting instruments. The standard problems of *adverse selection* and *moral hazard* may arise. The underlying basis is that the initial lender is likely to have more information about borrowers and a greater capacity to conduct post-loan monitoring. Several problems in particular may arise:

- The initiating bank may have an incentive to shift the risk on its existing low-quality loans (De Marzo and Duffee, 1999; Pennacchi, 1988).
- A potential *moral hazard* arises to the extent that, as a bank is able to shift credit risk, it has less incentive to assess credit risk accurately. This problem surfaced in the US sub-prime mortgage market during 2007. There is subsequently also less incentive to monitor the borrower (Gorton and Penacchi, 1995; Morrison, 2005), and it is unlikely that a seller of credit risk protection (or buyer of CDOs) is able to monitor borrowers because he or she does not have the information or relationship advantages possessed by the initiating bank. This amounts to a new banking model which, to some extent, abrogates

two of the fundamental roles of a bank: (1) assessment of risk and (2) *ex post* monitoring. There is some empirical evidence for this in that Mian and Sufi (2008) find that default rates tend to be higher on securitised mortgages than those that are held on the initiating bank's balance sheet. Keys et al. (2008) also find that securitisation tends to weaken the screening of borrowers before loans are made.

- A lemons problem can emerge in some credit risk transfer arrangements in that a lender buys protection on low-quality assets, which may drive up the cost of protection on high-quality assets (Duffee and Zhou, 2001). The standard lemons problem (Akerlof, 1970) is that, in the presence of asymmetric information, a market may eventually break down as only low-quality assets are offered for protection.
- In some cases, either the borrower or the credit risk protection buyer (banks that have made loans) may be able to influence the probability of a relevant 'credit event' as the buyer of protection may have the power to determine when a default has occurred. Under some circumstances there is an incentive for a buyer of credit protection through a credit derivative to trigger a default prematurely by, for instance, refusing to make further loans that it might otherwise have done had it not been for the terms of the CDS contract.
- If contracts are incomplete (in that they do not specify the rights and obligations of all parties in all circumstances), there may be scope for one of the parties (often the risk protection buyer) to act opportunistically against the interests of the risk absorber.
- The risk shedder may retain a relationship with the borrower after the credit risk has been shifted as an agent of the risk taker. As noted in BIS (2003), this gives rise to a potential principal-agent problem. In whose interest is the bank working?

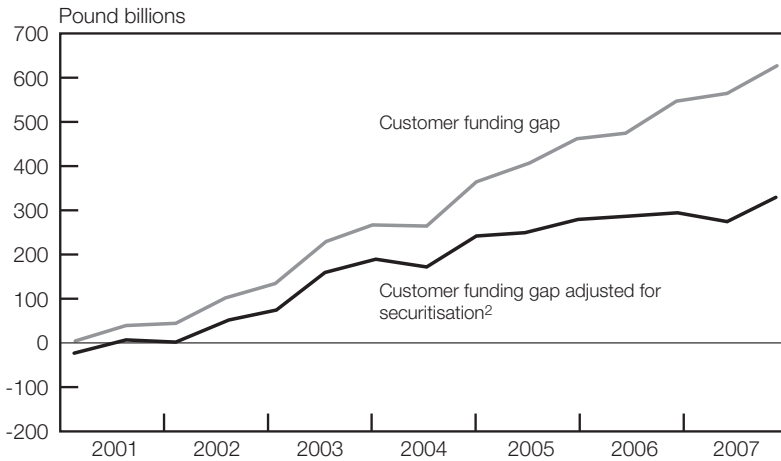
In some cases financial innovation contributes to alleviating standard problems associated with asymmetric information and, by adding further instruments to the armoury of risk management, may enable transactors to protect against the associated risks. However, in several ways, recent financial innovation (more specifically the emergence of credit risk-shifting instruments) has accentuated problems of asymmetric information and the associated problems of *adverse selection* and *moral hazard*. Mizen (2008) identifies several hazardous incentives structures within the 'originate and distribute' banking model and, in particular, the payment of upfront fees for originating banks and brokers; moral hazard; a bias towards writing business; and the incentives of rating agencies, which may be subject to conflicts of interest as they often advise on how to structure instruments in order to receive a favourable rating.

Risk analysis: Shifting versus changing

In practice, the financial crisis has revealed two major implications of credit risk-shifting instruments: (1) in many cases such risk was not shifted as much as banks thought would be the case, and (2) even when credit risk was shifted, this was sometimes at the cost of increasing market, liquidity, funding and ultimately solvency risk. In effect, credit risk that is initially shifted may involuntarily come back on to the balance sheet of the originating bank. There are several possible reasons for this, including a bank's SIV being unable to continue issuing asset-backed commercial paper; loans that were planned to be securitised may prove to be "non-securitisable" because of funding constraints; the originating bank may be called upon to honour agreed lines of credit to SIVs; and a bank may be induced to take back securitised assets in order to alleviate a potential reputation risk. In the case of Northern Rock, for instance, but other banks as well, an initial shifting of *credit risk* through securitisation exposed the bank to a *liquidity risk* as it (or its securitising SPV) could not "roll-over" in the wholesale markets its maturing short-term borrowings that were used to fund the acquisition of long-term mortgages. This liquidity risk, in turn, was quickly transformed into a structural *funding risk* (as alternative sources of funding were unavailable), which was ultimately transformed into a *solvency risk*.

In the case of Northern Rock (but again with several other banks too) the use of credit risk-shifting instruments exposed the bank to a low-probability-high-impact risk in that the reliance on short-term wholesale market funding to finance long-term mortgages meant that the bank became structurally dependent on a limited number of wholesale markets for its funding. It was always judged that the simultaneous drying up of all these markets would be extremely unlikely in that it had seldom, if ever, happened before. Equally, however, it would be very serious if this were to occur. In any event, this is precisely what happened. Banks ignored the low-probability-high-impact risk of liquidity drying up. Such risks equally applied to institutions and investors who would issue short-term commercial paper in order to acquire asset-backed securities of various kinds. The extensive use of some new instruments may, therefore, expose banks to low-probability-high-impact risks. The growing importance of non-retail funding for British banks is shown in Figure 1.

In essence, therefore, financial innovation (more specifically credit risk-shifting instruments) has both *risk-shifting* and *risk-changing* properties, and the specific outcome is not always predictable.

Figure 1: Major United Kingdom banks' customer funding gap¹

1 Data exclude Nationwide

2 Customer funding gap less securitised debt. Where not available, stocks of securitisations are estimated from issuance data

Source: Dealogic, published accounts and Bank of England calculations

Problems are compounded in the case of many derivative instruments by the fact that they can become difficult to price, not the least because the risk characteristics are opaque and complex. When secondary markets dried up in these instruments after mid-2007, prices became unavailable. This forced holders (banks) to attempt to value their holdings of derivative instruments on the basis of models that were found to be fundamentally flawed in two respects: (1) they were based on an insufficiently long observation period from which to calculate probabilities, and (2) they did not take into sufficient account the tail-risk that the risks attached to many of the assets within CDOs were themselves highly correlated. Thus, what were thought to be diversified instruments turned out to be highly concentrated.

II The global financial crisis

Profile of the crisis

This is not the place to offer a detailed scenario of the global financial crisis (for a description of the sequence of events: see Brunnermeier, 2008). Nevertheless, the key features are summarised: (1) intense market *uncertainty* with respect to counterparty risks, and the value of securities based on derivatives and banks' own liquidity requirements given potential funding problems with their own SIVs; (2) increased concern over the

quality of structured instruments and their long-term viability; (3) eroding confidence in banks; (4) weak liquidity in major markets; (5) the effective closure of some interbank markets due to a hoarding of liquidity; (6) a sharp tiering of interest rates in the interbank market; (7) enhanced risk aversion across the broad spectrum of financial and banking markets; (8) funding problems for both banks and their SIVs, and a “reintermediation” of credit flows; (9) serious impairment of bank capital due to large losses and writedowns, most notably on complex structured securities and instruments; and (10) the need to deleverage following several years of exceptionally rapid balance-sheet growth.

In many countries banks have reported substantial losses on their exposures to credit derivatives and securities. This, in turn, has produced a massive decline in the market capitalisation of banks as summarised for a sample of banks in Table 3.

Table 3: Market capitalisation of selected banks
(US\$ billions)

	June 2007	January 2009
Citigroup	255	19
HSBC	215	97
JPMorgan	165	85
Royal Bank of Scotland.....	120	5
UBS	116	35
Bank Santander	116	64
BNP Paribas	108	33
Goldman Sachs	100	35
Unicredit	93	26
Barclays	91	7
Société Générale.....	80	26
Deutsche Bank	76	10
Credit Suisse.....	75	27

A particular feature of the current financial crisis has been the intermittent closure of the interbank market (notably in the UK) as banks have been reluctant to lend to one another because of lack of confidence (or information) about counterparties. This, in turn, is due largely to the opaqueness of some of the credit risk-shifting instruments, which means it is difficult to know who is exposed to what and how much risk. This has resulted in a hoarding of liquidity by banks. Different banks in the interbank market have always had different risk characteristics and this has been reflected in different risk premiums paid in the market. When uncertainty dominates risk, however, lending ceases altogether.

A particular feature of financial markets in recent months has been the hoarding of cash by banks. There are three main reasons for this: (1) they have become uncertain about the credit standing of potential counterparty banks; (2) banks increased their precautionary demand for cash lest they be called upon either to honour previously agreed lines of credit to securitisation vehicles or required to take back on to their balance-sheets loans that had previously been securitised; and (3) in addition, many banks have become concerned about their own ability to obtain funding in the interbank markets. The liquidity problem became serious because securitisation vehicles, such as conduits and SIVs, were funding the acquisition of long-term mortgages (and other loans) through issuing short-term debt instruments such as asset-backed commercial paper. As liquidity dried up, banks could not finance their off-balance-sheet vehicles and were forced to take assets back on to the balance sheet or hold on to assets they were planning to securitise. This effectively amounts to a process of reintermediation.

Furthermore, the losses that several banks have experienced on their sub-prime mortgage loans, and their exposure to conduits and other securitisation vehicles and instruments (notably CDOs), have weakened capital positions seriously. This has forced some major international banks to seek injections of capital from, for instance, Sovereign Wealth Funds in the Far East and elsewhere. In the UK, the government has required major banks to inject £50 billion of new capital with a large proportion being from the government itself. The same trends have also raised the cost of capital to banks. The willingness to lend has also been affected by the less certain value of collateral that is offered by borrowers against their bank borrowing.

Since the middle of 2007, both the primary and secondary markets in mortgage-backed securities have been effectively closed and concern developed over the exposure of banks in the market. There has been uncertainty, for instance, about which banks were holding mortgage-backed securities (MBSs) and CDOs. The Governor of the Bank of England (BoE) likened the drying up of wholesale funding opportunities to the equivalent of a run on banks.

All this created considerable market uncertainty, which led to a sharp fall in the prices of many asset classes; considerable uncertainty as to the risk exposure of banks, particularly in the interbank markets; credit markets dried up and most notably those focused on asset-backed securities; and liquidity dried up in the markets for MBSs and CDOs. Overall, there has been considerable uncertainty regarding the true value of credit instruments (partly because the market had virtually ceased to function effectively) and the risk exposure of banks. As a result, a loss of confidence developed in the value of all asset-backed securities on a global basis.

Causes of the crisis: *Proximate*

Having set the background, and especially the role of financial innovation, I turn to the underlying cause of the crisis, and the multi-dimensional paradigm established in an earlier section. At the outset six “layers of causality” were suggested. The *proximate* cause of the crisis (the trigger that started it) was a sharp rise in defaults on sub-prime mortgages in the US (associated, in part, with a tightening of monetary policy after 2004, following several years of ultra-low interest rates), the sudden and widespread loss of confidence in the securitisation model, and a sharp fall in property prices following sharp rises in both house prices and sub-prime mortgages over the previous few years (Jaffee, 2008). There had, in particular, been strong demand for sub-prime mortgages by Freddie Mac and Fannie Mae. The fall in house prices created refinancing problems for borrowers (given the way that sub-prime mortgage contracts had been structured) and increased both the probability of default and the loss-given-default. As noted by Mizen (2008), for several years mortgage originators had been maintaining the volume of new mortgages for securitisation by expanding lending activity into previously untapped areas. The first stage occurred in the early months of 2007 when defaults on sub-prime mortgages emerged on a significant scale. This was followed by a Moody’s review of its ratings of MBSs.

These triggers, focused on sub-prime mortgages and securitisation of mortgage assets, were aggravated by evidently weak risk analysis, management and pricing systems within banks. Risks on sub-prime mortgages were clearly under-priced by mortgage originators which may, as argued below, be due in part to the moral hazard inherent in the securitisation process whereby originators adopting an “originate and distribute” model do not take the ultimate credit risk.

Causes of the crisis: *Environment*

Financial crises do not emerge in a vacuum, but surface in the context of the market environment that preceded it. It is usually the case that the seeds of a crisis are sown in an earlier period of euphoria and excessive optimism. For several years prior to the onset of the current crisis, the external economic and financial environment had been highly conducive to the financial sector and banks in particular (see Table 1). Financial liberalisation in many countries created conditions for a sharp rise in lending and balance-sheet expansion. For several years the world economy was particularly buoyant, in that growth was high and reasonably stable, inflation was similarly low and stable compared with previous decades which, in turn, brought with it a period of comparatively low and stable interest rates and bond yields around the world: real yields declined from around 4,4 per cent in 1990 to 1,5 per cent in 2007.

Some analysts have argued that the solution adopted to deal with one crisis sows the seeds of the next, and in this regard argue that the sharp cut in interest rates engineered by the Fed contributed to the subsequent euphoria (Boeri and Guiso, 2007). These conditions combined to create an environment of optimism and collective euphoria, and a perception that risks in the world economy generally, and bank lending in particular, were low. A perception of low risk (both in terms of the perceived probability of default and the loss-given-default), in turn, induced four hazardous trends: (1) an under-pricing of risk, (2) higher gearing by banks, (3) lower liquidity holdings by banks and (4) an accelerated growth in bank lending.

The emergence of substantial global financial imbalances created a glut of world savings, most especially in emerging-market economies such as China, India and countries of South East Asia, but also Germany and oil-exporting countries. The substantial accumulation of external financial assets by these countries needed to be invested and a significant proportion was invested in US government bonds. This, in turn, produced a sharp fall in US (and global) long-term bond yields.

Two more general trends emerged within financial systems. First, in many countries the financial sector expanded sharply and relative to GDP (a process of what might be termed a 'financialisation' of the economy) as indicated, for instance, by the sharp rise in the volume of a wide range of financial assets and liabilities relative to GDP. Second, within the financial sector, there was a shift towards a more market-centric system with a sharp rise in the role of financial markets in the intermediation process.

At the same time, and partly because of these trends and the responses made by banks and other lenders, there was a sharp rise in asset prices and most especially property prices in many countries: what turned out to be a substantial asset price bubble both in the stock market and housing market. This created conditions conducive to excessive lending by banks and excessive borrowing by households, most especially in the US and the UK. In the US, the savings ratio declined from 6 per cent in the early 1990s to close to zero by 2008, and the UK household savings ratio declined steadily from 11 per cent to close to zero by 2008.

Combined, these trends produced a period of several years of excessive optimism and euphoria during which conventional rules of banking were weakened or abandoned. What might be termed a 'collective euphoria' (or perhaps 'collective delusion and disaster myopia') militates against independent judgement by those who are required to monitor the behaviour and risk-taking of banks. The environmental conditions, in turn, induced internal fault lines within banks (see Table 1). In particular, they led to an excessive rise in bank lending and expansion of bank balance sheets. As lending rose at a faster rate than the supply of retail deposits,

the resulting “funding gap” was filled increasingly by wholesale funding, securitisation and the use of various credit derivatives. Within this total there was a substantial rise in the acquisition of mortgage assets, either directly or through investment in MBSs. Overall, such lending created excess leverage, both within banks and their borrowing customers. The low interest rate and yield environment created a “dash for returns” as banks and investors sought higher returns by moving up the risk-reward curve into higher-risk assets, even though their true risk characteristics were either not appreciated or ignored at the time.

This sharp rise in the size of bank balance sheets was compounded by a persistent under-pricing of risk, which became generalised within financial systems. Several supervisory agencies and others, including the BoE (2006 and 2007), the International Monetary Fund (IMF) and the BIS, gave frequent warnings that risks were being systematically under-priced. Always and everywhere, if risk is persistently either under-estimated and/or under-priced, problems will eventually emerge.

My thesis is that the financial crisis was preceded by a period of several years during which the external environment induced excessive optimism and encouraged banks to follow potentially hazardous strategies which, in some cases, were both predictable and predicted.

Causes of the crisis: Financial innovation

The theme of this paper is that the emergence of new banking models was a major factor in the emergence of the current crisis. The new models had two particular dimensions: (1) an increased emphasis given to rates of return on equity (ROE) as the bottom-line objective (Llewellyn, 2007, 2008) and (2) particular business models that followed from this. It can, for instance, be argued that the drive by banks towards securitisation and the use of credit derivatives was as much a product of a desire to raise revenue and the ROE as to shift credit risk.

Several trends in particular are identified: (1) bank assets expanded at a substantially faster rate than that of retail deposits; (2) the rise in bank loans substantially exceeded the rise in banks’ risk-weighted assets; (3) banks reduced their holdings of liquid assets as they developed greater access to wholesale funding markets; (4) there was a sharp rise in the proportion of investment and trading activity in banks’ balance sheets relative to loans; (5) there was an increased dependency on money-market funding and funding through securitisation models; and (6) a powerful trend emerged towards using credit derivatives as a means of supposedly shifting credit risk. With respect to the last-mentioned, the key issue is that securitisation and the use of credit risk-shifting instruments came to be strategic within banks rather than marginal: their use

became excessive and an integral part of banks' business models. As noted by Borio (2008: 20): "[T]he two most salient idiosyncratic aspects of the current turmoil are the role of structured credit products and that of the O&D [originate and distribute] business model". The BoE (2008) also notes that banks expanded into higher-risk assets for which the underlying value, quality and liquidity were unknown.

An overwhelming trend had been the substantial "financialisation" of economies as seen in the rise in assets of the banking system relative to GDP; the increased share of banks in aggregate corporate profits; a substantial rise in intrafinancial-sector leverage (perhaps symptomatic of increased "churning" whose real economic value might be questioned); and a sharp rise in the capital market value of banks relative to aggregate stock market valuation (Van Wensveen, 2007).

As a point of perspective, and with respect to the top ten US banks, total assets doubled in the period mid-2004 to mid-2007 while the sum of risk-weighted assets (against which capital needed to be held) rose by only 20 per cent. Furthermore, the loan-to-assets ratio of these banks declined from 52 per cent in 1997 to less than 40 per cent recently, while the investment-to-asset ratio rose from 32 per cent in 1998 to 54 per cent by 2008. At the same time and with respect to (5) above, the deposit-to-asset ratio declined from 45 per cent in 1998 to 36 per cent in 2008.

There are several routes through which financial innovation (most especially credit risk-shifting instruments) had the effect of increasing the pace of bank lending and raising the capacity of the financial system to generate credit: removing capital constraints as assets and/or risks are shifted off the balance sheet of lenders, thereby increasing the lending capacity of a given capital stock; lowering the risk profile of the balance sheet; through non-bank financial institutions being able to absorb credit risk without directly making loans themselves; raising the liquidity of bank loans and the possibility of trading credit risk, and the creation of SIVs which, to date, are not required to have capital. This largely unregulated 'shadow banking system' generated and facilitated a substantial volume of new credit. Shadow banks can be viewed as new entrants into banking markets, albeit outside the orbit of normal bank regulation.

I can also point to the substantial rise in the leverage of banks in recent years. In its *Global Financial Stability Report*, the IMF (2008: 27) noted "a collective failure to appreciate the extent of the leverage taken on by a wide range of institutions and the associated risks of a disorderly unwinding". In addition to all of this, there was an increasing volume of trading in credit risks in a situation where it had become evident that the risks in such trading were not always understood clearly.

A central theme is that, in some important respects, financial innovation (and most especially the emergence of credit derivatives) has changed the underlying economics of banking and the financial system. Earlier sections have outlined how new financial instruments have the potential to enhance the efficiency of the financial system in the performance of its core functions. I now consider how the economics of banking has also been changing, in part due to financial innovation. For illustrative purposes, a distinction is made in Table 4 between the *traditional model* of the bank (originate and hold), the *securitisation variant* (originate and sell), and the use of CDSs (originate, hold and externally insure).

It is instructive to begin with a stylised review of the traditional model of the banking firm (see Llewellyn, 1999 for a fuller discussion). Banks traditionally have information, risk analysis, and monitoring advantages, which enable them to solve asymmetric information problems and hence mitigate *adverse selection* and *moral hazard*. Banks accept deposits and utilise their comparative advantages to transform deposits into loans. In this model, the bank accepts the credit (default) risk, holds the asset on its own balance sheet, monitors its borrowing customers and holds appropriate levels of capital to cover unexpected risk. It also effectively ‘insures’ its loans internally through the risk premium incorporated into the rate of interest on loans. This is described in the *traditional* model in Table 4. In this process, the bank offers an integrated service, in that it performs all the core functions in the financial intermediation process.

Table 4: Alternative bank models

Model	Traditional	Securitisation	CDS
(1) Accept deposits	✓	(✓)	✓
(2) Originate loans	✓	✓	✓
(3) Utilise comparative advantage			
• Information	✓	✓	✓
• Risk analysis	✓	✓	✓
• Monitoring	✓		
(4) Transform into loans	✓	✓	✓
(5) Accept risk	✓		
(6) Hold on balance sheet	✓		✓
(7) Capital backing	✓		
(8) Insurance	Internal	Shift	Insure

Traditional: Originate and hold

Securitisation: Originate and sell

CDS: Originate and insure

Alternative bank models

Furthermore, in this traditional model the bank is not able to shift credit risk to other agents because of its asymmetric information advantages: a potential buyer or insurer of a loan from a bank might judge that, because of the bank's information advantage, there is an *adverse selection* and *moral hazard* problem, in that the bank might select low-quality loans to pass on and, if it knew that it could pass on risk, it might be less careful in assessing the risk of new loans and would conduct less intensive monitoring of borrowers after loans have been made. For the same reason, the traditional view of the bank is that it is unable to insure its credit risks externally and, instead, applies a risk (insurance) premium on loans and holds capital as an internal insurance fund. The reason for this is that, given the uncertainties outlined above, an external insurer would reflect this uncertainty in the insurance premiums charged to the bank. In this traditional view of the bank therefore credit risk cannot be shifted or insured, there is no liquidity to bank loans and banks are locked into their loan portfolios.

However, as noted in earlier sections, many aspects of this traditional model are now questioned. In the securitisation model in Table 4, the process of securitisation (including via CDOs) means that the bank is able to sell loans (which the traditional model denies) and hence the bank does not hold the loan asset on its own balance sheet, does not absorb the credit risk and does not need to hold capital against the credit risk. However, this depends on precisely how the securitisation is conducted and whether the SPV is truly bankruptcy-remote from the bank and *vice versa*.

The CDS model is similar to the securitisation model, except that, while the credit risk is passed to the protection seller, the asset remains on the balance sheet of the originating bank. In this model there is explicit external insurance of bank loans.

The two simple examples of financial innovation in Table 4 related to credit risk illustrate that the traditional model of the banking firm came to be modified. In particular, the examples of financial innovation considered in this paper (and many others that have not) mean that the bank is no longer required to perform all the functions in the bank intermediation business. Furthermore, banks are also able to outsource some of their other activities, such as loan administration and credit assessment through credit-scoring models of other banks. This further challenges the traditional view of the integrated bank. Banking is therefore no longer a totally integrated process whereby banks conduct all the functions in the loan process. Credit risk transfer facilities and instruments change the relationship between borrowers and lenders, and create incentive structures that are different from those contained in the traditional model of the

banking firm. In particular, the shifting of credit risk may create *adverse selection* and *moral hazard*, in that banks may have less incentive to monitor borrowers.

As a result of all of this, banks stopped behaving as banks in the traditional way and, in effect, came to act as brokers between ultimate borrowers and those who either purchased asset-backed securities or who offered CDS insurance.

Causes of the crisis: Incentive structures

The fourth identified 'layer of causality' identified at the outset focuses on incentive structures. Earlier sections discussed the incentive structures inherent in the originate-and-distribute bank models. Kashyap et al. (2008) place particular emphasis on the potentially perverse incentive structures in securitisation models.

There are several other dimensions to bank incentive structures in the current crisis: the extent to which reward structures have been based on the volume of business undertaken; the extent to which the risk characteristics of decisions are incorporated into management reward structures; the nature of internal control systems within banks; internal monitoring of the decision-making of loan officers; the nature of profit-sharing schemes; the extent to which decision-makers also share in losses and so on. Reward systems based on short-term profits can be hazardous as they may induce managers to pay less attention to the longer-term risk characteristics of their decisions. High staff turnover and the speed with which officers are moved within the bank may also create incentives for excessive risk-taking. A similar effect can arise through the herd behaviour that is common in banking. The incentive structures favouring 'short-termism' is epitomised by the now infamous statement of the Chairperson of Citi, Chuck Prince: "As long as the music is playing, you've got to get up and dance. We're still dancing."

Linked to such short-termism is the concept of 'disaster myopia' where low-probability-high-impact risks tend to be ignored most notably if competitors are adopting such myopia (the herd instinct). Internal reward structures within banks often make it difficult for managers to stand aside from the herd.

Buiter (2008: 14) suggests that "one of the key drivers of the excesses of the most recent (and earlier) financial booms has been the myopic and asymmetric reward structure in many financial institutions". The new business models of banks have created dysfunctional incentive structures. The President of the European Central Bank (ECB) (Trichet, 2008) has argued that there are lessons to be drawn from the crisis, as follows:

[there are] lessons to be drawn in terms of the structure of incentives in all stages of the securitisation process and the 'originate to distribute' model. All the relevant players – including originators of loans, arrangers of securitised products, rating agencies, conduits and SIVs, and final investors – should have the right incentives to undertake a proper assessment and monitoring of risks.

Overall, there is evidence that reward structures within banks (which have often focused on short-term profitability) have produced a bias towards excessive risk-taking. In particular, UBS (2008) has identified systemic deficiencies in its own compensation policy as a contributory factor in the substantial writedowns it has suffered. It emerged that at UBS, triple A-rated MBSs were charged a very low internal cost of capital. Traders holding such securities were allowed to count any spread in excess of this low hurdle rate as income which, in turn, determined their bonuses. If the internal cost of capital is under-priced, and bonuses are paid on any excess return over this low cost of capital, there is an inevitable tendency for traders to take excessive risk.

The perversity of some incentive structures within banks was revealed in the current financial crisis. Governor Mervyn King, in oral evidence to the House of Commons Treasury Committee in April 2008, argued that "banks themselves have come to realise, in the recent crisis, that they are paying the price themselves for having designed compensation packages which provide incentives that are not, in the long run, in the interests of the banks themselves". The hazardous incentive structures implicit in new banking models have been put well by Bath et al. (2006: 104) who argue that "exploitive risk-taking took place at every stage in the financial engineering process". They cite several examples, such as lenders collecting up-front fees, passing the risks on to others, slicing and dicing cash flows without requiring appropriate documentation or performing due diligence, and the use by rating agencies of poorly tested statistical models.

Causes of the crisis: Supervision

Failures of supervision certainly contributed to the financial crisis. My thesis is that it has been a failure of supervision rather than regulation that has been a central issue. There may be a role for a review of regulation. However, the thesis here is that it is not so much that more or new rules are needed (though there are areas where this is appropriate and will likely be forthcoming), but more effective supervision of banks' behaviour.

Several areas in particular can be counted as supervisory failures: (1) the risk characteristics of new business models (and the use of credit derivatives generally) were not fully understood by supervisory agencies; (2) insufficient focus on banks' liquidity; (3) banks' business models were not subject to sufficiently rigorous supervisory stress tests; (4) insufficient

attention was given to monitoring and testing banks' risk analysis and management systems; (5) in some cases the *adverse incentive* structures associated with banks' internal remuneration systems were not considered to be an issue; and (6) while some agencies (i.e., central banks, the IMF and the BIS) had been warning of the triple dangers of the sharp rise in bank lending, asset price excesses and the persistent under-pricing of risk, no action was taken. Supervisory authorities were also slow to recognise that regulated banks were engaged in regulatory arbitrage by using securitisation and SIVs to circumvent regulation that restricted their ability to expand leveraged risk-taking.

In practice, however, and most especially in the supervisory context of the time, it is sometimes difficult for supervisors to intervene even when they have concerns. As already noted, the seeds of a financial crisis are usually sown in a prior period of optimism, high profitability for banks, strong asset growth, and benevolent business and market conditions. It is often difficult for a supervisory agency to intervene (even assuming it has the authority and power to do so) ahead of risks being revealed and when profitability is high. Only weeks before the failure of Northern Rock, the bank had reported record-high profits, the Financial Services Agency had lowered its target risk assets ratio and the banks' stock market price had also reached a record high.

There is also a more fundamental problem of what might be termed 'collective euphoria', which applies not only to supervisors, but also to other market monitors such as rating agencies and shareholders. The role of these stakeholder monitors (see Llewellyn, 2000 and 2004) is to apply an independent check on the strategies and decision-makers in banks. Yet in practice they may be subject to the same euphoria as the banks are themselves and may be part of a collective myopia based on the excessive optimism of the time. In this sense, their role is undermined by not being sufficiently independent of the climate of the time.

The ideological framework and policy

The sixth layer in the causality paradigm outlined at the outset relates to the prevailing ideology of the time based on deregulation, the liberal market economic model, and rational expectations and efficient markets hypotheses. The general ideological climate favoured free-market solutions and strategies, and tended to downplay the role of intrusive regulation. This general, and over-arching, ethos had the effect of militating against regulatory and supervisory intervention.

As part of this, in the US several policy initiatives were taken at various times in the years before the onset of the crisis: measures to help low-income families to obtain mortgages such as through zero-equity

lending; the deductibility of mortgage interest for tax purposes and the exemption (after 1997) of capital gains tax on residential homes; general pressure to lend to low-income families and pressure on Freddie Mac and Fannie Mae to increase lending under the Community Reinvestment Act of 1997; the draft Basel II Capital Accord opened up arbitrage opportunities for banks to accelerate off-balance-sheet activity; and the abolition of the Glass Steagall restrictions in 1999.

What is old and what is new

While there are new characteristics in the current financial crisis (largely centred on new banking models) there are also elements that are common to virtually all crises. As in some past crises, the idea that “it is different this time” because of financial innovation has proven to be seriously misguided. Some of the lessons to be learnt therefore are not only new and related to the specific circumstances of the current crisis, but are common to all past crises.

Several common themes emerge which, in varying degrees, feature in most financial crises:

- The benefits of financial innovation and the extent to which new instruments mitigate risk are frequently over-stated in two respects: (1) an exaggerated view about the extent to which they mitigate particular risks, and (2) a failure to appreciate that, even when particular risks are shifted, they may do so at the expense of creating different risks.
- Crises have often followed periods of deregulation and increased competitive pressures in the financial system.
- Incentive structures within banks can be perverse and create a bias towards excessive risk-taking. It has often been the case that financial innovation leads to increased leverage.
- Periods of collective euphoria tend to induce herd behaviour. Demirguc-Kunt and Detragiache (2005) find that the likelihood of crises increases with the strength and duration of economic booms. Weak internal risk analysis and management systems tend to emerge in periods of collective euphoria.
- Such periods of euphoria also tend to undermine independent monitoring of banks, because stakeholder monitors such as rating agencies and even supervisors tend to be subject to the same euphoric mentality.
- Short-termist behaviour of banks (with a focus on short-term profitability) is often hazardous.
- Periods of rapid and substantial credit expansion tend to produce an

over-expansion of banks' balance sheets, and in such periods risk analysis and management systems are often weak.

- Similarly, asset price bubbles (often associated with the property market) frequently lead to an overshooting of sustainable values, leading to a subsequent (and sometimes large) correction. Movements of asset prices often overshoot in both directions in that, just as the rise in prices goes too far in the euphoria so, in the short run at least, do the subsequent and necessary corrections.
- A common feature of banking crises is that risks (and especially credit risks) are under-priced in two respects: risks are underestimated and, even on this basis, are often under-priced. Furthermore, losses-given-default tend to be under-estimated.
- Low-probability-high-impact risks are ignored.

While the mix of these characteristics varies from one crisis to another, they represent common features. The seeds of the problem are sown in the previous period of optimism which generate sharp asset growth by banks, an under-pricing of risks, excessive optimism about the risk-shifting properties of financial innovation and weak supervision where supervisors find it difficult to interfere when the collective climate of opinion is optimistic.

III Assessment

The financial crisis has impacted on banks across the world, albeit in different degrees of intensity. It is, however, significant that banks in Spain, Canada and South Africa have been considerably less (if at all) affected than those in many other countries (notably the US and UK). This might offer some tenuous support for the hypothesis of this paper that financial innovation, and new business models of banks, have been major contributory factors in the crisis. In Spain, for instance, there has been a heavy regulatory cost on creating SIVs. In Canada banks have adopted a conservative business strategy, with a heavy reliance on retail deposits rather than wholesale funding. In South Africa exchange control has limited the ability of banks to acquire international assets and the banks have also stuck to the traditional model of banking. It is also the case that in the UK (one of the countries most affected by the crisis) mutual building societies have been largely immune from the problems experienced by their bank competitors. These institutions also retained the traditional model of banking, because of the regulation that applied to them and which limited their ability to seek funding through wholesale markets and because their mutual status militated against such wholesale market funding (Llewellyn, 2009b). It is interesting to note that not only has no building society in the UK been forced to seek capital injections from the government, but the

two banks that have been taken into state ownership (i.e., Northern Rock, and Bradford and Bingley) were both former building societies that converted to bank status and made most use of the new banking models.

The global banking crisis is likely to be transformational in many dimensions. The banking landscape in the US has already changed radically with the demise of leading independent, stand-alone investment banks. It is likely that the traditional model of banking will become more dominant with less reliance on wholesale funding and many of the complex credit risk-shifting instruments discussed in earlier sections of this paper. More attention is likely to be given, both by banks and their supervisors, to how to manage low-probability-high-impact risks. There is also likely to be less reliance on rating agencies.

There is also no doubt that changes will be made to regulatory and supervisory regimes. The regulatory implications of financial innovation have been assessed succinctly by the Financial Stability Forum as follows (BIS, 2003: 87):

Credit risk transfer has the potential significantly to change institutions' risk profiles and their role in the financial system. From a financial stability perspective, it is important that these changes be addressed in regulation and disclosure standards, as well as in the behaviour of individual firms. Banks may in the future have less credit but more legal and operational risk. Liquidity risk might also become more important, created either by contingent liabilities within securitisation structures or by increased dependence on these transactions as a funding device. These risks are more difficult to measure than credit and market risk, and it may be more difficult to deal with them in quantitative capital rules and disclosure standards. A more qualitative approach, focussing on risk management, may be needed.

The way that supervision is conducted is likely to change in many respects: more active and proactive supervision, supervisory attention to banks' business models, greater focus on banks' liquidity requirements, and enhanced transparency and information disclosure with respect to both banks' balance-sheet position and the structure and characteristics of financial instruments. There is also likely to be a re-engineering of banks' regulatory capital requirements, with particular attention being given to addressing their procyclicality characteristics. It is also likely that incentive structures, and internal reward structures and their risk implications will become supervisory issues.

Over the past decade, banks enhanced their risk analysis and management systems, and financial innovation contributed to this in a significant way. For a decade or more, such innovation developed in a scenario of strong growth in the world economy, a fairly stable economic and monetary environment, low credit risks, and stable and low interest rates. This created a *disaster myopia* mindset.

However, the experience of the current financial crisis indicates that techniques and instruments that purport to shift credit risk in a stable environment may become problematic when the market environment becomes more volatile and uncertain, and when there are systemic shocks, more specifically when they involve low-probability-high-impact risks. In this sense, some risk-shifting innovations are 'fair weather' friends.

The financial crisis followed a period of several years when, throughout the world, banks had experienced exceptionally benign market conditions, which had the effect of generating rapid and substantial growth of business, enabling banks to diversify their business structures, generating new business models and ushering a period of exceptionally high profitability. The period 2000 to 2007 was, in many countries, the most profitable period for banks in particular and the financial sector in general. However, the fall-out from the most serious financial crisis since the Great Depression is likely to reverse many of these trends and force a rethink of business models. The traditional textbook model of a bank whereby it makes loans, keeps the asset on the balance sheet, holds capital against the risk and is unable to insure its credit risk externally seemed to evaporate with the experience of the early years of this century. Banks managed to do what the traditional textbook model said was not possible.

Since, to some extent, the crisis is a product of banks not behaving like banks, perhaps the traditional textbook model was right after all. Conversely, given the potential efficiency benefits of financial innovation, a sense of proportion is needed. While there will undoubtedly be regulatory responses to the crisis, and these are likely to limit the use of some instruments as banks revert to the more traditional model, there would clearly be a welfare loss if the potential efficiency benefits were to be lost. As always, a balance needs to be struck between the interests of efficiency and stability.

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Commentary: Financial innovation and a *new economics* of banking: Lessons from the financial crisis

Dennis Dykes

Llewellyn's paper gives a good framework for analysing and discussing the financial crisis. It gives a non-technical explanation of how the various factors have combined to produce the worst event since the 1930s. His main contention is that the creation and use of complex financial products have been central to this crisis and distinguish it from previous episodes, but he also gives a comprehensive summary of other contributing causes. In addition, he suggests that there will be a major rethink of the current banking model, with a move back to more traditional models or a back-to-basics framework.

I am not going to dwell on the technical descriptions of the new structures, instruments and derivatives or the detail of financial innovation, which Llewellyn describes well. Instead, I will focus on the key assertions of the paper noted above.

The split of the causes of the crisis into the different categories – proximate, ultimate, environmental, incentive structures and supervisory failures – may give the impression to the uninitiated that these were independent and that the accident was the result of many factors unexpectedly combining to produce the crisis. I am sure that this is not what Llewellyn is suggesting. In my view, what makes this event so intriguing is the self-reinforcing nature of the various factors and the build-up of the underlying problems over many years.

Strong liquidity almost always leads to overexuberant lending by banks, with new innovations in every cycle that extend credit boundaries and are meant to reduce risks. In this case, the recycling of Asian and petrodollar surpluses into global financial markets and the massive leveraging supported by off-balance-sheet lending helped push asset prices up. This made the underlying collateral look even more enticing and further boosted the banks' collective ability to lend by boosting capital and the ability to raise more capital cheaply. This virtuous cycle extended well over a decade in various forms, but the final stage was encouraged by the monetary and fiscal boosts post the 1997/98 emerging-market crisis and the recession in the United States (US) in 2001. After the dot-com bubble had burst in 2001, liquidity migrated to property and then later to commodities. While house prices continued to rise, higher debt levels were easy to justify, but once the bubble burst, it exposed significant excesses in the household sector.

For much of that period central banks largely ignored the growing risks and kept interest rates low, comforted by low consumer inflation. However, the long period of controlled consumer prices was only partly due to lower inflationary expectations stemming from earlier central bank behaviour. Much had to do with massive productivity improvements and economies of scale in China and an undervalued renmimbi, which kept the prices of imported manufactured and consumer prices in developed countries in check. When commodity prices finally started to rise strongly from late 2004 to 2006, this attitude changed and monetary policies tightened (the Greenspan ‘normalisation’ of the federal funds (fed funds) rate started in June 2004). Unfortunately, by then debt levels had increased dramatically and the combination of rising interest rates and – later in the cycle – higher consumer inflation started to affect consumers. The sub-prime twist was that many lower-income households in the US were persuaded to take out flexible interest mortgage bonds that often included a short period of a favourable fixed rate before onerous resets applied (so-called adjustable-rate mortgages (ARMs)). By 2005 the housing boom in the US was over and in 2006 house prices started to falter. The virtuous cycle had started to unravel and a vicious cycle was starting.

So who was to blame? Many would point to this episode as being a ‘Minsky moment’, after Hyman Minsky’s (1975, 1992) analysis of financial market behaviour. The basic assertion is that capitalism inevitably creates excesses and sows the seeds of its own destruction through ever-increasing speculative financial activity. Minsky (1992: 8) also held that “over periods of prolonged prosperity, the economy transits from financial relations that make for a stable system to financial relations that make for an unstable system”. Proponents of this view would look at deregulation (particularly the partial repeal in 1999 of the 1933 Glass–Steagal Act that separated commercial and investment banking) as playing a key part in the crisis. This is not the place to examine the hypothesis in any detail, although parts of it look almost prophetic today. In particular, some of the complicated derivatives that Llewellyn refers to appear – unintentionally – to have had highly speculative characteristics, with bets being placed on bets. However, there is nothing inherent in actors acting in their own self-interest, causing mutual self-destruction. Neither is deregulation by itself to blame. Rather, it was the implicit collusion of confidence over logic between the various players (i.e., banks, governments, central banks, regulators, rating agencies, investors and borrowers) that combined to produce a crisis that will have far-reaching and very damaging implications for the global economy.

Banks clearly played a major part in precipitating the crisis. They lowered their lending standards, comforted by rising collateral values and risk sharing through securitisation. Weak credit assessments played a large part in the crisis. Given the abundance of capital, it is not surprising that

spreads did not reflect the growing risks. What was also clearly not appreciated was the growing liquidity risk. Complicated off-balance-sheet structures were dependent on short-term funding. Once this dried up, banks had to step in and support their vehicles, once again, assuming the risk that they had thought had been so neatly parcelled out. This, in turn, resulted in mounting losses as the underlying collateral lost its value and, ultimately, a complete breakdown of the financial system, particularly following the Lehman Brothers collapse in mid-September.

Blame can also be apportioned to *governments, central banks and regulators*. In the US there was significant government pressure on banks to lend to lower-income households, starting with legislation such as the 1977 Community Reinvestment Act. The mortgage finance lenders, Freddie Mac and Fannie Mae, were also used as tools to broaden home-ownership, with a corresponding relaxing of credit or ability-to-pay requirements. Central banks played their part by largely disregarding anything but consumer inflation. This meant ignoring the growth of massive gearing in the economy and the emergence of successive asset price bubbles. Regulators were also too easily persuaded to relax lending criteria for banks. For example, in the generally euphoric mood of the time, the Securities and Exchange Commission relaxed debt-to-asset requirements on major investment banks in 2004; greatly extending the extent of leverage in the system. An associated problem was the switch in reporting standards to mark-to-market accounting. While, in principle, this makes sense, it has had the unintended consequence of encouraging further lending in boom times and greatly restricting credit in bad times. Lastly, as Llewellyn points out, there was a failure of supervision rather than a lack of regulation. The rules do not necessarily have to be changed too drastically, but in the coming years their application will.

Credit agencies have also come under significant criticism. The crisis has further revealed two fundamental flaws. The first is a potential conflict of interest: if the client is the issuer of a new exotic instrument and not the purchaser (or only indirectly), the temptation or tendency might be to rate it more favourably. The second is that it is very difficult for rating agencies to make significant downgrades as conditions worsen. By doing so they could feel that they would precipitate a crisis (making it a self-fulfilling prophecy), but by not doing so they are also failing their clients on the buy side. In any event, they collectively did little to warn of the growing underlying dangers.

The *borrowers* themselves have to assume some responsibility for continually taking on more and more debt.

Llewellyn's prediction of a back-to-basics banking model is likely to prove correct. Banks themselves will feel more comfortable with getting closer

to the client once again and regulators are likely to be very wary of any repeat of the excesses seen in the financial sector over the past few years for decades to come. My concern is that policy-makers will become too restrictive and further exacerbate the crisis in the short to medium term. For example, there have been calls for tougher capital requirements, but this seems to be shutting the stable door after the horse has bolted. In fact, the idea that such requirements play more of a countercyclical role in the future makes more sense. During periods of high bank profitability, capital ratios could rise, offsetting some of the self-reinforcing behaviour described above, while ratios should fall back to their minimums in more difficult times. Although this may seem counterintuitive (especially in the light of Basel II), it would provide a way of avoiding some of the major mistakes made during this cycle.

On the seriousness of the crisis for the real economy, Llewellyn stresses that this event is a major one that could result in a severe recession. My own view is similar. The deleveraging process currently under way will have a potentially devastating and long-lasting effect on the real economy. Compared with the 1930s, policy-makers are armed with prescriptions of what and what not to do, and so far have done reasonably well. These include fiscal and monetary boosts, provision of liquidity and preventing a systemic crisis by backing banks and providing comfort to deposit holders. Encouragingly, most governments also appreciate that trade barriers will serve only to worsen the crisis as occurred in the 1930s (Kindleberger 1986: 291–292). All this will help to prevent a depression. However, never before have consumers been so indebted, and never before has there been such complexity in the financial system and such a global extent of the problems. This makes predictions about the future speculative. However, deleveraging seems inevitable and the global downturn is likely to be at least as bad as anything experienced since the early 1980s.

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Commentary: Financial innovation and a *new economics* of banking: Lessons from the financial crisis

Hendrik Nel

It is indeed an honour to comment on the paper delivered by Llewellyn, a prolific researcher, academic and specialist in banking and regulation. The South African Reserve Bank (the Bank) and, specifically, the Bank Supervision and Financial Stability (FinStab) Departments have had interactions with Prof. Llewellyn over many years, starting with the single regulator debate in the late 1990s and early 2000s. We look forward to continuing our relationship with Prof. Llewellyn. The FinStab and other invited departments and guests will be fortunate to spend a week with him in a specialised seminar on topics related to the financial crisis and its financial stability and regulatory implications.

Llewellyn's paper adds to the ever-increasing literature on what the Bank of England Deputy Governor Charles Bean on one occasion called "possibly the largest financial crisis of its kind in human history". The paper, however, goes beyond reporting on the events of the past 18 months and provides a very interesting perspective, namely that of financial innovation and its role in the crisis. Authors such as Barrell, Hurst and Kirby (2008), and Roubini (2008) state in recent papers that the main cause of the global financial crisis is that the United States (US) has sacrificed financial stability for financial innovation. In his paper, Llewellyn considers the nature of financial innovation with special reference to the emergence of instruments and business models that transfer credit risk, such as the "originate and distribute" model. He argues that this changed the traditional economics of banking as banks stopped behaving like banks and the financial system became more crisis-prone.

The paper, firstly, considers the impact of financial innovation on the efficiency and stability of financial systems, and states that the main efficiency and stability benefits of financial innovation are derived from the risk-shifting characteristics of financial instruments. Financial innovation, however, has the potential to undermine financial stability because it facilitates substantial leveraging of risk. The paper then draws a very interesting conclusion, namely that although financial innovation makes the financial system less vulnerable to minor shocks, it may make it more prone to large, highly correlated and systemic shocks (exactly what has materialised recently).

Secondly, the paper analyses the key features and causes of the global financial crisis. Apart from identifying financial innovation as the

ultimate cause of the crisis, it also mentions and analyses other possible causes, namely

- the historical environment where the seeds of the crisis were sown in a prior period of excessive optimism (created by high and stable economic growth rates; low and stable inflation; and low and stable interest rates and bond yields). In this regard, Llewellyn makes a very important observation when he states as follows: “No financial crisis emerges in a vacuum, but surfaces in the context of the market environment that preceded it.”
- incentive structures based on short-term profits with a bias towards excessive risk-taking (several banks identified systemic deficiencies in their compensation policies as a contributory factor in the writedowns they suffered).
- failures of supervision, and in this regard the paper argues that it is not more regulation or new rules that are needed, but more effective supervision of banks.
- the paper also mentions common themes of most financial crises such as asset-price bubbles, sharp growth in lending volumes and under-pricing of risk as possible causes of the crisis.

At this point a number of other possible causes or contributory factors mentioned by Goodhart (2008), Roubini (2008) and others could be added:

- Basel II and the alleged flaws in the framework, namely procyclical capital-adequacy ratios; and excessive reliance on internal risk management models and on credit rating agencies.
- Conflicts of interest and informational problems leading to misratings of securities by credit rating agencies.
- Asset valuation and fair value accounting where mark-to-market accounting may, during times of market turmoil, force excessive writedowns and margin calls that may lead to further fire sales of illiquid assets that, in turn, could cause a cascading fall in asset prices well below long-term fundamentals. Also, mark-to-market accounting may create serious distortions during bubbles when it may lead to excessive leverage, as high valuation allows investors to borrow more and leverage more, thus feeding the asset bubble. Fair value accounting therefore leads to procyclical bank capital requirements under Basel II.
- A lack of international co-ordination: in a world of financial globalisation, mobile capital and a lack of capital controls, capital normally moves to more lightly regulated shores. A much stronger degree of co-ordination

of financial regulation and supervision is necessary to prevent excessive regulatory arbitrage.

It is also important to mention that the South African financial system has been largely protected against the direct effects of the global financial crisis (South Africa has up to now only experienced indirect effects through its liquid financial markets and the exchange rate of the rand). This may be explained as follows:

- The South African regulatory and credit environment is very conservative and the “originate and distribute” model has not really taken off.
- There is no separate “investment bank” regulatory format in South Africa as in the US, with its particular incentives and risk appetite.
- South Africa has the National Credit Act in place, which also protects borrowers against reckless lending.
- The South African banking system is well capitalised and profitable (currently South African banks can gear their capital about 8 times, while in US banks it could be as high as 30 times). Llewellyn also mentions the substantial rise in leveraging of banks in recent years.
- South Africa implemented Basel II successfully, while the US largely resisted it.
- In the US many banks rely on foreign funding only, while foreign funding comprises only about 5 per cent of total funding in the South African banking sector.
- South African banks were prevented by regulation from participating in the toxic assets that caused the US sub-prime crisis.

In conclusion, financial stability is an important factor in assessing the degree of development (innovation) of a financial system. Excessive stability may result in excessive regulation and restrictions on financial innovation and risk-taking, and thus may reduce the opportunities for long-run growth. Aggressive innovation, however, may lead to a lack of stability and trigger financial crises that are costly and inefficient, as it leads to severe economic downturns, and the large economic and fiscal costs of cleaning up a financial system in distress and crisis. A balance therefore needs to be found between innovation and stability, which stresses the point that, like central banking, maintaining financial stability is probably more of an art than a science.

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Capital flows and policy in emerging-market economies

Laurence Harris

The sharp net outflow of capital experienced by South Africa in October 2008 put into focus the sensitivity of the country's key markets to international capital flows. In that month a net withdrawal of almost R67 billion of foreign funds from the Johannesburg Stock Exchange contributed to a 12 per cent fall in the FTSE/JSE Africa All-Share Index and to a decline of almost 20 per cent of the rand against the United States (US) dollar. The net outflow of capital was one element in portfolio adjustments occurring worldwide and affecting markets in most countries, but South Africa's experience reflected its need to finance a persistent current-account deficit of more than 7 per cent of gross domestic product (GDP) and the unwinding of a yen–rand carry trade, stimulated by South Africa's relatively high interest rates, that had formerly buoyed the rand (the rand depreciation against the yen in October 2008 was greater than that against the US dollar). Such changes in external capital flows can have strong effects on inflation and real economic activity through their effect on the exchange rate and the cost of capital; in some circumstances countries have experienced them as a 'sudden stop' and wide-ranging crisis. The potential for changes in net inflows or outflows on the capital account complicates the task of macro-economic policy-makers charged with countering inflation and creating conditions for real growth, for policy variables such as a domestic interest rate influence both domestic and external capital flows and shocks to the latter are potentially ever present, not only in the unusual circumstances of the global financial turbulence of the late 2008. What are the implications for monetary policy?

Digging into his or her tool kit, the most basic instrument an economist pulls out for considering the connection between capital flows, exchange rate regimes and monetary policy is the Mundell–Fleming model (Fleming, 1962; Mundell, 1963). The powerful policy prescriptions yielded by the elegantly simple model have maintained their influence even as the original, comparative-static, fixed-price, aggregate model with static expectations has been superseded by dynamic models derived from agents' optimising behaviour (Obstfeld and Rogoff, 1995, 1996). Most relevant to the policy discussions engaging South Africa is the model's implication that a small open economy without restrictions on external capital flows cannot have a monetary policy that targets both a domestic interest rate and nominal exchange rate. More precisely, the simplified model demonstrates the impossibility of combining three elements that countries might desire: (1) participation in an international capital market characterised by

perfect capital mobility, (2) an autonomous monetary policy and (3) a fixed exchange rate.

South Africa's policy regime has been the subject of vigorous public debate, with a monetary policy regime based on inflation targeting and a floating exchange rate being opposed by demands for a monetary policy to achieve (employment-promoting) exchange rate targets. For example, the trade union confederation, the Congress of South African Trade Unions' (COSATU) position in 2006/07 was:

We believe the Rand is currently valued at an inappropriate level, and has resulted in massive job losses in many sectors, including manufacturing, mining, and tourism. We believe that the policies of the [South African] Reserve Bank [SARB] has contributed to the over-valued exchange rate. We will campaign to have an exchange rate that is more compatible with the goal of creating and saving jobs in South Africa. We will engage the SARB and government on interest rates, short-term speculative and portfolio flows, the mandate of the Reserve Bank, and policy tools to ensure a more appropriately valued Rand. (COSATU, 2006.)

Similarly, Pollin, Epstein, Heintz and Ndikumana (2006) argue for the active use of capital controls to support an expansionary monetary (and fiscal) policy with stabilised exchange rates.

Such proposals for change in the South African monetary and exchange rate policy regime accord with arguments elsewhere on the potential role for capital controls. In the belief that unrestricted capital accounts permit a high degree of capital mobility in modern international financial markets, the 'impossible trinity' proposition leads some to focus on whether freedom of external capital flows can or should be restricted, as Joshi (2003) does, using India as an example.

In this paper I look at evidence from experiments elsewhere on the feasibility of restrictions on capital flows. Focusing on the medium-term macroeconomic policy problem, I have flows of portfolio capital in mind rather than foreign direct investment, although conventional distinctions between 'short-term' and 'long-term' capital flows are just that, conventional and not necessarily realistic indicators of a country's exposure to volatile capital flows. Countries that have experimented with capital account restrictions have had one or more of a range of objectives:

1. Achieving autonomy for monetary policy while maintaining a fixed or pegged nominal exchange rate
2. Protecting domestic financial institutions and markets from balance-sheet instability, and volatile asset values resulting from volatile capital flows and exchange rates

3. Obtaining emergency protection from capital outflows in a crisis that comprehensively threatens macroeconomic stability and growth
4. Exerting influence over economic activity through capital controls as one element in a set of 'developmental state' interventions.

That is quite apart from countries that have used comprehensive exchange controls as one of the control instruments in a fully centrally planned economy.

Before examining those experiences, I put forward some general considerations that are useful for evaluating them and their relevance to South Africa.

General considerations

Like similarly powerful models, the Mundell–Fleming model is highly simplified. Consequently, it does not fit the real circumstances of South Africa or other countries and its policy prescriptions cannot be assumed to apply directly. The model's assumption of perfect capital mobility measured against a domestic and foreign interest rate does not represent market reality, even in the world of linked financial markets before the 2008 turmoil. What are the important sources of deviations and what are their implications for policy?

A potential deviation from perfect capital markets is the existence of transaction costs in currency transactions. Measuring transaction costs by bid–ask spreads in spot and forward currency markets, Burnside, Eichenbaum and Rebelo (2007) find that failure to take transaction costs into account would lead investors to make negative risk-adjusted returns from a carry trade strategy, while taking them into account would lead them to make positive returns, but would cause trades to be concentrated on a few currencies. Based on data from October 1997 to November 2006, optimal strategies in the presence of their constructed portfolio spreads showed that higher transaction costs diminished the frequency of trades. Since their data series show that trading emerging-market currencies against the US dollar involves bid–ask spreads up to four times greater than for major currencies, it is plausible to assume that such transaction costs create a significant imperfection, which modifies the applicability of the 'impossible trinity' to South Africa, especially since bid–ask spreads are not the only component of transaction costs.

The Keynesian simplification used by Mundell–Fleming represents all asset returns by a risk-free market interest rate and does not incorporate realistic expectations formation explicitly. In today's world large international capital flows appear to respond to relative expected returns in a number of distinct markets, including different countries' equity market

returns and returns in real-estate markets. To analyse international investor choices when a range of assets is available to domestic and international investors, new models of portfolio choice are required and, since capital flows are of concern, they have to address portfolio switches and simultaneous two-way flows of capital rather than steady state portfolio allocation. Dynamic models with portfolios diversified across asset classes and foreign and domestic markets suggest that the behaviour of net capital inflows responds to changes in variables in complex ways (Tille and van Wincoop, 2008).

One common-sense conclusion is that capital flows are sensitive to the differential between domestic and foreign investors' responses to shocks or endogenously time-varying parameters. To extrapolate, the effect on net capital inflows of a monetary policy innovation which, say, lowers South African money-market rates relative to the US, depends on its effect on the returns distributions (not simply expected rates of return) of South African equities and other assets, and upon differences between South African and foreign investors' responses. Net capital flows are not reducible to differentials in money-market interest rates.

Even if one recognises that international capital flows are directed into equities as well as fixed-income assets, a complication limiting the applicability of simple models is that deviations from the assumption of perfect international capital mobility arise from the well-documented existence of 'home bias' in equity portfolios (Tesar and Werner, 1995). While this can be partly explained by transaction costs, its roots are more fundamental and, as Karlsson and Norden (2004) find, can be related to individual savers' tastes, demographics and information imperfections.

In sum, if policies to restrict or manage external capital flows are regarded as a means to increase the scope for combining an interest rate target with an exchange rate target, I believe their marginal impact is reduced by the lack of perfect capital mobility without them.

Any marginal gains capital controls might offer monetary policy and have to be weighed against the direct costs of administering such policies. Any case for them is weakened further to the extent that such policies are evaded. Evasion can be expected to be higher, together with the administrative costs of countering it, if restrictions on capital flows are designed to be part of a long-term monetary policy regime (in contrast to temporary emergency measures).

In addition to administrative costs, capital controls may have long-term costs in terms of economic growth, although, in a world of imperfect markets they might be positively associated with growth. Either effect will depend on the institutional structure of the economy (free capital flows

being relatively beneficial within a supportive legal environment, while any benefit from controls over capital flows are likely to depend on the strength of 'developmental state' policies) and historical evidence from other countries offers no absolute conclusions (Eichengreen, 2003; Rodrik, 1998).

Facilitating monetary policy has not been the only objective of actions to manage external capital flows. Another objective that is sometimes cited is protecting the stability of financial-sector balance sheets from shocks arising from external capital flows. South Africa's existing capital controls, restricting that proportion of institutional funds' portfolios that can be invested overseas, may have had a positive effect, helping to insulate the country's financial institutions from the international instability caused by unsound financial innovation, although strong and relatively conservative supervision by the South African Reserve Bank (the Bank) has been the prime intervention giving protection from international banking and market turmoil. Another possible objective can be to provide emergency protection for macroeconomic stability in a currency crisis, as was practised in the 1980s under South Africa's 'debt moratorium' in response to the 'sudden stop' of external financing.

In the following sections I consider experience elsewhere in the use of capital controls (direct and indirect) and related measures. The examples chosen are those that have been the focus of most of the attention in the past decade.

China

At the beginning of China's series of reforms eventually leading to a substantial market economy, a comprehensive and complex bureaucratic regime of exchange controls covering both current and capital transactions existed. Starting in 1979 and continuing over several decades, a series of reforms has considerably liberalised the regime. In December 1996 China informed the International Monetary Fund (IMF) of its effectively full current-account convertibility, but important capital controls remain. The two linked motives for retaining controls have been the priority the government gives to avoiding instability of financial institutions and markets (i.e., mitigating the effects of international market volatility) and the desire to manage both the exchange rate and internal monetary policy.

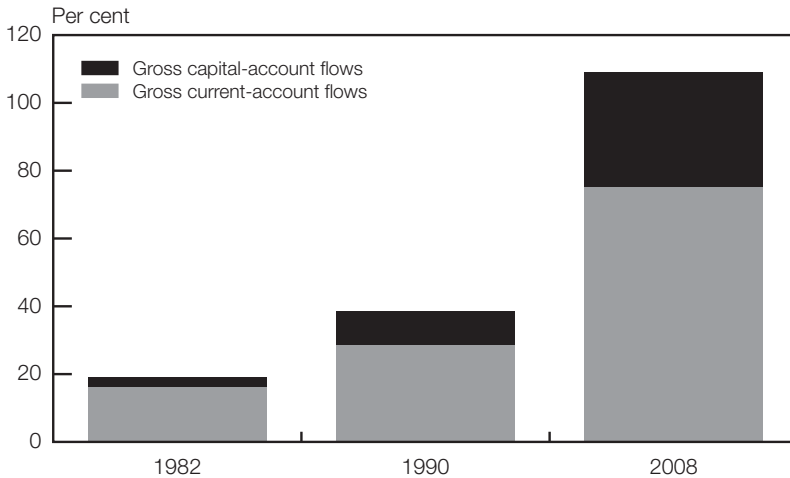
Although in 1993 China announced its intention to move steadily towards full convertibility, the 1997 Asian and 1998 Russian currency crises led to the postponement of moves to liberalise the capital account. In 2003 the Central Committee of the Communist Party promulgated liberalisation of the capital account as a goal, but the degree of openness, whether all direct and portfolio flows are to be liberalised, and what the timetable is to be are not known definitively.

In practice, steps taken towards capital account liberalisation have been partial and experimental. For foreign investors the most significant has been the creation in 2002 of the Qualified Foreign Institutional Investors (QFII) scheme. Under this scheme, strictly regulated and licensed foreign asset management companies are permitted to make portfolio investments within quotas allocated by the State Administration of Foreign Exchange (SAFE) and subject to some partial regulation of repatriation, which is designed to maintain orderly flows.

For residents, the establishment in April 2006 of the Qualified Domestic Institutional Investor (QDII) scheme enabled licensed private institutions to make foreign portfolio investments. For individuals, permission to transfer funds freely (within individual annual quotas) between renminbi and foreign currencies within China, and since January 2007 using offshore accounts, enables large flows to occur.

China's system of capital controls attempts to distinguish between short- and long-term flows, and has moved from focusing on the restriction of outflows towards permitting both inflows and outflows within a managed framework. As illustrated by Figure 1 the annual sum of inflows and outflows on capital (as well as current) account grew rapidly between 1990 and 2005.

Figure 1: Capital flows: China



Source: Ma and McCauley (2007: 3)

China's authorities believe that capital controls have helped to cushion China's financial sector from the shocks arising elsewhere in international

markets. Have they also freed China from ‘the impossible trinity’ and enabled the country to have an autonomous monetary policy and a managed exchange rate (pegged with an increasingly wide band)? If so, have the capital flows grown while controls, albeit liberalised, remain undermined by that monetary autonomy?

Ma and McCauley (2007) find that monetary autonomy was significant throughout the period 1998–2006. That conclusion is supported by evidence of a sustained differential between onshore and offshore renminbi yields, indicating imperfections in arbitrage or, in other words, cross-border market segmentation which they judge to be due to controls. They find that, although external capital flows do respond to interest rate differentials and exchange rate expectations, China’s administered domestic interest rate follows US interest rates less closely than does the rate in the eurozone, which has flexible exchange rates.

Chile

The main policy instrument used by Chile in attempting to manage external capital flows is the *encaje*, applied between 1991 and 1998 to control capital inflows by indirect means. The rule imposed financial costs on foreign investments in Chile by imposing unremunerated reserve requirements (URR) of 20 per cent, which was raised to 30 per cent in 1992, on borrowing from foreign creditors.

The URR acted as a tax on foreign investors, the rate of which (expressed as a percentage of the amount invested) was approximated by

$$t = [r(i^* + s) T / (1-r)] / D$$

where t represents the implied tax rate; r , the URR rate; i^* , the nominal interest rate for the currency in which the URR is constituted; s , the premium applied to the investor when borrowing funds to cover the URR (i.e., country risk premium plus specific credit risks for the investor); T , the duration of the URR; and D , the duration of the foreign investment (Ariyoshi et al., 2000: 79).

The URR was designed principally to overcome the ‘impossible trinity’ problem, permitting high interest rates to meet domestic objectives, without generating high inflows which would undermine monetary policy. In other words, the objective was to establish a ‘wedge’ between domestic and foreign interest rates. Other objectives were to incentivise a switch of financing from short- to long-term finance, particularly equity finance. It was also seen as helping to cushion financial institutions’ balance sheets from external shocks.

Initially applied to all foreign loans except trade credit, the range of investments covered was extended by successive measures until 1996. The extensions were stimulated by continual innovations by borrowers and lenders seeking to avoid the URR. In 1991 the URR covered almost 50 per cent of total capital inflows, but the proportion declined to 24 per cent as a result of such innovation before being raised to over 30 per cent, following the extension of the URR's coverage to a wider range of investment instruments.

Whether the URR succeeded in creating an interest rate wedge, giving a degree of freedom to monetary policy, has been widely analysed. The Chile–US interest rate differential widened from 3,5 per cent to 7,0 per cent in 1992 and 1993, before declining to 3,5 per cent in 1995 and then climbing to 5,0 per cent in 1996, and these movements mirrored the initial impact followed by increasing avoidance and then broadening of coverage of the URR. However, that does not demonstrate a causal relationship. Econometric studies suggest a statistical relationship, but they, in turn, suffer from various sources of bias and data limitations.

Malaysia

After the 1997 depreciation of the Thai bhat and ensuing financial market turmoil in other Asian countries, Malaysia initially managed its exchange rate. However, in September 1998, following Russia's financial crisis of August and faced with increased downward pressure on its currency, which the authorities attributed to speculation against the ringgit in the offshore market, Malaysia adopted extensive direct controls on outflows of capital. In February 1999 they were modified, replacing direct restrictions on the repatriation of portfolio investments with a graduated exit levy. These controls were designed to bring about the closure of the offshore market, and to enable the country to adopt a fixed exchange rate (RM3,80 to the US dollar), a low interest rate policy and fiscal expansion, in order to stimulate the economy's recovery from the low growth induced by the Asian crisis.

Malaysia's controls were successful in their immediate objectives in creating a wedge. The authorities were able to peg the exchange rate successfully and without the development of a parallel market. It appears that widespread evasion through such devices as under- or over-invoicing of current transactions did not occur. Low interest rates were maintained and movements of overnight rates in the domestic market were not correlated with those in Malaysia's regional neighbours.

Within a year of the imposition of controls, Malaysia resumed strong economic growth. Did the policy also enable Malaysia to achieve macroeconomic recovery from the 1997 Asian crisis faster than it would

have without such controls? Debate over that question has led to a predominant view that it did not or, at best, that the jury is still out. One argument in support of such judgments is that by September 1998 Malaysia had already begun its recovery from the downturn initiated by the 1997 Asian crisis. Another is that other countries that had suffered downturns in the crisis, especially South Korea and Thailand, also recovered strongly – by some measures more strongly – and Malaysia would have shared that experience without capital controls. A contrary view was reached by Kaplan and Rodrik (2001) on the basis of a regression of economic performance on country-specific and time-varying dummy variables representing policy (time-shifted). Their method led them to conclude that Malaysia's controls were superior to alternative, IMF-prescribed, strategies for economic recovery.

Tobin tax

Although this paper is concerned with capital flows and policy in actual countries' experience, there is one policy that, since first proposed by James Tobin in 1978, has recurrently been suggested, but has not been implemented as such anywhere and therefore cannot be judged by historical evidence. Tobin proposed a tax (up to 1 per cent) on spot currency transactions as a way to manage external capital flows. Its infeasibility results from the understanding that to be effective and to prevent tax regime arbitrage by trading through tax-free jurisdictions, it would have to be adopted and enforced universally. Moreover, evasion through financial engineering would be easy (Ul-Haq, Kaul and Grunberg, 1996).

Despite the absence of historical evidence, laboratory experiments within the paradigm of behavioural economics may yield useful insights. Kaiser, Chmura and Pritz (2007) report that in their experimental foreign-exchange markets, a low Tobin tax reduces exchange rate volatility without influencing the volume of transactions significantly.

Conclusion

In the salient cases summarised here the benefits of policies to affect capital flows are difficult to judge. The picture is not clearer if one were to widen the examples considered. Moreover, any lessons that could be drawn from any one country's experiences are not generalisable, as the effectiveness and effect of such policies are specific to the particular circumstances of that country in the relevant period. Consequently, I believe that useful conclusions cannot be drawn for South Africa from the experiences of emerging economies reviewed here.

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Commentary: Capital flows and policy in emerging-market economies

Eric Schaling

Introduction

On the first page of his paper, Harris says that the basic tool an economist pulls out for considering the connection between capital flows, exchange rate regimes and monetary policy is the Mundell–Fleming model.

He points out that most relevant to the policy discussions engaging South Africa is the model's implication that a small open economy without restrictions on external capital flows cannot have a monetary policy that targets both a domestic interest rate and nominal exchange rate. When countries are faced with concerns over monetary targets and volatility of flexible exchange rates, the open-economy trilemma proposition stimulates some to focus on whether freedom of external capital flows can or should be restricted.

Harris then looks at evidence from experiments elsewhere on the feasibility of restrictions on capital flows. His conclusion on page 55 is that “[t]he benefits of policies to affect capital flows are difficult to judge . . . Moreover, any lessons that could be drawn from any one country's experiences [such as China, Chile and Malaysia] cannot be generalised, because the effectiveness and effect of such policies are specific to the particular circumstances of that country in the relevant time.” Consequently, he believes no useful conclusions can be drawn for South Africa from the experiences of emerging economies reviewed in his paper.

Discussion

I think there are a few points that can be added in order to shed some more light on the South African experience. First, although the Mundell–Fleming model was the ‘Volkswagen’ of open-economy macroeconomics in the 1960s (as stated by Rudy Dornbusch (1980)), it has been replaced with the workhorse New-Keynesian model (Woodford, 2003) and its open-economy variants (see, for example, Bullard and Schaling, 2006). Therefore, my first point is that more up-to-date analytical macro frameworks are needed.

In addition, useful conclusions can be drawn from South Africa's own experiences with capital controls. In order to do this I want to introduce a useful concept, namely the law of unintended consequences.

As pointed out by Rob Norton (2007), the law of unintended consequences is that actions of people, and especially of government, always

have effects that are unanticipated or ‘unintended’. Economists and other social scientists have heeded its power for centuries; for just as long, politicians and popular opinion have largely ignored it.¹

Most often, the law of unintended consequences illuminates the perverse and unanticipated effects of legislation and regulation. In 1692 John Locke, the English philosopher and a forerunner of modern economists, urged the defeat of a parliamentary Bill designed to cut the maximum permissible rate of interest from 6 per cent to 4 per cent. Locke argued that instead of benefiting borrowers, as intended, it would hurt them. People would find ways to circumvent the law, with the costs of circumvention borne by borrowers. To the extent to which the law was obeyed, Locke concluded, the chief results would be less available credit and a redistribution of income away from “widows, orphans and all those who have their estates in money”.

South Africa’s 40 years of experience with capital controls on residents and non-residents (1961–2001) reads like a collection of examples of perverse unanticipated effects of legislation and regulation. Of course, those unintended consequences can add so much to the costs of policies that they make the policies unwise even if they achieve their stated goals.

Capital controls in South Africa exhibited substantial institutional inertia and this same institutional inertia also applied to the monetary policy regime. A plausible reason for this is that for most of the twentieth century in South Africa capital controls and exchange rate-based monetary policies were like Siamese twins; almost impossible to separate.

For example, it appears that in the period 1995–1998 the South African Reserve Bank (the Bank) tried to escape from the open-economy trilemma by using the policy of foreign-exchange market intervention. In the past this policy was partly motivated as being a way of managing the effects of capital flows on the exchange rate.

These interventions partially contributed towards the currency crises in 1996 and 1998: for example, after the Mexican crisis and the demise of the dual exchange rate (financial rand) system in early 1995, the Bank continued to target the exchange rate of the rand within an extremely narrow band to the United States dollar.

Thus, a 40-year-long and inert culture of capital controls in South Africa – via the style of monetary policy and thinking about the economy this culture implied – indirectly contributed towards the depreciation of the rand in 1996 and 1998.

In addition, in the context of the 2001 crisis, there is *prima facie* evidence that the implementation of the remaining elements of exchange control

on residents and non-residents contributed towards the rapid depreciation of the rand in the last quarter of 2001.

Conclusion

Therefore, my conclusion is that although emergency capital controls were applied with some success during crisis times in countries such as Chile and Malaysia, based on South Africa's 40 years of experience with capital controls on residents and non-residents (1961–2001), I do not recommend these controls for South Africa.

Note

¹ Rob Norton is a columnist for *eCompany Now* magazine and was previously the economics editor of *Fortune* magazine.

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Commentary: Capital flows and policy in emerging-market economies

Daleen Smal

The purpose of Harris's paper is to identify lessons that South Africa may learn from capital flows and monetary policy in emerging-market economies. The analytical framework that he used is the Mundell–Fleming model developed in the early 1980s and he focuses on the so-called impossible trinity, that is, given highly mobile capital flows, a country cannot have both a fixed exchange rate regime and an independent monetary policy. Harris concludes that there are no useful lessons for South Africa to learn from other countries. I do not agree with this assessment. Even though countries and their circumstances differ, I believe that one can always learn from others' experiences. Even though

Table 1: Emerging-market countries grouped by exchange rate arrangement (as of 31 December 2006)

De facto exchange rate regime (number of countries)		Country
Hard peg (5)	No separate legal tender/ currency board (5) (*2)	Bulgaria, Ecuador (*), Greece(*), Lithuania, Panama
Intermediate (14)	Other fixed pegs (10) (*5)	Argentina (*), Egypt (*), Jordan, Latvia, Morocco, Nigeria (*), Pakistan, Qatar, Slovenia (*), Venezuela (*)
	Pegged rate in horizontal band (3) (*2)	Cyprus, Hungary (* **), Slovak Republic (*)
	Crawling peg (*1)	China (*)
	Rates within crawling bands	
Float (19)	Managed float (10) (*6)	Colombia (* **), Czech Republic (**), India, Malaysia (*), Peru (* **), Philippines (**), Romania (* **), Russia, Sri Lanka (* **), Thailand (* **)
	Independent float (9) (*3)	Brazil (**), Chile (**), Indonesia (**), Israel (* **), Korea (**), Mexico (**), Poland (* **), South Africa (**), Turkey (* **)

* Indicates country whose exchange rate regime has changed since 1999

** Indicates an inflation target monetary policy framework

Sources: Fischer (2007); IMF (2007); Batini and Laxton (2006)

there is a rapidly growing body of literature on this topic, in my response I will focus only on, firstly, monetary policy, as this is the main theme of the conference and, secondly, exchange rate regimes, capital inflows and restrictions, as this is the focus of this session.

On the conduct of monetary policy, White (2001) rightly remarks that the process of re-evaluation and changes has continued over time and is by no means over yet. Monetary policy is conditioned on certain broad issues. First of all, policy-makers have to act within an economic, political and philosophical framework. Second, conditional on this framework, the policy strategy that they follow should be consistent over time and, third, policy-makers must make certain operational decisions to exploit whatever room for manoeuvre remains within the confines of the framework and the strategy (White, 2001). Owing to the existence of the “impossible trinity”, the most important choice is the exchange rate regime. With the size and mobility of capital flows increasing, it appears that the exchange rate system is the one that needs to be sacrificed and many countries have moved to a flexible exchange rate regime.

Capital flows have allowed emerging-market economies to tap into the larger pool of global savings to augment their resources for development. Foreign investment has acted as a vehicle for the transfer of technical and managerial skills, thereby speeding up the growth of productivity. Furthermore, openness has improved domestic policies as market disciplines have acted to penalise unsustainable domestic policy developments. Despite difficulties, there is a general presumption that capital inflows are, on balance, favourable in their welfare effects (Sinclair and Shu, 2001). By contrast, capital flows can be highly disruptive, and the growing size and complexity of the financial system have led to greater costs when crises occur.

A key policy decision for countries facing large capital inflows is to what extent should pressures be resisted for the currency to appreciate by intervening in the foreign-exchange market. In practice, capital mobility is not perfect (even in the absence of direct capital controls) and perhaps leaves more scope than what the “impossible trinity” suggests. The *World Economic Outlook* (IMF, 2007) indicates that there is a tendency by emerging-market policy-makers to “lean against the wind” by accumulating reserves to moderate the appreciation of the currency during periods of large capital inflows. At the same time, some sterilisation also occurs. Growth in real government expenditure also increases strongly as capital inflows surge. More recently, capital controls appear to have been eased when large inflows occurred.

Sinclair and Shu (2001) highlight some difficulties around comparing empirical work on capital flows and capital controls. First, there is no generally accepted measure of the intensity of capital controls; second, there may be a two-way causal link between capital controls and capital flows; and third, it is difficult to disentangle the effects of capital controls and other factors.

Some general lessons learnt regarding capital restrictions are that they lead to harmful long-run welfare effects, impose high administrative costs, may be an invitation to corruption and that no single capital control measure is universally effective. Furthermore, capital controls tend to be more effective when accompanied by suitable macroeconomic policy as part of a reform programme. Finally, and most importantly, capital controls are no substitute for sound macroeconomic policies and prudential regulation (Sinclair and Shu, 2001). Policy-makers must maintain a longer-term commitment to price stability and remain concerned about how financial instability might impede the pursuit of this objective (White, 2001).

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Capital flows, current-account adjustment and monetary policy in South Africa¹

Ben Smit

Introduction

Balance-of-payments flows have historically played an important role in macroeconomic policy formation in South Africa. This followed from the small open-economy and commodity-rich characteristics of the economy and the consequent importance of fluctuations in foreign capital flows and current-account balances under the conditions of relatively fixed exchange rates. In the years from the early 1990s, but especially from the democratic elections in 1994, the balance of payments became less of a focus of domestic macroeconomic policy. This reflected the generally small imbalances on both the current and capital accounts of the balance of payments, the regaining of full access to the international financial markets, and the switch to a flexible exchange rate regime.

More recently, however, and especially since 2004, the magnitude of South Africa's balance-of-payments flows has increased substantially. Foreign capital inflows, presumably associated primarily with the international commodity price boom and the improved domestic macroeconomic performance, have increased sharply to levels last experienced in the 1950s. These inflows financed both a significant increase in foreign-exchange reserves (from US\$8 billion in 2003 to US\$33 billion in 2007) and, especially, a sustained sharp increase in the deficit on the current account of the balance of payments. This current-account deficit is persisting and has reached levels (8,9 per cent of gross domestic product (GDP) in 2008Q1) that are raising concerns about its sustainability. In addition, the current international financial turmoil may well have adverse implications for foreign capital flows to emerging-market economies such as South Africa. Under these conditions a sharp slowdown in foreign capital inflows (a so-called sudden stop) and a (likely) associated sharp reversal of the current-account deficit may well come about – raising questions about the appropriate policy response, if any, to the developments on the balance of payments.

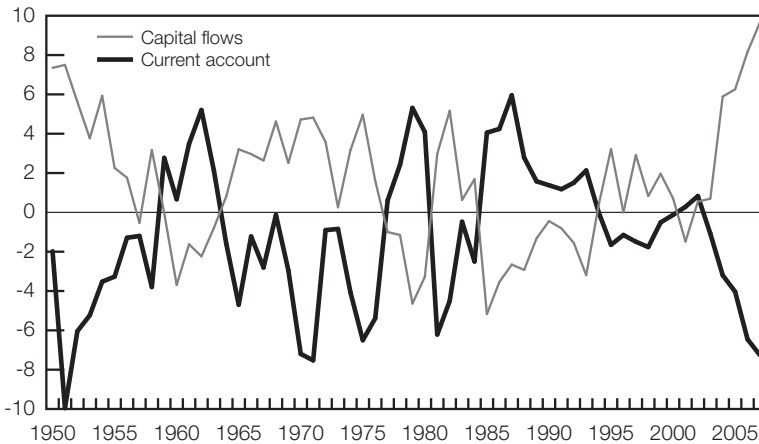
In this paper the recent and prospective developments regarding South Africa's foreign capital flows and the associated current-account developments, as well as the appropriate monetary policy responses are considered. In section one, the main characteristics of South Africa's recent foreign capital flows and current-account developments are presented briefly. This is followed, in section two, by a brief review of the international experience regarding current-account deficits, sudden stops of capital

flows, current-account reversals and the macroeconomic impact of such reversals. Against this background the sustainability of South Africa's current-account deficit is considered in section three. Section four is devoted to a consideration of the appropriate macroeconomic (especially monetary) policy responses. Finally, the macroeconomic impact of a sudden stop of foreign capital flows to South Africa under alternative macroeconomic policy assumptions is modelled in section five, followed by conclusions in section six.

1. Recent balance-of-payments developments in South Africa

From a longer-term historical perspective, South Africa's balance-of-payments flows are characterised by substantial volatility in both the current-account balance and international capital flows. This volatility is reflected clearly in Figure 1 and may be ascribed, *inter alia*, to South Africa's position as a major commodity exporter and the impact of domestic political developments in the early 1960s, the second half of the 1970s and the mid-1980s.²

Figure 1: Current-account balance and capital flows as a percentage of gross domestic product



Source: South African Reserve Bank

In the first decade since South Africa's democratic transition in 1994, the volatility of the balance-of-payments flows and the magnitudes of both the current and capital account balances appear to have declined substantially (see Figure 1). Since 2004, however, the magnitude of these balances has increased dramatically. Capital flows (total capital movements, including errors and omissions) increased from 0,7 per cent

of GDP in 2003 to 5,9 per cent in 2004 and 9,7 per cent in 2007 (see Table 1). The balance on the current account, in turn, increased from a deficit of 1,1 per cent of GDP in 2003 to 3,2 per cent in 2004 and 7,3 per cent in 2007. Both these trends continued in the first half of 2008.

In “explaining” the recent behaviour of the current account and capital flows, the current account can be viewed either as the difference between imports and exports of goods and services or the difference between gross domestic saving and gross capital formation (investment). The capital flows, in turn, can be described with reference to the different types of flows identified by the South African Reserve Bank in the balance-of-payments statistics.

Table 1: South African balance-of-payments and national account variables: 2000–2008Q2

	Current-account balance	Trade balance	Services and income balance	Exports: Volume index	Imports: Volume index	Terms of trade	Gross domestic savings	Gross capital formation	Total capital inflows
2000	-0,1	3,5	-3,0	100	100	100	15,8	15,9	0,7
2001	0,3	4,4	-3,5	102,3	100,3	101,2	15,6	15,3	-1,5
2002	0,8	4,3	-3,0	103,4	105,6	103,4	16,9	16,1	0,5
2003	-1,1	2,1	-2,6	103,5	114,1	107,2	15,8	16,9	0,7
2004	-3,2	-0,1	-2,3	106,5	130,7	108,3	14,5	17,7	5,9
2005	-4,0	-0,4	-2,5	115	144,2	108,8	14,0	18,1	6,3
2006	-6,5	-2,4	-3,0	121,5	171,3	113,6	14,0	20,4	8,2
2007	-7,3	-2,0	-4,2	131,5	189,2	117,1	14,1	21,4	9,7
2008Q1	-8,9	-2,8	-5,1	125,5	194,7	122,8	13,9	22,8	8,7
2008Q2	-7,3	-1,4	-4,7	137,5	195,0	117,0	14,8	22,1	7,9

All variables, except indices, are expressed as a percentage of GDP

Source of data: South African Reserve Bank *Quarterly Bulletin*, September 2008

From the trade (i.e., imports and exports) perspective it appears that the current-account deficit resulted primarily from a turnaround in the trade deficit (of more than 5 per cent of GDP since 2000) since the services and income balance declined by only about 2 per cent of GDP over the same period (see Table 1). The trade deficit, in turn, resulted from a relatively poor export performance combined with booming imports – the latter driven by the very strong domestic demand growth since 2004. An increase in the terms of trade (by 17 per cent from 2000 to 2007) helped to limit the increase in the deficit.

From the savings-investment perspective, the statistics in Table 1 indicate that the increase in the current-account deficit primarily resulted from the increase in investment (from 15,3 per cent of GDP in 2001 to more than 22 per cent in 2008) and a limited decline in savings (from 16,9 per cent of GDP in 2002 to 14,1 per cent in 2007).

The sustained increase in the current-account deficit was facilitated by the sharp increase in foreign capital flows to South Africa, especially since 2004. These capital inflows, which reached historically high levels in 2006 and 2007, were large enough both to finance the increased current-account deficit and allow for a substantial increase in the country's official foreign-exchange reserves (see Table 2). Apart from the magnitude, the composition of these inflows is also of interest. By far the greater majority of the inflows was portfolio capital and then specifically equity rather than bond inflows (see Table 2 and Figure 2). This is in sharp contrast to most other emerging-market economies where the foreign direct investment inflows dominated over the past decade (see IMF, 2008). Another category of capital inflows that has contributed significantly to the total inflows since 2004 is that of errors and omissions.³

Table 2: South African foreign capital flows and gross reserves

	Total capital flows (including errors and omissions)	Net direct investment	Net portfolio investment	Net other investment	Errors and omissions	Gross reserves
2000	0,7	0,5	-1,5	1,2	0,5	-
2001	-1,5	8,4	-6,6	-4,1	0,8	8,9
2002	0,5	1,8	-0,4	-0,3	-0,5	5,6
2003	0,7	0,1	0,5	-1,8	1,8	4,2
2004	5,9	-0,3	2,9	0,6	2,6	5,9
2005	6,3	2,4	1,9	0,6	1,3	8,5
2006	8,2	-2,8	7,4	1,3	2,3	10,2
2007	9,7	0,7	4,2	3,3	1,5	11,2
2008Q1	8,7	6,4	-3,8	5,4	0,6	12,7
2008Q2	7,9	0,2	4,0	3,4	0,4	12,0

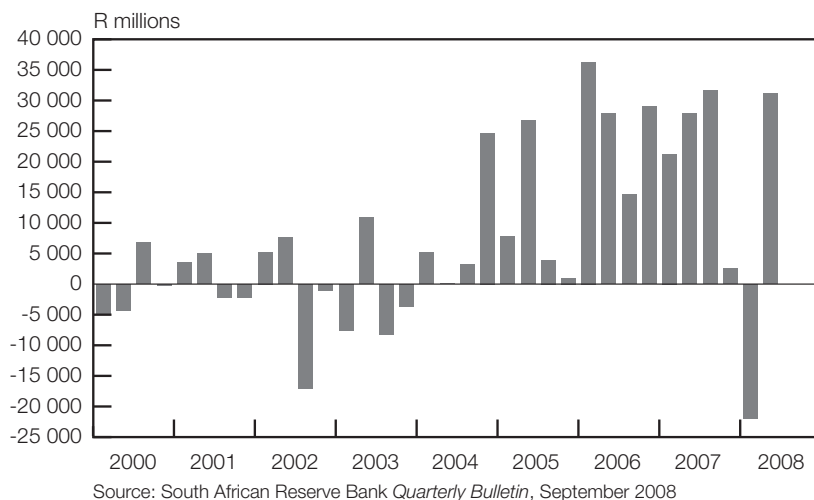
All variables are expressed as a percentage of GDP

Source of data: South African Reserve Bank *Quarterly Bulletin*, September 2008

The current levels of South Africa's foreign capital inflows and the current-account deficit are very high by South African historical standards. This, combined with the current international financial turmoil and its potentially adverse implications for financial flows to emerging-market economies, raises questions about the sustainability of these inflows and, consequently,

of the current-account deficit. It also raises questions about the appropriate macroeconomic policy response. Are the potential costs of a sharp slow-down (sudden stop) in these capital outflows and the likely associated reversal in the current-account deficit sufficient to justify policy intervention? If deemed to be the case, should the authorities attempt to pre-empt such an event by inducing a reversal of the current-account deficit? In order to investigate these questions, the pertinent international experience is considered in the next section.

Figure 2: Non-resident net purchases of securities on the JSE



2. The international experience

Balance-of-payments developments and, in particular, those in international capital flows and current-account deficits, have received considerable exposure in the literature over time. In recent years much of this interest has emanated from the sustained large United States (US) current-account deficit and the large-scale capital flows to emerging-market economies.⁴ Among other things, this literature has focused on the magnitude and persistence of current-account deficits, sudden stops of capital inflows (to emerging-market economies), current-account deficit reversals and the causes and (macroeconomic) consequences of these events. In this section the relevant details that resulted from this literature are presented briefly.

The characteristics of current-account deficits relevant to an analysis of current-account sustainability have been documented in a number of studies.⁵ Edwards (2006: 43), in a summary of the international experience with current-account deficits over the period 1971–2004, found that

- the median (mean) deficit was 3,1 (4,0) per cent of GDP
- the third quartile was 7,2 per cent (i.e., 75 per cent of the deficits were smaller or equal to 7,2 per cent of GDP)
- 9 (out of 157) countries experienced persistent (i.e., five consecutive years or longer) high deficits.⁶

Another characteristic of the international experience with current-account deficits that has been analysed is that of the frequency (incidence) of current-account reversals, that is, sharp reductions in current-account deficits. Edwards (2006: 21) also analysed this feature of the international experience during the period 1970–2004 and found the incidence of current-account deficit reversals for the overall sample of countries considered to be 17,2 per cent. The definition of a reversal he used was that of a reduction in the current-account deficit of at least 3 per cent of GDP over a period of one year. The incidence of reversals varied considerably between regions, from 5,3 per cent for the industrial countries to 22,8 per cent for the African regions.

Milesi-Ferretti and Razin (1997) also researched the incidence of current-account reversals. Their definition of a reversal is that of an average reduction in the deficit of at least 3 (5) percentage points of GDP over a period of three years and one where the maximum deficit after the reversal must be no larger than the minimum in the three years preceding the reversal. Their investigation covered the period 1974–1990 and they found 116 reversals in 60 countries (72 reversals in 40 countries) for the 3 percentage point (5 percentage point) criterion.

The International Monetary Fund (IMF) has also recently considered the incidence of current-account reversals. Defining large and sustained reversals as swings in the current account of at least 2,5 per cent of GDP and at least 50 per cent of the initial current-account balance that are sustained for at least five years (IMF, 2007a: 83), the IMF identified 16 deficit reversals in emerging-market countries and 13 deficit reversals in advanced economies over the period 1960–2006.

Current-account reversals have also been found to be closely associated with sudden stops of foreign capital inflows, that is, large declines (more than 5 per cent of GDP or more than two standard deviations below its sample mean). Guidotti et al. (2004) analysed 313 such cases and found that in 265 of these, a current-account adjustment of 2 per cent of GDP or more was required. Edwards (2005) found that in 46,8 per cent of the cases, a country experiencing a sudden stop also experienced a current-account reversal.

It is clear that sudden stops of capital inflows, large current-account deficits and large-scale reversals (and thus the non-sustainability) of current-account deficits are common occurrences internationally.

The concerns about current-account sustainability arise because of the potential negative impact of a reversal of a large current-account deficit (i.e., a change in the deficit to a surplus or a much smaller deficit) on economic growth and other macroeconomic variables. This issue has been considered in a number of recent studies on current-account deficits. The studies reveal that the macroeconomic impact of current-account reversals is not uniform across countries. This has led to considerations of the factors that may influence the nature and severity of these macroeconomic impacts.

The literature on the impact of current-account reversals on economic growth and other macroeconomic variables is by no means unanimous in its findings. Some studies find significant adverse effects, while others find no systematic impact. Edwards considered the possible negative impact of current-account reversals in a number of studies. In a National Bureau of Economic Research (NBER) paper (2001:37) on whether the current-account matters, he finds that “reversals have a negative impact on economic performance. They affect negatively aggregate investment; moreover, even when I control for investment, the regression analysis suggests that reversals have a negative impact on GDP growth per capita.” In another NBER paper (2005) on the sustainability of the US current-account deficit, Edwards finds (for large countries) the reduction in GDP growth of a Type 1 reversal (i.e., a reduction of the current-account deficit of at least 6 per cent of GDP in a three-year period) of 3,2 percentage points.

Debelle and Galati (2005) considered the macroeconomic impact of current-account reversals (28 reversals in industrialised countries during the period 1974–2003). They found that, on average, a decline in economic growth of 2 percentage points and a real exchange rate depreciation of 4 per cent, but questioned whether the direction of causality runs from the current-account imbalance.

Milesi-Ferretti and Razin (1998: 20) found, in an analysis of 100 reversal episodes in low- and middle-income countries, that “the median change in output growth between the period after and before the event is around zero, suggesting that reversals in current-account deficits are not necessarily associated with domestic output compression.”

The IMF, in the most recent *World Economic Outlook* (2007b) also considered the impact of current-account reversals in advanced economies. They (2007: 87) found (for current-account reversals of 6 per cent of GDP on average and lasting for 4 to 5 years) an average slowdown in growth of 1,5 percentage points and an average real depreciation of the domestic currency of 12 per cent. They also distinguished between a group of “contractionary” deficit reversals (with a median 3,5 percentage point

growth slowdown and a median 8 per cent real exchange rate depreciation) and a group of “expansionary” reversals (a median increase in GDP growth of about a 0,75 percentage point and a median real depreciation of about 18 per cent). They concluded that “over the past 40 years, there has been a clear trade-off between the growth slowdown after the reversal and total real effective exchange rate depreciation” (p. 89).

In a recent review of the costs of reversals in current-account deficits (71 episodes since the mid-1970s, Algieri and Bracke (2007) found that, on average, the adjustments were accompanied by “some slowdown in real GDP growth and some real effective depreciation in the deficit country”. However, they also found an unusually large degree of heterogeneity, with the real GDP increasing in one third of the cases and the real exchange rate appreciating in one third of the cases.

The wide diversity of country experiences regarding the macroeconomic impact of current-account deficit reversals has resulted in research on the identification of factors that can explain these diverse experiences. Studies that have focused on this issue include Edwards (2004), Guidotti, Sturzenegger and Vilar (2004), Milesi-Ferretti and Razin (1998), and Algieri and Bracke (2007). Edwards identified three such factors, namely (1) openness of the economy (the more open, the smaller the cost of a reversal), (2) the extent of dollarisation (foreign currency denomination) of a country’s foreign debt (the more dollarised, the bigger the negative impact of a large exchange rate depreciation) and (3) the exchange rate regime (the more flexible the exchange rate, the smaller the impact of a deficit reversal). However, only the openness and exchange rate regime factors proved statistically significant in Edwards’s (2004: 35–38) empirical analysis. Guidotti, Sturzenegger and Vilar (2004) considered the same three factors plus the terms of trade, and found all four statistically significant. Milesi-Ferretti and Razin (1998), in a study of low- and middle-income countries identified openness, the level of appreciation of the exchange rate and the level of external debt as factors that could influence the macroeconomic impact of a current-account deficit reversal.

Algieri and Bracke (2007) found that the type of reversal/adjustment experienced is not a function of characteristics such as the openness of the economy or its degree of industrialisation, but rather of the underlying problems in the deficit country, for example countries in an advanced stage of the business cycle experienced internal adjustment whereas external adjustment was experienced by countries with an overvalued exchange rate.

3. The sustainability of South Africa's current-account deficit

The recent South African experience of sustained large-scale foreign capital inflows and the associated current-account deficits, seen against the international experience of sudden stops of such capital inflows and the (often) associated current-account reversals, raises questions about the sustainability of South Africa's current balance-of-payments situation (see, for example, Frankel et al., 2007 and Smit, 2007).

In the literature the issue of current-account sustainability has received considerable attention over the past decade (see Debelle and Galati, 2005). Various approaches have been developed to assess the sustainability of current-account deficits. These include (1) the identification of a list of indicators of sustainability (see Milesi-Ferretti and Razin, 1996); (2) calculating current-account norms (based on the determinants of current-account balances); (3) the "predicted" and actual current-account positions for a particular country (see IMF, 2007); and (4) *ex post* assessments of actual current-account adjustments in order to predict the occurrence of current-account adjustments (Milesi-Ferretti and Razin, 1998).

The sustainability of South Africa's current-account deficit has also been considered in the literature. Smit (2007) has calculated (based on similar analyses done by the IMF (see IMF, 2006) the level of South Africa's current-account deficits required to stabilise the country's net foreign liabilities at particular levels. If the net foreign liabilities measure used is that of South Africa's end-2006 level (the average emerging-market level) the current deficit consistent with sustainability is approximately 1 per cent (3 per cent) of GDP. Frankel et al. (2007) considered the sustainability of South Africa's current-account deficit from the perspective of factors that have been identified in the literature as being important in indicating the likelihood of a current-account reversal. They considered the following factors:

1. Southern Africa's current deficit is relatively large (especially relative to recent emerging-market standards)
2. South Africa's foreign debt levels are relatively low (23 per cent of GDP in 2006)
3. A substantial portion of the debt is rand-denominated (37,3 per cent in 2006)
4. The South African economy is moderately open
5. As far as the composition of South Africa's foreign liabilities is concerned, the short-term component is quite small, but the share of equity plus foreign direct investment (FDI) in total capital inflows is average relative to comparable countries.

They concluded that the current-account deficit was probably not sustainable at the policy settings current at the time of their analysis.

4. Macroeconomic policy responses

The potentially adverse impacts of sudden stops of foreign capital inflows and the (often) associated current-account deficit reversals naturally raise questions about potential policy intervention. In this regard, policy can focus on a number of different issues, namely (1) policy measures aimed at limiting the capital inflows or their effects on, for example, domestic demand and the exchange rate; (2) policy measures aimed at pre-empting an abrupt larger-scale current-account reversal; and (3) policy measures aimed at facilitating the current-account reversal that may be required by the sudden stop of capital inflows.

In the case of South Africa's current balance-of-payments situation, the central question is clearly not that of limiting capital inflows given the relatively poor domestic savings performance and the need to finance a continued strong investment drive. The pertinent question is rather what macroeconomic policy (monetary policy in particular) can contribute to facilitating the reversal of the current-account deficit that would be required (given the limited, albeit improved, level of the official foreign-exchange reserves). A related question is whether macroeconomic policy measures should be used to pre-empt such a reversal by ensuring a substantially reduced current-account deficit before a sudden stop occurs.

In terms of specific macroeconomic policy measures aimed at reversing a current-account deficit, conventional thinking distinguishes between policy measures aimed at *switching* expenditure (from foreign to domestic goods and services) and reducing domestic expenditure (and thus imports and also releasing resources for increased exports). In the case of the former, exchange rate changes and exchange controls are typical examples, and in the case of the latter, changes in interest rates (and other monetary policy instruments) and fiscal policy. Government foreign borrowing and/or access to IMF credit facilities also forms part of the policy tool kit – especially as an alternative/supplement to running down the country's foreign-exchange reserves.

An important issue in the formulation of monetary policy measures to facilitate a current-account deficit reversal is the nature of the country's exchange rate regime. This follows from the so-called impossible trinity paradigm of open-economy macroeconomies, that is, the inability simultaneously to target the exchange rate, allow full capital mobility and conduct an independent monetary policy.

In the case of South Africa the current exchange rate regime is one of a relative clean float – a choice that has recently been confirmed as being appropriate by the "Harvard" team of economists that considered South

Africa's economic policies (see Frankel et al., 2007). It is also a choice that is consistent with the inflation-targeting monetary policy framework (since February 2000).

The implication for the monetary policy responses to facilitate the current-account adjustment in the event of a sudden stop of capital inflows of South Africa's current monetary policy framework is consequently that currency adjustment (depreciation) is likely to constitute an important part of the response. Under these circumstances the policy choice is obviously not the change in the exchange rate itself, but the decision to leave the response to the foreign-exchange market. Any changes in the repurchase (repo) rate (responding to both the inflation impact of the exchange rate depreciation and the need to restrict domestic demand to facilitate the current-account adjustment) remain as the explicit monetary policy response.

The monetary policy response would also depend on any fiscal policy measures aimed at the same goal. In this respect, fiscal policy has been found particularly useful (see IMF, 2007b) and forms the crux of the above-mentioned "Harvard" group's macroeconomic policy recommendations for South Africa.

5. Sudden-stop scenarios

What could the macroeconomic impact of a sudden stop of foreign capital inflows to the South African economy be and what effect could alternative combinations of macroeconomic policy have in such an event? In this section the results of a macro-model simulation exercise aimed at providing one set of answers to the question above are presented. The model used to generate the scenarios is the medium-term macroeconomic forecasting model of the South African economy developed at the Bureau for Economic Research at Stellenbosch University.⁷ The sudden-stop scenarios modelled consist of a single set of alternative foreign capital flow and world economic growth assumptions, combined with different sets of macroeconomic policy assumptions. The different scenarios are compared to a base-run scenario forecast for South Africa for the period 2008–2013, which assumes that the sudden stop of capital inflows and the associated adverse world economic growth conditions do not come about.

The quantified details of the base-run scenario and the various alternative sudden-stop scenarios are presented in Table 3.

The various scenarios modelled may be briefly described as follows:

1. Base-run scenario:

- A standard forecast scenario for the South African economy based on the information on domestic and world conditions available in the second quarter of 2008.

2. Sudden stop version I:

- A scenario with adverse alternative assumptions for the period 2009–2013 on the performance of the world economy and international capital flows to South Africa.⁸
- The policy response provided for in this scenario is a combination of exchange rate depreciation and repo rate increases of roughly equal magnitudes.

3. Sudden stop version II:

- Similar world economy and international capital flow assumption to those of version I.
- Policy response assumptions that allow for a relatively larger portion of the required current-account adjustment to be borne by exchange rate depreciation.

4. Sudden stop version III:

- Similar world economy and international capital flow assumptions to those of version I.
- Policy response assumptions that allow for a relatively larger portion of the required current-account adjustment to be borne by repo rate increases.

5. Sudden stop version IV:

- Similar world economy and international capital flow assumptions to that of version I.
- Policy response assumptions that allow for fiscal policy (in the form of increased personal taxes) to share the burden of the required current-account adjustment with monetary policy.

The results suggest the following:

- A substantial part of the adjustment to the reduced capital inflows in the first two years (2009 and 2010) is provided by the official foreign-exchange reserves, which decline by approximately 50 per cent.
- The impact on economic growth varies between -1,7 percentage points in 2009 (scenario III) and +0,8 percentage points (scenario II). The cost in terms of growth foregone increases the heavier the reliance on interest rate increases and the less the reliance on exchange rate depreciation.
- The improvement in the current-account deficit varies between 2,5 per cent of GDP (scenarios II and IV) and 1,9 per cent of GDP in 2009 (scenario III). The bigger the exchange rate depreciation, the bigger the current-account improvement.

Table 3: Sudden-stop scenarios: 2008–2013

Scenarios	2008	2009	2010	2011	2012	2013
1. Total capital inflows to South Africa (US\$ billions)						
Baseline	22,2	17,5	22,0	22,0	22,0	24,0
Scenario I	22,2	5,0	5,0	10,0	15,0	15,0
Scenario II	22,2	5,0	5,0	10,0	15,0	15,0
Scenario III	22,2	5,0	5,0	10,0	15,0	15,0
Scenario IV	22,2	5,0	5,0	10,0	15,0	15,0
2. Exchange rate (ZAR/US\$)						
Baseline	7,75	8,31	8,87	9,40	10,04	10,66
Scenario I	7,75	10,39	11,54	11,09	11,40	12,16
Scenario II	7,75	10,92	12,19	11,40	11,58	12,28
Scenario III	7,75	9,41	11,08	10,78	11,19	12,01
Scenario IV	7,75	10,44	11,65	11,33	11,64	12,36
3. Exchange rate (real effective)						
Baseline	98,94	98,46	96,14	93,89	91,42	89,02
Scenario I	98,94	83,07	80,29	87,67	87,55	83,96
Scenario II	98,94	78,34	76,74	87,30	88,01	84,43
Scenario III	98,94	92,61	82,03	87,89	87,12	83,63
Scenario IV	98,94	81,46	78,46	85,50	86,56	83,84
4. South African repurchase (repo) rate						
Baseline	11,69	11,37	10,49	9,40	9,29	9,17
Scenario I	11,69	15,55	15,84	13,13	10,37	9,00
Scenario II	11,69	14,61	16,54	14,26	10,85	8,97
Scenario III	11,69	16,59	14,75	12,13	10,02	9,16
Scenario IV	11,69	13,39	14,15	12,98	11,34	9,90
5. Current account as a percentage of GDP						
Baseline	-7,2	-6,6	-6,5	-6,2	-6,3	-6,2
Scenario I	-7,2	-4,3	-4,1	-3,6	-3,2	-2,9
Scenario II	-7,2	-4,1	-4,1	-3,6	-3,1	-2,8
Scenario III	-7,2	-4,7	-4,0	-3,7	-3,4	-3,1
Scenario IV	-7,2	-4,1	-4,2	-4,0	-3,5	-3,0
6. Foreign reserves (US\$ billions)						
Baseline	32,6	30,2	31,5	32,6	32,6	33,3
Scenario I	32,6	22,2	16,9	18,0	23,7	28,9
Scenario II	32,6	22,0	17,2	18,6	24,8	30,4
Scenario III	32,6	22,3	16,6	17,5	22,9	27,6
Scenario IV	32,6	22,7	17,3	17,1	22,1	27,3
7. Inflation rate (CPIX)						
Baseline	11,4	7,0	5,7	5,7	5,5	5,2
Scenario I	11,4	8,3	8,4	7,2	5,3	4,6
Scenario II	11,4	8,4	9,4	8,2	5,4	4,3
Scenario III	11,4	7,9	6,9	6,5	5,3	5,0
Scenario IV	11,4	8,4	8,2	7,4	6,1	5,1
8. Real GDP growth (percentage change)						
Baseline	3,39	3,17	4,84	4,68	4,33	4,73
Scenario I	3,39	3,02	3,82	3,51	4,30	5,55
Scenario II	3,39	3,93	4,10	2,81	3,92	5,50
Scenario III	3,39	1,49	4,26	4,15	4,62	5,59
Scenario IV	3,39	2,75	4,41	4,43	3,85	4,94

- The impact on the inflation rate (on average for 2009 and 2010) varies between 1,1 percentage points (scenario III) and 2,6 percentage points (scenario II). The higher inflation cost is obviously associated with the greater reliance on exchange rate depreciation.
- The interest rate increases (on average for 2009 and 2010 relative to the base case) vary between 2,8 percentage points (scenario IV) and 4,8 percentage points (scenario III). When considered over the two years 2009 and 2010, the interest rate increases relative to base are very similar for all the scenarios, except scenario IV (which is about half those of the other scenarios).
- The exchange rate depreciations (ZAR/US\$) relative to base in 2009 vary from 13,2 per cent (scenario III) to 31,4 per cent (scenario II) and from 24,9 per cent (scenario III) to 37,4 per cent (scenario II) in 2010.

6. Conclusions

Arguably, the current most significant macroeconomic risk to the South African economy is the high and sustained current-account deficit and the possibility that the large-scale foreign capital inflows, which have provided the financing of this deficit over the past four years, may decline sharply. Should this happen, the current-account deficit could not be sustained for long, implying a sharp reversal of the deficit and the possibly adverse macroeconomic conditions generally associated with such an event.

The question facing the monetary (and perhaps also the fiscal) authorities in South Africa is how they should respond. Should they endeavour to pre-empt such an event by facilitating an orderly decline in the current-account deficit through appropriate macroeconomic policy measures or should they only react when a sudden stop event actually comes about. And if they decide to intervene (either before or after the event), what would the appropriate policy measures be?

The answer to the first question, based on the analysis presented in this paper, and in my opinion, is not to attempt to pre-empt for the following reasons:

1. The opportunity cost in terms of the economic growth and employment foregone should foreign investors (lenders) have been prepared to continue to finance South Africa's current-account deficit.
2. The likely resilience of the South African economy in terms of the macroeconomic costs of a sudden stop-cum-current-account reversal event (i.e., the likely relative small opportunity cost of not pre-empting).
3. The implications of South Africa's floating exchange rate regime in that the authorities cannot, under these conditions, proactively use the exchange rate as a policy tool to facilitate an improvement in the current-account deficit.

The answer to the second question is less unequivocal. The standard monetary policy (interest rate and exchange rate adjustments – the latter being a market reaction in this case) and fiscal policy (tax or spending adjustments) are all potentially useful.⁹ The model-based scenarios presented in section 5 give some idea of the relative costs and benefits of alternative combinations of these – assuming that the macroeconomic model used here reflects the South African macroeconomic structure reasonably well.

Notes

¹ The sharp (negative) changes in foreign capital inflows in the first quarter of 1996 and in the second quarter of 1998 did, however, result in sharp exchange rate depreciations and monetary policy reaction, especially in 1998.

² See Mohr et al. (1989) and Mohr (2003) for detailed analyses of South Africa's balance-of-payments history.

³ Errors and omissions consist not only of unidentified capital movements, but are generally regarded as consisting mostly of capital rather than current-account transactions – hence their classification in the balance-of-payments statistics as part of the capital account items.

⁴ See, for example, Edwards (2005), Croke, Kahn and Leduc (2005), and IMF (2007b).

⁵ See Edwards (2004) for a comprehensive documentation of current-account imbalances over the period 1970–2001.

⁶ Edwards (2006: 44) defined a 'persistent high deficit' as one that exceeded the ninth decile for the country's region for at least five consecutive years. An earlier study (Edwards, 2004) found that 26 out of 157 countries over the period 1970–2001 experienced persistent high deficits (defined here as exceeding the third quartile of each region).

⁷ An earlier version of the model is documented in Smit and Pellisier (1997). It should be noted that the model does not feature forward-looking expectations and may thus be subject to the well-known Lucas critique.

⁸ These adverse alternative assumptions consist of the following: (1) G-7 GDP growth lower by 0,7 and 1,0 percentage points in 2009 and 2010, respectively; (2) commodity prices declining by 5 and 7 percentage points in 2009 and 2010 relative to the baseline changes; (3) the US dollar 7 per cent weaker against the euro from 2009 to 2013; and (4) the oil price lower by US\$15 on average for 2009 to 2013.

⁹ In the event of a large decline in (sudden stop of) private capital inflows, the authorities would probably first consider generating official foreign financing (such as direct government borrowing and/or an IMF facility) before resorting to restrictive macroeconomic policy measures.

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Commentary: Capital flows, current-account adjustment and monetary policy in South Africa

Elna Moolman

There can hardly be any more pertinent economic issue in the South African economy than the one researched in this paper. This paper's largest contribution lies in the macroeconomic model framework used to evaluate empirically different policy interventions that are aimed at reversing the huge current-account deficit. The paper essentially evaluates the economic cost of reversing the current-account deficit through different combinations of interest rate and exchange rate adjustments. One fiscal policy intervention is also considered. The key findings of the paper are as follows:

- The larger the interest rate adjustment, the higher the economic growth cost associated with the current-account reversal.
- The larger the exchange rate adjustment, the larger the current-account impact associated with the current-account reversal. However, a larger exchange rate adjustment is, according to the results, also associated with a larger adjustment in inflation.
- In the final scenario, where fiscal policy intervention is also considered, the results show that there can be a trade-off between fiscal and monetary policy. In other words, other policy objectives may determine the desired balance between monetary and fiscal policy interventions.

Complementary literature review

The prominence of global current-account imbalances spurred a wealth of research on the general characteristics associated with the correction of current-account deficits. This could give useful guidance in forecasting the reversal of the domestic deficit, even though no two cases are exactly the same. The experiences of different countries, and even the same country at different moments, will be influenced by a host of factors, including global sentiment, global liquidity, policy credibility, global inflation conditions, the underlying inflation rate, and the extent of exchange rate pass-through to inflation, which may in itself be time-varying.

Some of the key conclusions in the literature not deliberated in the paper under discussion are as follows:

- The *income growth correction* usually involves a combination of slower domestic demand growth, lower imports and higher exports. The adjustment is usually associated with a deterioration in fiscal balances and a pause in the accumulation of official reserves (Freund

and Warnock, 2005). In developed countries, growth typically peaks two years in advance of the current-account deficit and is back at pre-deficit levels four to five years after the trough in the current-account shortfall (Freund, 2000). Freund (2000) estimates that a current-account reversal usually involves a reduction in growth from around 3,0 per cent to around 1,0 per cent; Edwards (2006) shows that growth in gross domestic product (GDP) per capita usually drops by between 3,5 percentage points and 5,0 percentage points.

- Adjustment through the external balance usually occurs first through *import compression* and with a longer delay in *improved export performance* (Freund, 2000). The pick-up in exports is usually more important than the retreat in import growth. Therefore, current-account reversals in emerging markets usually occur when growth in developed countries is strong, due to the positive impact on emerging-market exports.
- In most countries, the *savings rate* declines before the current-account reversal, while the investment rate drops after the reversal with no further change in the savings rate (Freund, 2000).
- Generally, a large part of any associated *exchange rate adjustment* precedes a current-account reversal (Freund and Warnock, 2005). A current-account reversal does not necessarily involve a currency crisis (Freund, 2000; Milesi-Ferretti and Razin, 1998); less than a third of reversals were historically preceded by a currency crisis (Milesi-Ferretti and Razin, 1998). Most countries experience a cumulative real depreciation of around 20,0 per cent beginning in the year before the maximum current-account deficit (Clausen and Kandil, 2005). Current-account deficits usually benefit from a currency adjustment with a lag of around two years (Edwards, 2006).
- *Larger current-account deficits* usually take longer to reverse and they tend to be associated with more severe income growth moderations (Freund and Warnock, 2005).
- Current-account deficits driven primarily by *investment* (as opposed to consumption or fiscal) expansion tend to be reversed largely through a slowdown in GDP growth rather than currency depreciation. This could be the result of a decline in the investment rate once the capacity constraints that led to the investment boom have been addressed. The opposite is true for consumption-driven current-account shortfalls (Freund and Warnock, 2005). This is arguably owing to foreign investors being more punishing towards the currencies of countries where elevated current-account deficits are driven by consumption, rather than investment. In the former case, the deficit would clearly be unsustainable. In the latter case, investors may be more tolerant in anticipation of eventual increases in economic growth and, by extension, investment returns.

- The literature suggests that very large current-account deficits do not matter as long as they are the result of higher (private-sector) investment (Corden, 1994) and “a higher deficit in the current account in response to domestic growth goes hand in hand with its own external financing” (Clausen and Kandil, 2005).
- There is no statistical correlation between the *composition of the funding* of the current-account deficit and the relative importance of the adjustment through the income or exchange rate channels (Freund, and Warnock, 2005). The funding composition also does not seem to impact on the severity of the adjustment. In *emerging markets*, all types of capital inflows typically decline at the time of the current-account reversal (Rothenberg and Warnock, 2005). In the case of industrial countries, by contrast, the adjustment is most pronounced through banking or ‘other’ flows in the financial account of the balance of payments and the adjustment usually occurs in the year following the current-account trough (Freund and Warnock, 2005).
- Reversals of current-account deficits occur through a combination of *exchange rate depreciation and slower income growth* (Freund, 2000; Freund and Warnock, 2005). Countries that resist exchange rate adjustments (through, for example, fixed exchange rate regimes) generally sacrifice more in terms of income growth than those allowing for exchange rate adjustment. Current-account reversals in *emerging markets* are generally not associated with large changes in growth, possibly because of relatively larger exchange rate adjustments (Milesi-Ferretti and Razin, 1998; Chin and Prasad, 2003; Freund and Warnock, 2005). Generally, growth in more open economies tends to suffer less during a current-account reversal (Milesi-Ferretti and Razin, 1998).

Examples of global current-account reversals include the following:

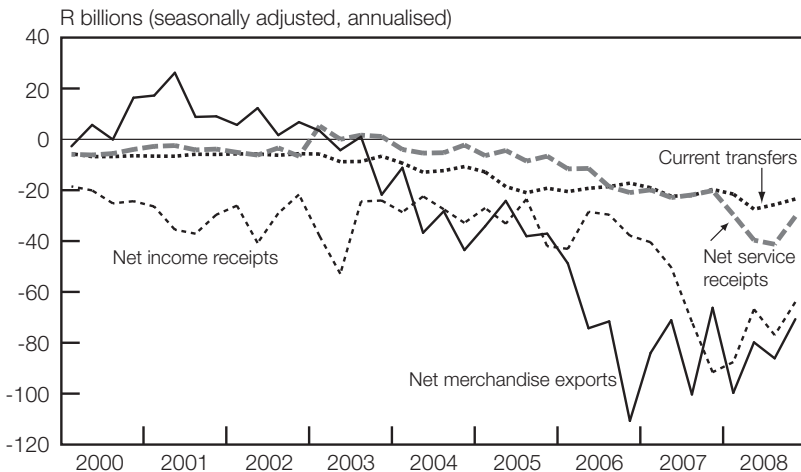
- *Australia*’s current-account deficit of 6,1 per cent of GDP in 1989 fell to 3,6 per cent of GDP two years later. Its economic growth rate swung from 5,1 per cent in 1989 (when the deficit peaked) to 1,4 per cent the following year and -1,0 per cent two years later. It only recovered to 3,8 per cent in 1993 – four years after its deficit had peaked. The Australian dollar depreciated by 17,0 per cent between 1989 and 1993. However, this current-account reversal was not sustainable. By 1995 its currency and growth rate had reverted to the levels that prevailed prior to the current-account correction and its current-account shortfall rose to 5,3 per cent of GDP in 1995.
- *New Zealand* managed to reduce a deficit of 6,3 per cent of GDP in 1999 to 2,6 per cent of GDP two years later, while its economic growth rate fell from 4,0 per cent to 2,7 per cent and its currency depreciated by 18,0 per cent. However, its currency subsequently appreciated by 46,0 per cent and its deficit reached -8,7 per cent of GDP in 2006.

- *Canada's* deficit of 4,2 per cent of GDP in 1981 was reversed abruptly to a 0,6 per cent surplus in 1982. Over this period, its growth rate fell from 5,0 per cent to -2,9 per cent, before recovering to 2,8 per cent in 1983. Its currency depreciated by 18,0 per cent between 1981 and 1985.
- *Italy* reversed a deficit of 2,4 per cent of GDP in 1992 to a surplus of 0,8 per cent the following year. Between 1992 and 1993 its economic growth rate dropped from 0,7 per cent to -1,1 per cent, before recovering to 2,2 per cent in 1994.
- A current-account deficit of 5,1 per cent of GDP in the *United Kingdom* in 1989 was reversed to 1,8 per cent two years later. The pound did not depreciate materially, but economic growth fell from 5,2 per cent in 1988 to 2,1 per cent in 1989, and 0,6 per cent and -1,5 per cent in the two subsequent years respectively.

The South African current-account deficit

Figure 1 clearly illustrates that the deterioration in the current-account deficit in recent years is largely due to a deterioration in the *trade account*, which went from a traditional surplus position to a shortfall that exceeded the other two main components of the current account (net service and income receipts). This was the result of higher imports in all the categories, including strong growth in capital goods on the back of double-digit growth in real fixed capital formation, which has a high import intensity. The trade shortfall is unprecedented; not even during the investment boom of the early 1980s did the trade account swing into a

Figure 1: Composition of balance of payments

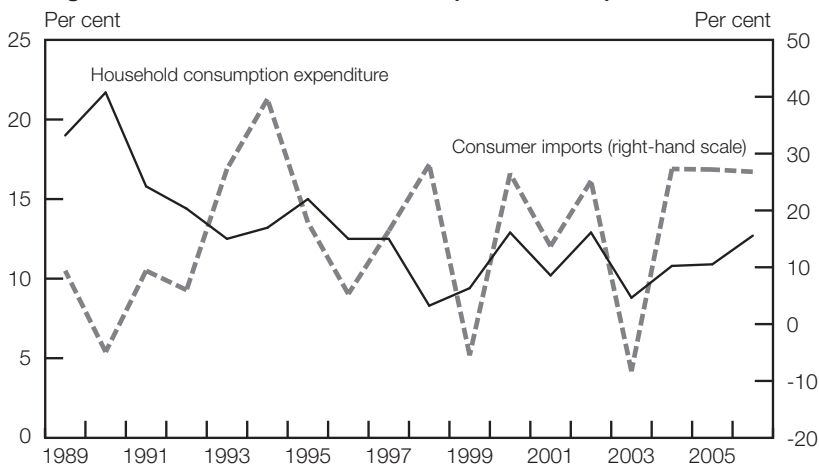


Sources: South African Reserve Bank and Barnard Jacobs Mellet Research

sustained deficit. However, any historical comparison is complicated by the structural/political changes that took place in the economy. In particular, elevated trade and current-account deficits were impossible during the era of international sanctions against South Africa, which limited the availability of foreign capital. South Africa's trade and current-account deficits therefore had to be contained, and this, in turn, curbed actual and potential economic growth. The trade and current-account deficits were seen as imposing speed limits on the economy's performance. The current record-high trade and current-account deficits could therefore be partly attributable to the unprecedented access to foreign capital that is available and willing to fund the shortfall.

An analysis of the composition of imports suggests that *consumer goods* constitute around 25,0 per cent of total goods imports. This part of the trade deficit is expected to respond to the slowdown under way in consumer demand. If the current *investment expansion* is reasonably interest rate insensitive, as appears to be generally accepted, then the bulk of the import account may be somewhat unresponsive to the tighter monetary policy stance and softer business cycle. However, the investment cycle is expected to be moderately sensitive to higher interest rates and the slowdown in consumer demand. If this is the case, it could offer some reprieve to the growth in the current-account and trade deficits.

Figure 2: Growth in consumer imports and expenditure

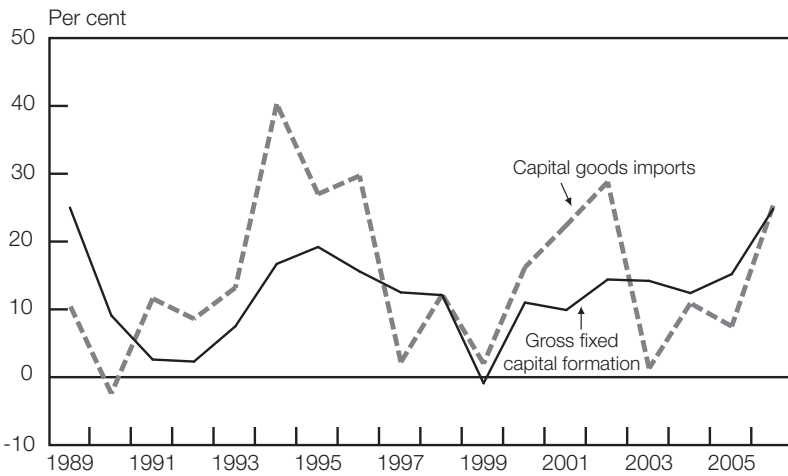


Sources: Industrial Development Corporation, South African Reserve Bank, South African Revenue Service and Barnard Jacobs Mellet Research

A closer look at these two types of imports is instructive. While the ratio of *capital goods imports* to total imports remains reasonably steady at around 3,6 per cent, the ratio of capital goods imports to fixed capital

formation has risen materially in recent years from around 26,4 per cent in 1990 to 46,4 per cent in 2006. However, on the back of the construction boom in recent years, capital spending has become less import-intensive to a ratio of 46,4 per cent in 2006 from a peak of 56,6 per cent in 2002. There is a reasonably strong correlation between growth in capital formation and capital goods imports (see Figure 3). The nominal capital formation growth is expected to slow materially. This component of the current-account deficit-to-GDP ratio could therefore continue to rise in 2008.

Figure 3: Growth in capital imports and expenditure



Sources: Industrial Development Corporation, South African Reserve Bank and Barnard Jacobs Mellet Research

While the ratio of *consumer goods imports* to total imports remains reasonably steady at around 25,3 per cent, the ratio of consumer goods imports to total household consumption expenditure has risen materially in recent years from an average of around 14,0 per cent in 1990 to 26,8 per cent in 2006.

Consumer spending has therefore clearly become more import-intensive, arguably at least partly due to rising GDP per capita.¹ It is noteworthy that there is a reasonably strong correlation between growth in household consumption expenditure and consumer goods imports, with the growth in consumer goods imports being much more volatile (see Figure 2). This suggests that the slowdown under way in consumer demand will likely be associated with substantially slower, if any, growth in consumer goods imports.

Imports of *raw materials and intermediate goods* have risen faster than the other merchandise import categories since 2005. This category rose to 42,0 per cent of goods imports in the first quarter of 2007 from 37,0 per cent of goods imports in 2005. This surge in raw material and intermediate goods imports was owing to a combination of rapid price escalation and volume growth. The subsequent decline in the prices of raw and intermediate materials should curb the growth in these imports. This should be reinforced by softer economic activity. Therefore, some retreat in the nominal growth of this component of the current-account shortfall is expected in 2009.

In recent years the surge in *oil prices* in particular made a large contribution to the widening of the trade deficit. Mineral imports, which are primarily made up of oil imports, rose from an average of 14,0 per cent of total imports in 2004 to 19,0 per cent in 2007. This was largely driven by the escalation in oil prices, although rising oil import volumes also played a meaningful role in this regard. From October 2003 to October 2007, the value of mineral imports rose by 301,1 per cent. Over this period the rand oil price rose by 175,1 per cent.

The substantial rise in net payments to other Southern Africa Customs Union (SACU) members has increased along with the growth in imports, especially since the revision of the formula in 2002. The average ratio of net *SACU payments* to goods imports rose from 2,7 per cent between 1990 and 2002 to 3,9 per cent between 2002 and 2007. These payments now constitute around 1,1 per cent of GDP.²

Table 1: Econometric model: Exports*

Variable	Coefficient	t-value
Constant	-2,9	-2,8
Nominal effective exchange rate	-0,3	-4,2
Commodity prices (South African rand)	0,7	13,7
Global demand	2,2	8,9
R ²	99,1%	

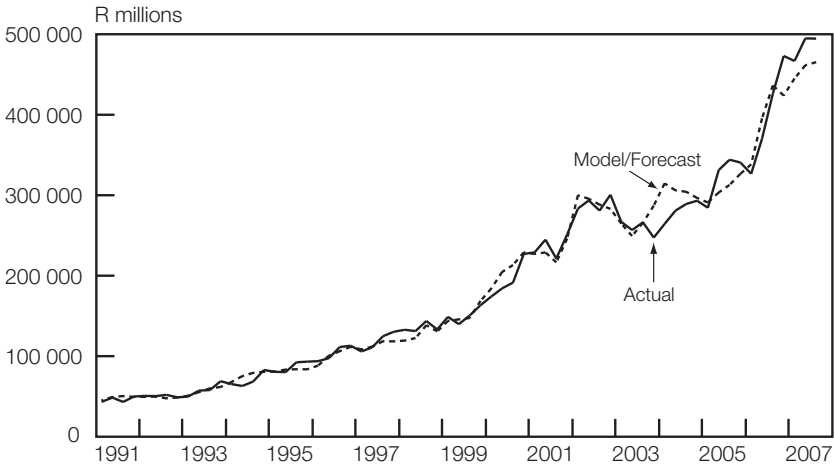
* All the variables are in natural logarithmic form

Source: Barnard Jacobs Mellet Research

Barnard Jacobs Mellet (BJM) Securities' econometric model of South African exports suggests that they are driven by commodity prices, global growth and the South African rand (see Table 1).³ Unfortunately, it is impossible to measure the benefits of the ongoing infrastructure and

capacity expansion accurately, which means that it cannot be captured accurately in econometric models such as those in Figure 4. BJM’s imports model suggests that imports are driven by gross domestic expenditure (GDE), the rand and exports (see Table 2 and Figure 5).⁴

Figure 4: Econometric model of exports



Sources: South African Reserve Bank and Barnard Jacobs Mellet Research

Table 2: Econometric model: Imports*

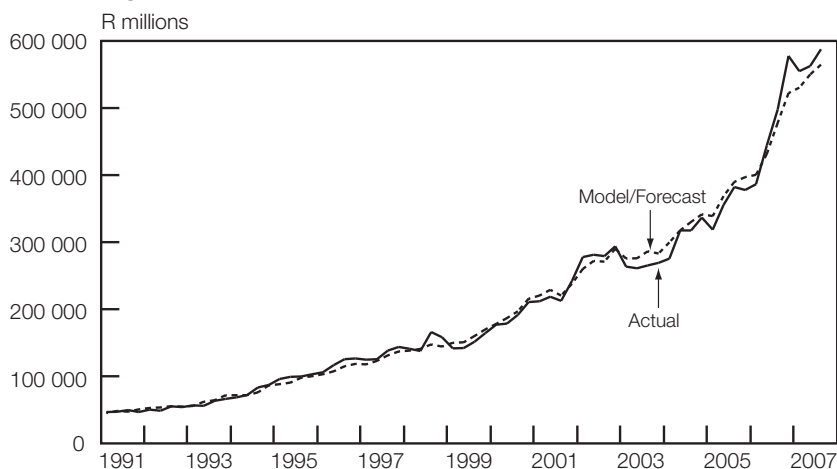
Variable	Coefficient	t-value
Constant	-3,7	-8,8
Gross domestic expenditure	0,7	6,5
Nominal effective exchange rate	0,1	1,2
Exports	0,5	5,0
R²	99,5%	

* All the variables are in natural logarithmic form

Source: Barnard Jacobs Mellet Research

Net exports should gradually begin to reap the benefits of the ongoing investment boom and improvements in infrastructure. However, in the short term, gains in net exports will be curbed by weak global demand. While the slowdown in growth will be less pronounced in the developing countries in which growth tends to be more commodity-intensive, they will not escape unscathed. The possible exposure of excess capacity in China, in particular, could curb growth in the demand for, and prices of, *commodities*.

Figure 5: Econometric model of imports



Sources: South African Reserve Bank and Barnard Jacobs Mellet Research

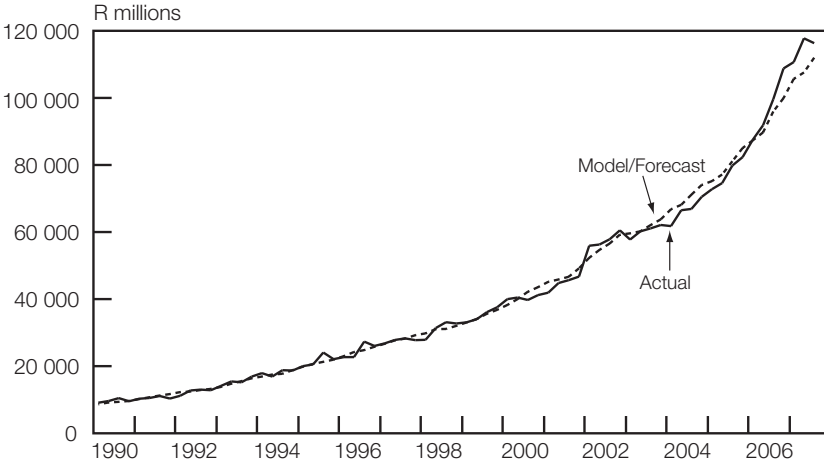
The research under discussion largely assumes that the so-called invisible portion of the current-account deficit (largely service and income payments and transfers) is structural or exogenous. This is possibly the macroeconomic model's biggest weakness and would probably distort the empirical results.

Net *services payments*, which are essentially made up of tourism-related payments, have traditionally occupied deficit territory. Although the nominal value of this shortfall has risen rapidly in recent years (see Figure 3), it remains reasonably stable relative to the value of GDP (see Figure 4). Services payments have rarely, if ever, declined historically, which suggests that relief from this segment of the current-account deficit is unlikely. However, during 2003 services receipts rose faster than services payments, following the sharp depreciation of the rand and recovery in the business cycle in 2002. This was the only year since 1980 in which net service receipts had been in positive territory.

An *econometric model of services payments* suggests that these payments are essentially driven by domestic economic growth (see Figure 6). According to BJM's econometric results, a 1,0 per cent increase in nominal GDP would lead to a 1,3 per cent increase in (nominal) service payments.⁵ The statistical criteria indicate that this model is adequate in explaining service payments and that the exchange rate does not play a significant role in driving service payments. Intuitively, tourism outflows are expected to be positively correlated with domestic economic and income growth. This segment of the current-account shortfall therefore

appears to be sensitive to the business cycle. It could therefore very well assist in the reversal of the current-account deficit in the current setting.

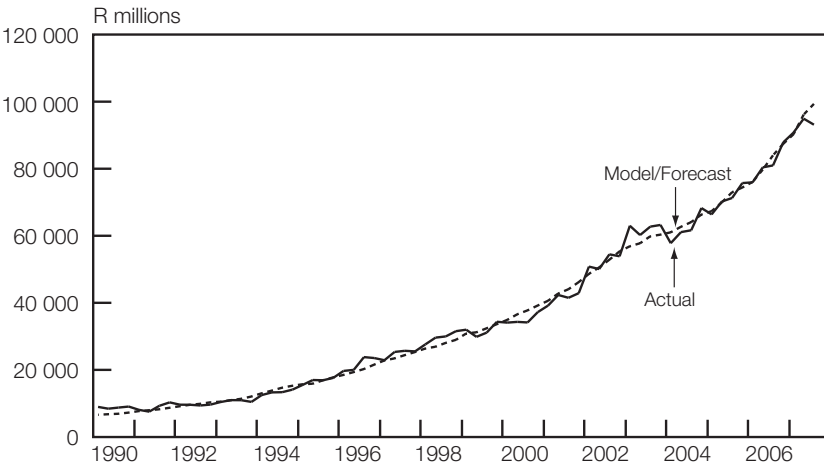
Figure 6: Econometric model of services payments



Sources: South African Reserve Bank and Barnard Jacobs Mellet Research

BJM's econometric model of *services receipts* suggests that they are driven by global economic growth, the rand and domestic growth (see Figure 7).⁶ Intuitively, it would make sense for tourism inflows to rise with domestic economic growth insofar as it attracts business tourism. The

Figure 7: Econometric model of services receipts

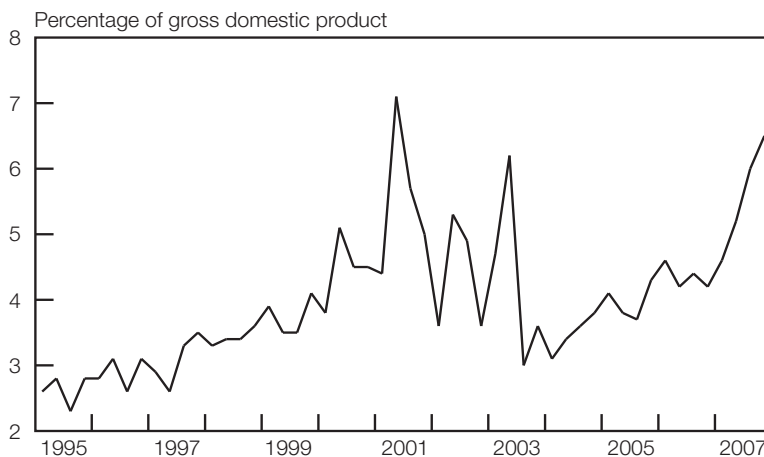


Sources: South African Reserve Bank and Barnard Jacobs Mellet Research

domestic business cycle is also closely correlated with that of other economies in the region, which would explain why higher domestic economic growth will be positively correlated with tourism inflow from neighbouring countries. Around 71,0 per cent of foreign tourists visiting South Africa come from other African states and the top four source countries are all immediate neighbours.⁷ According to the econometric results, service receipts will rise by around 1,1 per cent in response to a 1,0 per cent rise in nominal GDP. This would suggest that the benefits of the business cycle slowdown in curbing service payments mentioned earlier may be partly offset by the concomitant impact of domestic growth on service receipts.

While the value of net *income payments* (essentially made up of dividend and interest payments) has risen rapidly in recent years, it is not extraordinarily high (compared with historical values) when expressed as a ratio to GDP (see Figure 8). The income account has historically been somewhat volatile and, unlike the services account, occasionally recorded outright declines, which makes the possibility of material relief from this segment of the current-account deficit somewhat more plausible than from services.

Figure 8: Income payments



Sources: South African Reserve Bank and Barnard Jacobs Mellet Research

Changes in *income receipts and payments* have high correlations with changes in the *exchange rate* (with no significant difference between their correlations with the US dollar/South African rand versus the trade-weighted rand). Both income payments and receipts are negatively correlated with the rand, so that a stronger rand tends to be associated with lower income payments and lower income receipts. Income receipts

are probably suppressed by the translation effect of a stronger rand on foreign currency income, as well as the disincentive that it creates towards repatriation of investment returns earned abroad.

Dividend payments may generally be lower during periods of rand strength due to their adverse impact on the profitability and, by extension, dividend payments by the mining sector, which still plays a disproportionate role in the domestic stockmarket. *Interest payments* may be lower during periods of rand strength insofar as they will underpin lower inflation and, in turn, interest rates. Changes in income payments and receipts seem to respond to changes in the rand with a lag of around two quarters, given that they have a higher correlation than that between concurrent changes in net income payments and the rand.

Econometric modelling of income payments proved to be instructive and intuitively sensible. The importance of continued net foreign purchases of domestic bonds and equities was very clear. It was virtually impossible to get a model that satisfies the economic and statistical criteria without including a measure of the stock of bonds and equities held by foreigners. However, due to data constraints in this regard, one should guard against over-emphasising the estimated coefficients.

Since the primary focus of this commentary is on the response of income payments to interest rates and the business cycle, the *dividends* on the JSE All-Share Index were also modelled econometrically to avoid the data problems associated with measuring the value of foreigners' holdings of South African bonds and equities. According to the results, dividends are driven in the long run by nominal GDP growth, interest rates and commodity prices, which are in line with *a priori* expectations. According to the analysis, dividends generally increase in line with nominal GDP. At first glance this may seem to suggest that dividend payments could potentially offer some reprieve to the current-account shortfall if nominal economic growth subsides in 2008. History shows that the ratio of income payments to GDP has continuously risen due to the accumulation of domestic securities by foreigners (see Figure 8). This could therefore corroborate the conclusion in the literature that current-account reversals in emerging markets usually partly stem from a decline in capital inflows. Meaningful reprieve from dividend outflows is unlikely unless *foreign purchases of domestic securities* subside (as they did towards the end of 2008).

Alternatively, net income payments could decline if *income receipts* were to rise. This could stem from a rise in South Africans' holdings of foreign securities and/or a rise in the yield earned by South Africans on investments abroad. The latter is unlikely, given that interest rates and forecast earnings growth are higher domestically than in South Africa's major trading

partners. Further relaxation of the remaining *exchange controls* could therefore assist in reversing the current-account deficit in the same way that it had assisted in boosting the deficit. However, while the National Treasury earlier in 2008 relaxed exchange controls with regard to institutions, most of the institutions remain well below the regulatory thresholds.

Reversal of the domestic current-account shortfall

In terms of the reversal of the South African current-account deficit, the literature review and global experience therefore suggest the following:

- The growth in *imports* should moderate in response to the slowdown under way in domestic demand. My economic forecasts are broadly consistent with the global experience that growth peaks around two years prior to the peak in the current-account deficit. Import growth should also be curbed by the anticipated consolidation in commodity prices. The rand depreciation in 2008 should put further downward pressure on imports from 2009.
- Meanwhile, *export* performance should benefit from the investment boom and infrastructure improvements. Export growth will likely be contained this year by softer global growth and commodity prices, but it should thereafter gather pace as global economic conditions improve. The anticipated improvement in export performance is absolutely critical to a reversal of the current-account deficit.
- The literature is somewhat ambiguous on the likely relative importance of the *growth and exchange rate channels* in correcting the current-account deficit. On the one hand, the openness of South Africa's economy and the flexibility of its exchange rate could curb the slowdown in economic growth needed to facilitate a current-account reversal. On the other hand, the investment-driven nature of the current-account shortfall would suggest that softer investment and economic growth will likely be needed as part of the reversal.
- The magnitude of the deficit points towards a *protracted correction* in the current-account deficit.
- The nominal, trade-weighted *South African rand* depreciated by 22,8 per cent between January and October 2006. While it subsequently strengthened somewhat, especially against the ailing US dollar, it is still around 20,7 per cent weaker on a trade-weighted basis than in January 2006. This currency adjustment is in line with other countries in which elevated current-account shortfalls were reversed, even before taking into account the anticipated depreciation in 2008.
- All types of *capital inflows* will likely fall at the time of the current-account reversal. This will not necessarily cause further rand depreciation, if it occurs in response to a reduced need for foreign funding. Co-movement

in foreign capital inflows and the need for it can at least partly be explained by trade credit agreements, where capital goods' purchases are funded with supplier credit. The possible reduction in capital inflows will therefore not necessarily cause substantial further rand depreciation if it is merely a response to a reduced need for foreign funds.

Notes

¹ The small available sample size prevents robust econometric analysis of the determinants of the ratio of consumer imports to spending. It appears as if it may also be influenced by the rand. For example, the ratio fell in the aftermath of the sharp rand depreciations in 1998 and 2001.

² Total government transfers, of which SACU payments make up the bulk, were used in this calculation.

³ Co-integration tests confirmed that the variables are co-integrated.

⁴ The inclusion of exports in this equation captures the need to import certain inputs in the manufacturing of export goods. This is similar to the structure of the South African Reserve Bank's macroeconomic model.

⁵ Co-integration tests confirmed that the variables are co-integrated.

⁶ The regression has an R^2 of 99,2 per cent. Co-integration tests confirmed that the variables are co-integrated.

⁷ This is measured by the number of tourists. Neighbouring countries are also six of the top ten source countries of foreign tourists to South Africa.

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Commentary: Capital flows, current-account adjustment and monetary policy in South Africa

Khathu Todani

1. Introduction

Smit's paper addresses one of the most important and topical issues in international economics. It starts by providing a brief overview of the balance-of-payments developments in South Africa. The general observation is that the current-account deficit in South Africa is rather large by historical standards, but it is comfortably financed by increases in capital inflows. These capital inflows, however, are predominantly portfolio capital. The paper then digresses and looks at international experiences covering issues such as sudden stops and current-account reversals. Then the issue of current-account sustainability is discussed, which is quite important, given the current global financial crisis. Section four of the paper is devoted to a consideration of appropriate macroeconomic (especially monetary) policy responses. Finally, the macroeconomic impact of a sudden stop of foreign capital flows to South Africa under alternative macroeconomic policy assumptions is modelled and analysed.

2. Sustainability

Several issues raised in Smit's paper merit some comments. First, the issue of sustainability needs further interrogation. The author cites at least two studies as proof of the non-sustainability of the South African current-account deficit, that is, Smit (2007) and Frankel et al. (2007). The conclusions reached from both these studies are not very tractable. The criteria used in Smit (2007) of choosing net foreign liabilities are ad hoc and thus can generate any result that the author desires. Similarly, Frankel et al. (2007) draw a probability conclusion without providing the magnitude of the probability. Of course, these are standard tools for evaluating current-account sustainability and have been used by a number of authors as pointed out in the paper. However, this points to an important area of future research, that is, there is a need for more rigorous interrogation of current-account sustainability in South Africa. Edwards (2006) provides a good starting point in this regard.

3. Policy

The other issue raised in the paper relates to policy options available to deal with current-account deficits. The paper focuses more on monetary policy and, to a lesser extent, on fiscal policy. The questions then are (1) is there a role for other policies such as fiscal and trade policies and (2) is

there a role for confidence-building initiatives, given that, to a large extent, the current financial crises are basically crises of confidence? The issue here is that there is a need to be more comprehensive when one searches for an appropriate policy response.

4. Macro-model simulation

Smit's paper also provides some interesting macro-model simulation exercises. Unfortunately, the author provides no model on which the simulation is based. Understandably, often these models, given their size, can be difficult to present in the text, but authors typically include a model or, at a minimum, a subset of critical equations in an appendix for readers to appreciate what they have done. In the absence of a model, the paper is basically a "black box" and it is therefore difficult to make an informed evaluation. However, suffice to mention that authors need to be extra careful when using non-micro-founded "large-scale econometric models" (assuming that they are of the type used in the paper) for policy simulation (see, for example, Favero, 2007).

5. Scenarios

The scenarios provided in the paper need to be reconsidered. As they are, they seem incomplete and not systematically "question-driven". Take, for example, a sudden-stop scenario, version I. With adverse assumption on both the performance of the world economy and capital flows, how does one separate the impacts? Moreover, with a floating exchange rate system in South Africa, how does one justify the exchange rate as a policy instrument? Thus, there is a need to rethink the policy scenarios analysed here. The first scenario, in my view, should be the one that answers the following question: how does a one-off shock to capital flows impact on the other variables? This question is important because policy responses often come at a price and, as such, researchers need to demonstrate necessity for policy response(s).

6. Further research

Finally, there are other questions that the topic raises for further research. There is a need to model fully the early-warning signals of current-account reversals or sudden stops. There is also a need to disentangle the current account fully so that one may understand its components. One needs to understand, for example, (1) the extent to which the outflow is a result of normal dividends paid out to foreign shareholders, given the reasonable amount of foreign ownership in South Africa; and (2) whether this is an investment-driven current account or a consumption-driven one. In this way one will begin to have a better understanding of the current-account deficit and its implications. This paper, nonetheless, is interesting since it begins to address an important question that South Africa faces in the current financial turmoil.

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The global economic crisis and its impact on South Africa and the country's mining industry

Roger Baxter

Introduction

The purpose of this briefing note is, firstly, to provide a brief overview of the impact of the global financial crisis on South Africa and the country's mining industry in particular. Secondly, the note will focus on measures that South African stakeholders need to consider in order to ride out the current crisis and in order to prepare the country for the next global economic upturn.

Defining the global financial crisis

During 1999 the Clinton administration in the United States (US) placed political pressure on Fannie Mae and Freddie Mac (two quasi public-sector mortgage lending institutions) to start lending to low- and moderate-income households. The Clinton administration's objective was to expand access to housing for poorer households. This pressure also fed through into the commercial financial sector. In essence, the pressure to lend to poorer households implied that financial institutions would assume greater levels of risk. During 'flush' economic periods when asset prices (such as housing and equity prices) are rising, there are more limited risks to the lending banks. During periods of 'bear' market conditions, declining asset values would elevate the risk to banks significantly. In particular, when property prices fall below the value of the mortgage loan provided to the poorer household (i.e., a move into negative equity), the likelihood of that poorer family sustaining debt repayments diminishes significantly, resulting in rising foreclosure rates. Under normal financial and prudential regulation banks are generally required to sustain a portion of depositors' capital to loans. Financial institutions, with the best and the brightest, of course, went into 'innovation overdrive' to try to mitigate the risks of lending to low-income households. The loans to low-income households, the so-called sub-prime mortgages were then securitised, packaged as collateralised debt obligations (CDOs) and on-sold to various investors. This was also another way of taking the loans off the balance sheets of banks, to ensure that these financial institutions remained within the prudential requirements. The challenge is that the underlying debt remained to the banks.

During 2004 to 2006 US interest rates rose from 1 per cent to 5,35 per cent and the US housing market began to take strain. Falling house prices and rising interest rates led to increasing numbers of people who could not repay

their mortgages. Investors suffered losses, making them reluctant to take on more CDOs. Credit markets froze as banks became reluctant to lend to one another, not knowing how many bad loans could be on their rivals' books. Interbank lending rates spiked. Investors in banks withdrew their equity and depositors tried to withdraw their cash deposits, resulting in significant solvency and liquidity problems for the exposed banks. These problems rapidly spiralled out of control into a crisis of confidence in the banks and in the credit markets. Consumers in the US were hit hard by rapidly escalating fuel and food prices, the higher cost of debt, and the inability to obtain credit retreat from the consumer markets, forcing a significant slowdown in the US economy (two-thirds of which is driven by household expenditure).

The impact of the sub-prime mortgage crisis was then quickly shown to have implications beyond the US. Losses were felt by investment banks as far afield as Australia and Europe. Firms cancelled sales of bonds worth billions of dollars, citing market conditions, and consumers in these markets followed the US example. By April 2008 the US Treasury and US Federal Reserve Bank had to bail out two financial institutions as the 'credit freeze' gripped their financial system. Like a pack of dominoes, most banks with large sub-prime exposures joined the solvency and liquidity fracas. As liquidity issues became more challenging, investors began to withdraw funds from emerging markets in a so-called flight to quality as risk aversion set in. This further exacerbated the freeze in global credit markets and resulted in further significant declines in all stock markets. The freezing of global credit markets and the sudden significant slowdown in the large industrialised economies quickly translated into a number of country-specific rescue packages being announced as governments attempted to restore some confidence back into the financial system by helping with solvency (cash injections and the purchase of equity) and liquidity (by reducing interest rates and guaranteeing deposits).

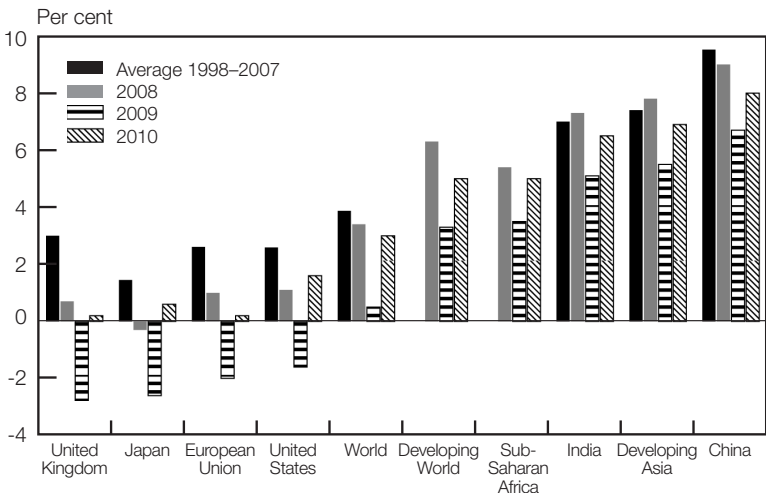
Impact of the global financial crisis on the world economy

As a result of the sub-prime crisis, the world's 15 top banks have seen their market capitalisations fall from US\$1,7 trillion in the second quarter of 2007 to US\$500 billion by 20 January 2009 (JPMorgan Eastern Europe, Middle East, Africa (EEMEA) team), a decline of two-thirds. Current estimates (Standard & Poor's, 2008) suggest that some US\$25 trillion in asset values (share prices and property values) has been wiped out at the global level, due to the unwinding of the leverage created by the global sub-prime financial crisis. This means that the approximate gross domestic product (GDP) of both the European Union and the US has been wiped out in one year – and not surprisingly consumers in these key markets have run for cover after experiencing a significant decline in

personal wealth. Coupled with consumers cutting back on purchases in the 12 months to November 2008, some 2,6 million Americans lost their jobs; the biggest decline in employment since World War II.

The unwinding of the sub-prime mortgage market, and the significant impact on household and corporate wealth have thus affected the demand side of many of the world's largest economies. The result has been that the International Monetary Fund (IMF) and the World Bank downgraded their economic growth forecasts twice during the second half of 2008. In the *Global Economic Outlook* published by the World Bank in November 2008, the world's economic growth rate is expected to slow to only 0,9 per cent in 2009 and world trade growth is expected to decline by 2 per cent; the first such decline since 1990. The situation is expected to remain volatile in the short term and further downgrades to the growth picture are possible.

Figure 1: Economic growth rates in key markets



The world's three largest economies (US, European Union and Japan) are expected to have negative economic growth rates in 2009 and overall global economic growth is expected to decline to 0,5 per cent in 2009 from 3,7 per cent in 2008.

Short-term prognosis

While the risk of moving into a full-blown depression is evident (small), the increasingly co-ordinated reflationary efforts of the world's governments

and central bankers (via recapitalising banks, guaranteeing deposits, reducing interest rates and through countercyclical fiscal policies) should overcome the deflationary effects of the impact that declining asset prices and the global financial crisis have had on global demand (consumers and companies). In the *short term the news is going to remain negative* as there has been a significant correction in consumer spending in most developed markets and this will feed through into recessions in most advanced economies, and has already affected the investment and export sectors of most developing economies. Global economic growth is expected to slow considerably from 2,5 per cent in 2008 to about 0,9 per cent in 2009, with a modest recovery expected in 2010. Advanced economies are expected to grow at -0,1 per cent in 2009 compared with 1,3 per cent growth in 2008, and developing country growth is expected to slow considerably from 6,3 per cent in 2008 to about 4,5 per cent in 2009. Global trade growth is expecting its first decline in 18 years of -2,1 per cent, which shows the seriousness of the contraction in demand.

The amount of capital available (and flowing) to developing countries in 2009 at about US\$500 billion is half of the 2008 level – and the costs of getting credit have risen considerably (6 to 10 percentage point spread between emerging-market commercial bonds and the US commercial bond market rates). Despite the weakness in the US economy and the fact that the sub-prime crisis emerged in the US, the US dollar has strengthened as investors sought safe-haven status in the US Treasury bill market. The significant depreciation of many currencies against the dollar (caused by this flight of capital and increasing risk aversion) has resulted in many developing countries going into default on their external debts, and thus having to seek out IMF stabilisation packages. At this stage, all indicators seem to be pointing towards a very challenging 2009 as countries (developed and developing) deal with the contraction in global demand and the lack of availability of credit for trade and investment. *Yes, global growth will be lower, but much of the tempo of the recovery will be determined by the pace at which credit markets unfreeze* (due to stimulus programmes, lower interest rates and, hopefully, some improvement in confidence) to enable a pick-up in trade and investment financing. However, the picture does not imply a global recession at this stage.

Possible downside risks

But there are downside risks, which may feed through into pushing the current environment into a possible global depression. A 'depression' is a sustained, long downturn in one or more economies. It is more severe than a recession, which is seen as a normal downturn in the business cycle. If the reflationary efforts of governments and central banks do not unfreeze global credit markets, the ability of countries to trade and for investment to be financed will be severely challenged, which may result

in a prolonged contraction in demand. Limited availability of credit would mean no growth in lending and no growth in investment or demand.

However, the risks may well be more acute at the political level. Already the global financial crisis is spilling over into the streets in countries such as Latvia, where the economic downturn caused by the financial crisis has been severe. In a country such as China, which has to accommodate the urbanisation of 10 to 15 million people annually, the risk of political retreat away from globalisation is a serious one. China's growth rate slowed to 6,8 per cent by the fourth quarter of 2008, and this is below the 7 per cent minimum growth rate that is needed to create employment for the large numbers of people urbanising – so the risks of upheaval have increased.

The last thing the world needs right now is a shift back to a polarised world characterised by trade protectionism and slow growth. Yes, this is a significant blight on the global capitalist system – but it should enable humankind to learn from mistakes and not to retreat into the laager!

Implications of the global financial crisis for commodities

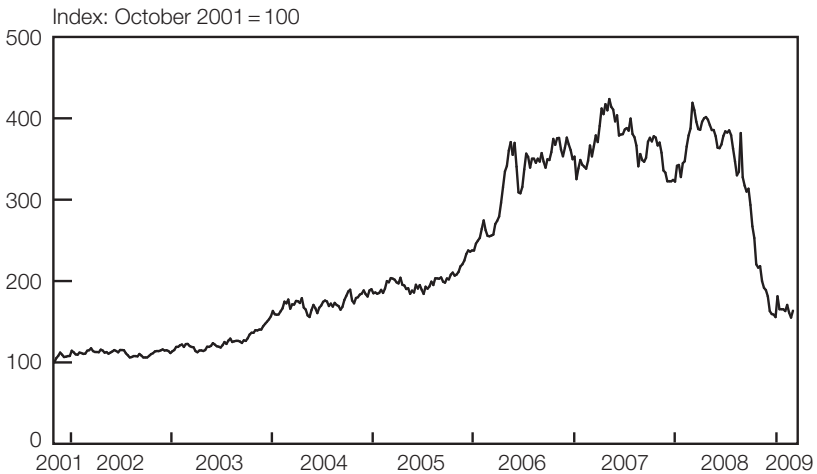
The global economic picture is critically important for the economic health and prospects of the global mineral-resources sector. The recent global commodities boom, which commenced in October 2001, was driven by a confluence of positive factors including

- materials-intensive growth in developing countries and emerging economies with a fast-growing populous (i.e., Brazil, Russia, India and China (BRIC)), driven by significant urbanisation and industrialisation processes;
- reasonable economic growth and the concomitant demand for minerals in advanced economies;
- constraints in supply from mining companies. Mineral supply was relatively constrained as the mining industry grappled with the six 'Ps': constraints in the form of (1) people, (2) procurement, (3) power, (4) permits, (5) projects and (6) politics, resulting in declining stock piles for various minerals; and
- the weakening US dollar.

All these factors had worked together to propel commodity prices upwards. Between October 2001 and mid-2007 the Economist's Metals Index rose by 384 per cent over a period of 84 months, making this boom one with the longest duration and the largest in recent times. However, the sub-prime-induced financial crisis, with its feedback loops back into the real economy, has resulted in two of the above-mentioned variables turning negative. First, economic growth, which is traditionally driven by

consumer expenditure, has collapsed in the advanced economies. Given that these economies account for more than 50 per cent of global GDP and for about 40 per cent of total mineral demand¹ the migration into economic recession has weakened the demand outlook for minerals significantly, while economic growth in these countries remains weak. This, in turn, has resulted in a build-up in stockpiles of various minerals. The second key issue is that the US dollar has strengthened against the euro as investors sought 'safe-haven status' in the US Treasury bill market. The result has been that since July 2008 the Economist's Metals Index has fallen by 50 per cent as most metal prices experienced a significant price reversion.

Figure 2: The Economist's Metals Index, US\$ terms, base indexed from October 2001 to March 2009



Source: Economist.com

Nevertheless, the underlying structural demand story related to the materials-intensive growth in the BRIC economies has not gone away. The body of evidence of the factors supporting this commodity boom has been related to strong demand for minerals, especially in the fast-growing populous countries such as China and due to constrained supply. The fact that the economic growth rates of the BRIC countries are, in part, attributable to their significant urbanisation and industrialisation trends and high investment rates in infrastructure has supported the thesis that the 2001 commodity boom was more *structural* in nature than purely cyclical. In other words, demand for commodities will not totally collapse as the BRICs countries are likely to spend US\$22 trillion on infrastructure in the next decade and some 1,4 billion people are expected to urbanise in the next two decades, while mineral supply was expected to remain relatively constrained as the mining industry grapples with the six 'Ps'.

However, the financial crisis-induced global economic slowdown has already affected the global demand for minerals and some sections of the mining industry have already started to curtail supply in response to weakening demand conditions. Is this the end of the structurally driven commodity bull market? While there is little doubt that the short-term global economic wobble will undermine the commodity cycle, does it mean that the underlying structural factors have disappeared? Yes, the 2001 to 2008 commodity bull market had been driven by a confluence of positive factors listed above, and while some of the positive factors have fallen away (such as the reasonable economic growth in the rest of the world), it does not mean that the materials-intensive growth in the BRIC economies has also collapsed. Yes, the growth rates of these economies will slow down, but they will not go into recession.

Unfortunately, the decoupling theory proposed by several economists, which suggested that the factors driving economic growth in emerging economies were separate from the growth drivers in advanced economies, has proved to be incorrect as all economies have felt the impact of the global financial crisis. This illustrates the increasingly interconnected world in which we live.

However, it is clear that markets exhibit 'irrational exuberance' on the way up and 'irrational pessimism' on the way down. The challenge is that, while it appears that the reversion in commodity prices may have been overdone, it is difficult to predict with any accuracy when some sort of semblance of order will return to the markets and when commodity prices will cover the true long-run marginal production costs of mining more appropriately. It is clear that, in the short term, the order of the day will be volatility in all markets, including the commodity markets.

Likely duration of the financial crisis-induced economic slowdown

The critical question is how long this financial crisis will last? The Japanese banking crisis of the 1990s lasted a whole decade due to a weak and delayed response by government. The Swedish banking crisis lasted 18 months as that country's authorities responded expeditiously to recapitalise their banks. However, this crisis is more serious in terms of magnitude and breadth. While there has already been a speedy response in the developed world to help restore confidence in the system, it is interesting to note that many emerging economies have also responded with lower interest rates and fiscal stimulus programmes. At this stage most economists are expecting a weak global growth performance in 2009, with a recovery in the global economy towards 2010. The amount of liquidity available to emerging-market economies in 2009 is expected to

be half of that made available in 2008, but in the short term, very little credit is available. This does not mean that funding will be unavailable. It means that less will be available and that the costs of accessing the capital will be higher.

Impact of the global economic crisis on South Africa

While ranked in the top 20 economies by size, the South African economy is relatively small and accounts for less than 1 per cent of global GDP. For a small open economy such as South Africa, which is dependent on foreign trade and attracting foreign savings to prop up domestic investment, the country will not be immune to the impact of the global financial crisis-induced economic slowdown. Slower economic growth (and recessions) in key export markets, combined with lower commodity prices and a slowdown in capital flows to developing countries, will impact on the South African economy. Already, certain components of the domestic economy are in recession, including the automotive, mining and retail sectors, although it is important to differentiate between domestic and international factors in relation to the slowdown of sectors.

However, despite being a small and open economy intricately woven into the 'fabric' of the global economy, South Africa's economy has initially weathered the global storm relatively well. Low levels of external debt, appropriate fiscal and monetary policies and a flexible exchange rate have helped 'buffer' the economy against the global storm. Yes, economic growth has slowed, but it is not yet in overall recession. Yes, various sectors remain under pressure, but appropriate counter-cyclical fiscal policy and the large infrastructure investment programme are helping to take up some of the slack. Compare the performance of South Africa to other developing countries, such as some of the Baltic countries, where high levels of external debt and inappropriate fiscal policy have forced these countries to seek IMF bail-outs. So South Africa's economy has done relatively well, but challenges will continue to increase in the short and medium term.

The reality is that, despite having the appropriate buffers, many sectors and many companies have moved into 'survival mode', which means they are focused on surviving the global crisis. However, *the critical point to be made is that if these companies and sectors can be helped to survive, then a significant portion of the labour force will remain employed. The key business input is therefore that a growing vibrant private sector is the basis for creating and retaining employment in the South African economy.*

In addressing these challenges, stakeholders must guard against 'knee-jerk reactions' to structural issues in the global economy. Stakeholders must be careful not to jeopardise long-term prosperity in responding to the

current crisis. In averting the current challenges, social partners must strike a skillful balance and avoid adopting policy responses that will jeopardise the long-term economic sustainability and prosperity of South Africa.

Impact of the global economic crisis on the South African mining sector

The global picture is clearly important for a large mineral-producing country such as South Africa. Despite the global commodities boom and a recovery in fixed investment in the sector, mining production in South Africa has continued to decline and the country has not been able to take full advantage of the global boom. A combination of factors has been responsible, including infrastructure challenges (rail, ports and electricity), regulatory red tape (especially environmental permits) and production disruptions due to safety shutdowns. The additional issues of the squeeze on the global banks and investors will also affect the funding of projects going forward. The following are the likely implications of the financial crisis-induced global economic slowdown for the South African mining sector (with the caveat that the impact may be different per mineral):

- Revenues for some minerals are likely to decline precipitously in 2009 as the sharp fall in US dollar prices has not necessarily been compensated for in terms of depreciation in the rand exchange rate. For example, in the case of platinum group metals, assuming a 10 per cent decline in production in 2009 (on 2007 data), plus the current price of about US\$900 per ounce produced, would result in revenues of ZAR60–ZAR70 billion, versus the ZAR90–ZAR100 billion achieved in 2008. Whereas in the coal sector, while export prices have declined there is the 'base load' of locally sold coal where prices will remain stable. In the diamond market, given that 75 per cent of the market for cut diamonds is the US, Japan and Europe, and these countries or regions are going into recession, the ability to sell diamonds into these markets has diminished and prices have declined by 30–50 per cent. The challenges regarding the delayed release of diamonds once the 10 per cent has been offered to the State Diamond Trader have also prejudiced the diamond mining companies.
- Lower revenues and higher production costs will result in a number of mines at the upper end of the cost curve being forced to cut costs, restructure, delay capex, and may possibly result in the closure of shafts and in some cases force shafts to be placed on care and maintenance. The reality is that some mines or shafts face imminent closure as their costs of production unsustainably exceed their revenues. Again, this will vary according to mineral type.
- The restructuring of these operations to enable survival is likely to have employment consequences. Again, this will vary according to mineral type.

- It is clear that most mining companies have been forced to review capital investment and exploration programmes. This will result in a reduction in capital investment in the sector and may lead to certain expansion projects being placed on hold. However, a number of the capital investment projects that are core to some of the companies will be sustained through this challenging period.
- The decline in the availability of credit or liquidity will affect all mining companies, but the junior resource companies will be harder hit. This is likely to force further consolidation in the mining sector and reduce the growth rate in the junior sector.
- The levels of corporate taxes paid by the mining sector will plunge. In 2007 the sector paid R22 billion in direct corporate taxes, which represented about 20 per cent of all corporate taxes paid.
- Shareholders will receive substantially lower (if any) dividends in the next 18 months as mining companies focus on survival and cost containment.
- The impact on the South African economy will be substantial. Export earnings, GDP growth, investment and employment are all likely to be affected by this crisis. Smaller capital spending and a focus on cutting costs in terms of procurement will affect all supplier industries.

In essence, most of the mining companies have gone into *survival mode*, with significant consequences for the South African economy.

Possible elements of a short-term support package for the South African economy

Ultimately, the South African response “needs to be *timely, targeted, and temporary* for it to be effective”. It is thus crucial to focus on alleviating short-term societal pressures, namely unemployment and poverty, while supporting private-sector stability, and simultaneously charting a path for sustained future economic growth. In this regard, it is important that appropriate messages are communicated by the leadership of all stakeholders. It is important that such messages reinforce South Africa’s commitment to achieving stated socio-economic objectives; and prudent macroeconomic management.

Perhaps the most important component of any short-term package of measures to help South Africa ameliorate the impact of the global crisis has to be *ensuring that the confidence of investors, the business sector and consumers is not further undermined by any proposals*. Rather, a central theme of any short-term package should be the *maintenance and improvement in confidence in dealing with the economy*. This requires a focus on continuing with the predictability and stability of economic

policies. It must be remembered that as a small open economy South Africa is reliant on growing foreign trade and attracting foreign capital to supplement its investment.

We are all aware that to support higher economic and employment growth in South Africa, we need high rates of fixed investment. It is estimated that over the longer term, for any economy to grow sustainably at a rate of over 5 per cent per annum, an investment rate of 25 per cent of GDP is required. South Africa's investment rate is currently about 22 per cent of GDP. Owing to the country's low savings rate of only 14 per cent of GDP, South Africa has to borrow the balance from rich countries, which results in an 8 per cent current-account deficit (also known as our savings-investment gap). The key point is that to attract the foreign capital, and to promote business and consumer confidence, there has to be stability and predictability in economic policy-making. The recent decline in the South African Business Confidence Index to the lowest level in a decade highlights the risk of any sudden policy changes.

South Africa does not have the same extent of the challenge facing many advanced economies. There does not have to be a bail-out of the banking or other sectors. What is needed is a focus on ensuring that sectors facing problems survive and that South Africa positions itself for future growth.

Specific mining-sector proposals

The mining-industry stakeholders established the Mining Industry Growth, Development and Employment Task Team (MIGDETT) on 1 December 2008. This task team has two mandates: the first is to make recommendations on how to get the mining industry out of the immediate crisis, while the second is to identify all the issues needed to be addressed in order to position the industry to benefit from the next economic upturn. MIGDETT met on four occasions and two main stakeholder principal meetings have taken place to consider the task team's findings.

Recognising significant pressures for survival that a number of companies are facing in the short term and the stakeholders wanting to try and save jobs in the sector, the stakeholders recognised the need to be as flexible as possible to deal with the issues (and to employ some 'out-of-the box' thinking on solutions). The following bullet points summarise an array of issues that were proposed by stakeholders.

- *Reducing cost pressures on mining:* In order to reduce costs and cost pressures to try and keep mines viable and to help preserve employment, the stakeholders should consider ways and means of reducing cost pressures in the industry.
- *Significant financing pressures faced by mining companies:* In the short term, liquidity from international sources is not readily available

for all mining companies, but especially the smaller ones. This significantly impacts on exploration (especially Greenfields exploration), project development and trade financing. What are the roles of direct foreign investments (DFIs) and credit markets in managing the crisis and enabling companies to weather the storm?

- *Mitigating issues that affect production and revenues of the mining sector negatively:* The MIGDETT proposed that stakeholders consider addressing issues (e.g. electricity supply and red tape) that affect mining production, which, in turn, helps reduce costs and stabilises mines.
- *Compliance with legislation in respect of retrenchment:* The task team developed draft guidelines on compliance with the statutory requirements for fair retrenchments. This includes the provisions of the Labour Relations Act and Mineral and Petroleum Resources Development Act (MPRDA), and the timing of the application of section 52 of the MPRDA. In the event that retrenchments are inevitable, these guidelines are to be followed by mining companies as a last resort.
- *Alternatives to retrenchments:* The parties were urged to look at possible alternatives to retrenchment, including areas such as internal company transfers and redeployment and extended leave periods.
- *Mitigating the result of retrenchment:* The Department of Labour and Department of Minerals and Energy have key roles to play in ensuring that social plans are activated when retrenchments take place. Where retrenchments become inevitable, measures such as evoking training to empower workers in different skills should be explored by the stakeholders.

Medium- to long-term issues

As agreed, the stakeholders will investigate unblocking the issues that affect the ability of the sector to respond to the next up-cycle positively. Issues such as dealing with infrastructure bottlenecks, red tape and human capital, in the medium- to long-term issues will require intensive discussion.

Note

¹ PWC 'mine' statistics of mineral sales for the top 40 mining companies by customer location.

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Some policy implications of movements in commodity prices

Logan Rangasamy

1. Introduction

Since 2003, there has been a sharp rise in commodity prices with record highs in real terms being registered in many instances. In addition, the price boom has been broad-based and spread across metals, energy and agricultural commodities. For example, the real prices of energy and metals doubled over the past five years, while the real prices of food commodities have increased by over 75 per cent in recent years (World Bank, 2008).¹

In the main, the rapid rise in prices has been primarily driven by sharp rises in demand as a result of strong global growth. Some attention has also been given to the role of speculative influences on commodity price developments. On the one hand, Krugman (2008) and the International Monetary Fund (IMF) (2006) find little evidence of speculative influences on commodity prices. Calvo (2008), on the other hand, argues that portfolio shifts by investors – partly triggered by lax monetary policy – have increased the demand and hence price of commodities. In essence, according to Calvo, there has been a move away from highly liquid low return assets to investments in commodities, which in general are more risky in nature. This has been borne out in the recent rapid decline in commodity prices as a result of the slowdown in the world economy.

The next section provides a brief analysis of commodity prices as economic indicators. A short review of South African commodity price movements and production volumes is undertaken in section 3. Some policy implications of the movements in commodity prices are highlighted in section 4. The last section concludes.

2. Usefulness of commodity prices as economic indicators

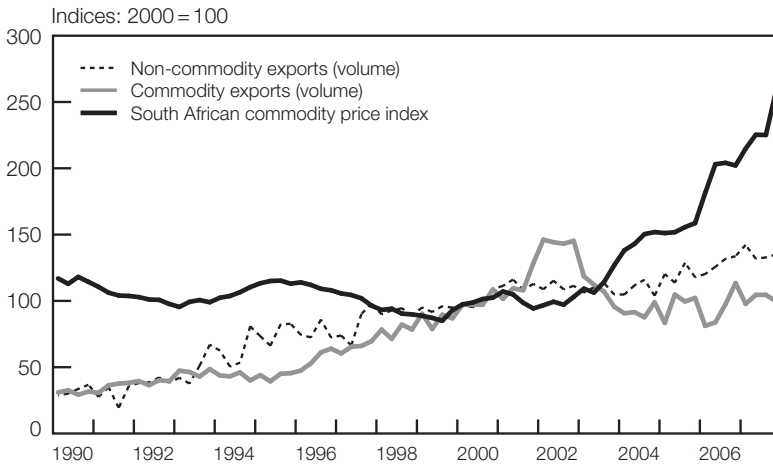
Commodity prices are considered useful economic indicators since they possess some leading indicator properties. For example, they can provide a useful indication of likely future price or cost pressures in the economy. In addition, commodity price movements provide a good indication of the nature of shocks facing an economy; since commodity prices are determined on the international market, commodity price shocks are considered to be exogenous in nature. Probably the biggest benefit of commodity prices is that they are readily available with little

controversy surrounding their measurement in practice. It is therefore not surprising that commodity prices play an important role in policy formulation as is evident by, for example, a mention in almost all monetary policy statements over the past year or so.

3. South African commodity price movements and production volumes

Figure 1 captures the movements in South Africa's commodity price index and export volumes.²

Figure 1: South African commodity export prices and volumes



Source: South African Reserve Bank

South African export prices increased by over 150 per cent between 2000 and 2007. It is, however, interesting to note that commodity export volumes, in general, remained fairly stagnant, while non-commodity export volumes increased by around 35 per cent over this period. There are two points worth noting in this regard. First, the fact that export volumes have not increased may be rational in the sense that the rise in prices may have facilitated higher marginal-cost mining production, which would otherwise not have been possible. Second, while the stagnation in production volumes may be justified on economic grounds, there is little doubt that the recent decline in commodity prices (coupled with the announcement by some of the major mining houses of a cut in mining production) would have an adverse impact on South Africa's growth prospects.

4. Commodity price: Some policy implications

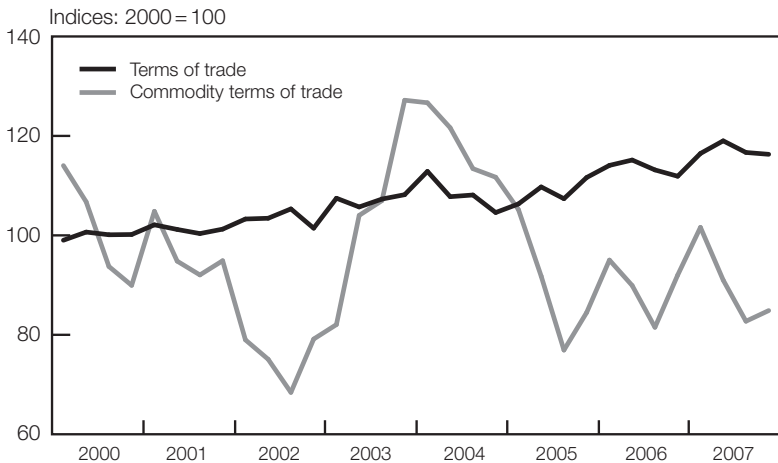
The policy implications of commodity price movements depend on whether a country is a net commodity exporter or importer. In the case of a net importer, commodity price rises serve as tax, while the impact is expansionary in the case of a net exporter.³

4.1 Commodity price rises and terms-of-trade effects

In the case of net commodity exporters, there is a positive terms-of-trade shock that stimulates economic growth, real income, employment, and so on.⁴ However, in the case of South Africa, the positive benefits from rising commodity export prices have been offset by rising oil prices.

As is depicted in Figure 2, South Africa's terms of trade increased by 20 per cent between 2000 and 2007. However, the commodity terms of trade have been very volatile.⁵ In fact, the commodity terms of trade have been below the 2003 level for most of the period between 2000 and 2007.

Figure 2: Terms of trade and commodity terms of trade – South Africa



Source: South African Reserve Bank

4.2 Commodity prices and inflation

As far as inflation is concerned, the positive income effect from increases in the terms of trade, coupled with rising oil prices, adds to inflationary pressures. In addition, the distributional impacts of movements in prices

differ across the commodity groups. For example, oil and food price movements have a larger and more direct impact on the welfare of the poor, since they have a higher weight in the consumer price index. However, it is also important to note that there will also be a positive impact on welfare by virtue of the employment of a large number of workers in mining.

4.3 Commodity prices and the exchange rate

Like the other commodity-producing countries, South Africa has a floating exchange rate. One of the 'stylised facts' emanating from empirical work on commodity country currencies is the influence of commodity prices on movements in the real exchange rate. However, other factors such as investor perceptions about economic policy also have a bearing on exchange rate movements. South African policy-makers have chosen not to intervene in the foreign-exchange market, but have opted to rely on the commitment to macroeconomic fundamentals as a means of securing the best outcomes. While the South African currency has been volatile, the evidence seems to support the authority's stance of not intervening in the foreign-exchange market.⁶

4.4 Commodity prices and relative price effect

The recent commodity price boom has resulted in significant relative price changes across the globe. The relative price shift of food and energy has been particularly evident in emerging and developing countries. In the case of South Africa, the domestic price movements have been magnified by exchange rate movements.

How should the economy adjust to a change in relative prices? Theory suggests that if the change is temporary, policy should accommodate the relative price shift, that is, there is no need for structural changes in the economy. Conversely, if the change is permanent, then macroeconomic policy in general should facilitate or accommodate a structural change in the economy. However, in practice, it is extremely difficult to determine if the change is temporary or permanent.

Price signals in well-functioning markets should facilitate the optimal resource location effects. The question then is: to what extent have the commodity price movements South Africa has experienced been the outcome of well-functioning markets? In some regard, within an inflation-targeting regime, the problem could be reduced to one of accommodating relative price changes as long as long-term inflationary expectations are well anchored. In other words, the main monetary policy challenge is to prevent second-round price effects from taking hold.

5. Conclusion

There is little doubt that commodity price movements have had an important bearing on economic growth and inflation trends in South Africa. The recent decline in world economic activity has resulted in a significant decline in commodity prices. Commodity prices are likely to remain at subdued levels in the foreseeable future, given the recession in many of the advanced economies and projected slowdown in economic growth in developing countries. Against this background, declining economic growth and inflation rates will be firmly entrenched on the radar screens of South African policy-makers in the immediate future.

Notes

¹ In part, the rise in food prices has been caused by a diversion of agricultural commodities towards biofuel production.

² The index is a weighted average of South Africa's agricultural and mining exports.

³ However, it is important to bear in mind that the impact of an import commodity (e.g. oil) may have important implications for a non-oil commodity exporter such as South Africa (see Figure 3).

⁴ In order to prevent overheating in the economy, many commodity-producing countries have established stabilisation funds.

⁵ 'Commodity terms of trade' is defined as the commodity export price deflated by the oil price, both in rand terms.

⁶ While the South African exchange rate has been volatile, it has in general not been much more volatile than other emerging economies.

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Challenges of inflation targeting for emerging-market economies: The South African case

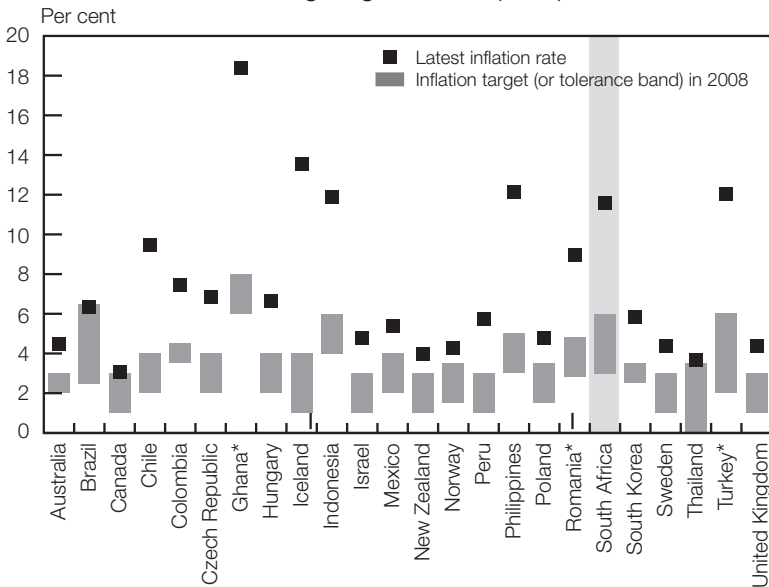
Brian Kahn

1. Introduction

The apparent successful implementation of inflation targeting in a number of countries in the 1990s led some observers to argue that it had been introduced under relatively benign conditions and that it had not as yet been tested seriously. The same cannot be said today: supply-side shocks over the past few years have proved to be a major challenge to the inflation-targeting framework. While the evidence with respect to the performance of countries that have adopted inflation targeting is generally favourable, the jury is still out on whether or not inflation targeting has passed the test of sustainability in the face of persistent shocks.

At present there are 23 inflation-targeting countries, of which 16 are classified as emerging-market economies. Figure 1 shows that most inflation-targeting countries are now outside their target ranges. The true test of

Figure 1: Inflation targets and outcomes in selected inflation-targeting countries (2008)



* Year-end target

Source: Various national central banks and statistical offices

the framework will be whether these countries can bring inflation back to their targets over a reasonable time horizon. Not everyone is confident about the outcome. In a recent critique of inflation targeting, Joseph Stiglitz (2008) noted that “[t]oday, inflation targeting is being put to the test – and it will almost certainly fail”. Nevertheless, to date no country that has adopted an inflation-targeting framework has abandoned it.

Inflation targeting has not been without its critics, and the criticisms have ranged from allowing too much discretion or, alternatively, for being inflexible, particularly within the emerging-market or developing-economy context where greater flexibility is required to deal with exogenous shocks and where the trade-offs are generally more acute. In this vein, critics contend that the focus on inflation is at the expense of long-run economic growth and/or short-run output variability; or that the inability to deal with shocks inevitably leads to procyclical monetary policy with resultant magnified economic cycles. Stiglitz (2008) has suggested that in trying to contain inflation, the “cure would be worse than the disease”.¹ Finally, inflation targeting is regarded as being inappropriate for developing or emerging-market economies because very few of these countries can comply with the prerequisites for its successful introduction.

This paper attempts to address these issues, emphasising that, given the volatile environment emerging markets face, the flexibility of the framework offers distinct advantages compared to other alternatives. However, the challenge is often to balance this flexibility with monetary policy credibility.

The paper is structured as follows: first it deals with some theoretical issues relating to inflation targeting: what it is and issues of flexibility. The next section focuses on emerging-market economies, the challenges they face in operating within an inflation-targeting framework and the prerequisites for the implementation of inflation targeting. Next the issue of dealing with shocks within a targeting framework is examined, followed by an assessment of South Africa’s experience.

2. What is inflation targeting?

The distinguishing feature of inflation targeting is that there is a pre-announced target for inflation that defines the goal of monetary policy and provides a benchmark for the accountability of the central bank. Other features involve the use of a number of economic variables for making policy decisions, and a general commitment by society and government that price stability is the ultimate target of monetary policy. Some features of inflation targeting have become common to other monetary frameworks. In particular, transparency and communication, the hallmarks of the inflation-targeting framework, are no longer unique to it. Similarly, while all inflation-targeting central banks are explicitly forward-looking in

formulating monetary policy with reliance placed on inflation forecasts, this has become more widespread.

There is no unique way of implementing inflation targeting and application varies across countries. For example, there are differences in the nature of communication and degree of transparency. Recent developments in transparency involve the provision of the central bank's projection of the interest rate path (e.g. in New Zealand, Norway, Sweden and Iceland) which is used in their forecasting models; others use market forecasts (e.g. United Kingdom (UK)) or assume an unchanged interest rate path (e.g. South Africa).

Operationally, there are also differences in the levels and specifications of the targets. While most countries specify a point target, usually with a tolerance level around it, some specify a band. Some require inflation to be within the target at all times (e.g. the UK and South Africa), while others require *expected* inflation to remain within the target over the medium term (e.g. Australia and New Zealand). Differences also emerge when specifying a policy time horizon and the length of the horizon. Some targeters have an explicit escape clause, explanation clause or caveat that provides for deviations from the target under certain circumstances, usually in the event of supply-side shocks.

Some countries do not regard themselves as official targeters, yet bear many of the characteristics (e.g. Switzerland and the euro area). The distinction between targeters and non-targeters has become so blurred at times that Mervyn King (2005: 13), Governor of the Bank of England, has argued that "any coherent policy reaction found can be described as inflation targeting". Most monetary policies try to achieve a low-inflation environment. By making the target explicit, inflation targeting helps to manage or anchor inflation expectations. Inflation expectations do not automatically become anchored as a result of the announcement of the target; credibility has to be built up through successful application of monetary policy. Once achieved, well-anchored inflation expectations help to reduce the cost of reacting to deviations from the target.

3. The flexibility of inflation targeting

Emerging markets are more susceptible to shocks than advanced economies and they therefore require greater flexibility in responding to these shocks. The critical questions are: does the framework allow for too much or too little discretion and is the focus on inflation to the exclusion of other objectives?

The time-inconsistency theory of optimal monetary policy (Kydlan and Prescott, 1977) showed that if too much discretion were allowed in the

conduct of monetary policy, there would be an inflationary bias in the economy. The fact that monetary authorities know that they could achieve real output effects by surprising the market means that market participants would anticipate this possibility, and wages and prices would be set accordingly. To overcome this, Rogoff (1985) proposed an independent and conservative central banker who would put a greater weight on inflation than does society. Economic agents would factor this into their wage and price settings. Inflation would remain under control, but the consequence would be higher output variability.

Has inflation targeting, in fact, produced the conservative central banker or what Mervyn King coined the ‘inflation nutter’ who eschews other economic objectives? There are divergent views. For example, Blanchard (2003) and Stiglitz (2008) argue that inflation targeting unnecessarily constrains growth because of its narrow focus and lack of discretion, while others (e.g. Genberg, 2001 and Buiter, 2006) argue that because it allows too much discretion, it cannot be expected to anchor expectations.

Inflation targeting can be seen as a compromise of the ‘rules-versus-discretion’ debate: Bernanke et al. (1999), for example, characterise inflation targeting as a framework of “constrained discretion”. Some argue that this is both its weakness and its strength. Unlike the pure rules-based case which allows for no flexibility, inflation targeting defines a broad rule, but allows for some discretion which is constrained by the basic rule. The flexibility can change, depending on circumstances. This could, however, detract from the predictability of the framework. It has also been suggested that an inflation-targeting framework may give too much discretion in countries with weak institutional environments and this would lead to unfavourable macroeconomic outcomes. Mishkin (2004) argues that in order for inflation targeting to constrain discretion, it has to be supported by the public and the political process.

However, rigid rules, such as a fixed exchange rate target or some form of strict monetary rule, have the drawback that they lack flexibility in the face of shocks and may induce unsustainable conditions, often manifested in some form of crisis. Such rules place the burden of adjustment on output, when faced with a shock. The extreme or ‘strict’ version of inflation targeting would suffer from the same drawback.

4. Inflation targeting and output

An important consideration is whether or not inflation targeting places too much weight on the inflation objective at the expense of other possible objectives of monetary policy. Some have suggested that monetary policy should promote growth or employment, yet there is little evidence that there is a *long-run* trade-off between monetary policy and economic

growth. Growth is determined by a range of real variables. These include the quantity and productivity of labour, capital, land and infrastructure in the economy, and the general regulatory environment, including the efficiency of government and the judicial system. External factors, such as the terms of trade, are also relevant. However, in the medium term, good monetary policy can provide a stable environment conducive to long-term growth. Aron and Muellbauer (2007) note that a large body of economic theory suggests that high uncertainty impedes investment, and there is a negative link between inflation volatility and growth. Therefore, if monetary policy can lower volatility and uncertainty, this could support long-run growth, productivity and welfare.

There is, however, a short-run trade-off between inflation and output (or deviations from potential output). The academic literature generally characterises inflation targeting as the assignment of an objective function of the following form, which illustrates this trade-off between inflation and output variability (e.g. Walsh, 2003 and Svensson, 2002):

$$L_t = E_t \sum_{i=0}^{\infty} \beta^i \left[(\pi_{t+i} - \pi^T)^2 + \lambda (y - y^*)_{t+i}^2 \right]$$

The loss function, L , to be minimised reflects expected deviations of inflation (π) from the inflation target (π^T) and the expected deviation of output (y) from potential output (y^*) (the output gap). The greater the deviation from the inflation target, the more costly it will be and the more strongly monetary policy is likely to react. λ represents the weight assigned to achieving the output gap objective *relative* to the inflation objective. If $\lambda = 0$, then one has a 'strict' inflation targeter, where all weight is put on the inflation objective and therefore one would expect increased output variability. Any weight on output ($\lambda > 0$) describes what is referred to as a flexible inflation-targeting regime. It is generally agreed that there are very few central banks, if any, that act in the strict sense. In other words, there is a concern about the amplitude and length of the business cycle.

Inflation-targeting banks do not usually use such a loss function in practice. However, as noted by Svendsen et al. (2004) and Smets (2000), the choice of the monetary policy horizon implicitly provides an indication of the size of λ . Strict inflation targeters would choose as short a time horizon as possible within the constraints of the lag of monetary policy, while more flexible central banks would have a longer target horizon. The target horizon may also be extended in the face of shocks that would have a strong negative output effect.

While a focus on the time horizon is a simplification of the loss function above, it is easier to evaluate and is more easily operationalised. Several

central banks apply this approach, either using an escape clause or specifying some flexibility in the length of the policy time horizon. Given a lag between monetary policy and its full impact on inflation, most central banks specify a horizon of between 18 and 24 months, often with provision for extending this horizon. For the Norges Bank, for example, the relevant horizon “will depend on disturbances to which the economy is exposed and how they affect the path for inflation and the real economy ahead”. Similarly, Charles Bean (2003: 17) of the Bank of England has noted that “the two-year point (time horizon) makes a convenient reference point for the purposes of communication. But . . . there is no mechanical link between the central projection at the forecast horizon and the policy decision. The latter may also be affected by the balance of risks, i.e. the skewness of the probability distribution, what is happening to inflation both before and beyond the two-year horizon and what is happening to activity.”

Countries using explicit escape clauses or caveats, which allow for deviations from the target as a result of supply-side shocks, include New Zealand, Iceland and the Czech Republic. However, these clauses do not suspend or change the target. Rather, they allow for a deviation from the target and implicitly allow for the lengthening of the time horizon. The ultimate focus remains the inflation target.

South Africa too adopts a flexible medium-term focus, as exemplified in the ‘explanation clause’:

When the economy is buffeted by a supply side shock similar to those envisaged by the original escape clause that will take CPIX inflation outside the target range (e.g. an oil price shock, a drought, a natural disaster, or financial contagion affecting the currency), at the subsequent meeting of the Monetary Policy Committee, the SARB will fully inform the public of the nature of the ‘shock’, the anticipated impact on CPIX inflation and the monetary policy response to ensure that inflation returns to the target and the time frame over which this will occur. (Republic of South Africa, 2003: 31.)

This clause implicitly allows for inflation to be out of the target as a result of first-round effects of a supply shock and for the Bank to define the time horizon for restoring inflation to within the target range. It does not permit a respecification of the target, nor relieve the Bank of its responsibility with respect to returning to the target range. Instead, the implied flexibility allows for interest rate smoothing over the cycle, which may mitigate any output variability from the monetary policy response to the shock.

This flexible time horizon imparts a degree of flexibility to the inflation-targeting framework to deal with exogenous shocks. However, this discretion is not absolute and is constrained by how well inflation expectations are anchored which, in turn, is a function of past credibility. A high degree of credibility, usually gained through a history of low inflation and

appropriate monetary policy actions, permits a more moderate monetary policy response, a longer time horizon and a lower output loss. Conversely, central banks with low credibility often have to respond more strongly as expectations would not be well anchored. In the early days of an inflation-targeting regime, central banks are more likely to be on the 'strict' side of the spectrum (i.e., $\lambda \approx 0$), (see Batini and Laxton, 2007, and Kahn and Farrell, 2002). Once credibility is built up, monetary policy may have more flexibility. With low credibility, failure to respond appropriately could cause an acceleration of inflation from the target, as expectations of second-round effects take hold.

Even if a central bank does not have an explicit concern for output variability, the output gap is one of the determinants of inflation and hence has an important impact on monetary policy, along with other variables. This relationship results automatically in a countercyclical monetary policy stance, unless other factors override this. Thus, even if monetary policy does not have an explicit growth objective, the state of the economy relative to potential influences the inflation outlook and hence monetary policy responses.

Nevertheless, Walsh (2008) notes that the fear that real variables will be neglected at the expense of inflation stabilisation is conceptually well founded. He argues that the theory of performance measures suggests that individuals and institutions do tend to focus on the yardstick on which their rewards are based. But even in societies with a strong aversion to inflation, where there are genuine trade-offs to be faced, society may prefer a more flexible approach from the central bank. Furthermore, despite a clear mandate, few central bank governors would want to be remembered for killing inflation and the economy.

5. Emerging-market economies and inflation targeting

Fraga et al. (2003) present data up to 2002 suggesting inflation-targeting emerging-market economies performed less well than developed economies. However, they ascribe this to the fact that inflation targeting is more challenging in emerging markets rather than to a lack of commitment to the targets.

Should a more challenging environment discourage the adoption of inflation targeting or is this an appropriate framework for dealing with such vulnerabilities and challenges? It is important to distinguish between preconditions, which may be more difficult and more costly for emerging-market economies to put in place, and their greater vulnerability to exogenous shocks.

Various preconditions or requirements are seen as essential for the successful implementation of inflation targeting, and relate to rectifying institutional weaknesses, lack of credibility and lack of technical capabilities (see Masson et al., 1997; Schaechter, Stone and Zelmer, 2000; Fraga et al., 2003; Batini and Laxton 2007; and Mishkin, 2004). It is also necessary to have a relatively well-developed financial system to facilitate the effective transmission of monetary policy.

Batini and Laxton (2007) suggest that it is not necessary for all the requirements to be met fully before the implementation of inflation targeting. They conclude that the feasibility and success of inflation targeting depend more on the authorities' commitment, and ability to plan and drive institutional change after the introduction of the new framework. In fact, the introduction of inflation targeting has, in a number of emerging markets, led to a rapid improvement of institutional structures and technical capabilities.

5.1 Central bank independence

Key institutional requirements include central bank independence, and a public and institutional political commitment to the inflation objective of the framework. The focus on central bank independence relates to instrument-independence. From a political economy perspective, it is desirable that the goal of monetary policy be set by democratically elected governments. But once set, the mandate should be given to central banks with independence to implement monetary policy in order to avoid the time-inconsistency problem or a political monetary policy cycle.

But independence is almost irrelevant if there is not a general commitment to the framework to give it legitimacy. Mishkin (2004: 11) argues that writing the mandate into law is not necessarily required, or indeed in some cases is not necessarily sufficient, as "laws may matter less than the general public and politicians' commitment to support price stability. Here past history matters. Many emerging-market countries have had a history of poor support for the price stability goal and since laws are easily overturned in these countries, it is not clear that laws will be sufficient."

This commitment to price stability is critical. If government changes the target each time the central bank has to implement unpopular measures, the underlying advantages of inflation targeting, of building credibility and predictability, and the anchoring of expectations will fall away. An institutional structure that lacks this commitment could, in effect, result in a transfer of monetary policy discretion to the government and a return of the time-inconsistency problem. For this reason, transparency and good communication skills are especially needed by central banks in 'politically complicated' environments. Yet even excellent communication may not be

enough if the political environment is not conducive to supporting an independent central bank that focuses on inflation control (Mishkin, 2004). However, an excessive focus on inflation without regard to real output variability could undermine independence as government may move to reduce the degree of independence (Mishkin, 2008).

In South Africa instrument-independence is constitutionally guaranteed. The Bank does not have goal-independence, since the goal of monetary policy is set by government in the form of the target. While the institutional requirement is guaranteed, it is not necessarily the case that a high weight is placed on price stability by the public or some politicians.

5.2 Fiscal dominance

A further challenge facing emerging-market economies relates to the extent of fiscal dominance in the economy (Masson et al., 1997, and Batini and Laxton, 2007). The demands for social expenditure are usually more pressing in developing economies with narrow tax bases. If central banks are forced to monetise the debt of governments, the ability of monetary policy to focus on inflation will be undermined. However, the adoption of inflation targeting could help promote fiscal and financial reforms, and make it harder for government to advocate loose fiscal policy that is clearly inconsistent with the inflation target.

Fortunately, in South Africa fiscal policy has been disciplined and supportive of the inflation-targeting framework (Ajam and Aron, 2009). In more recent years small surpluses have been achieved. Although fiscal policy has at times been relatively procyclical (Du Plessis et al., 2008; Swanepoel, 2004), it has not impinged negatively on monetary policy. Monetary policy has not had to act to offset fiscal policy actions that could potentially undermine the monetary policy stance.

5.3 The economic structure

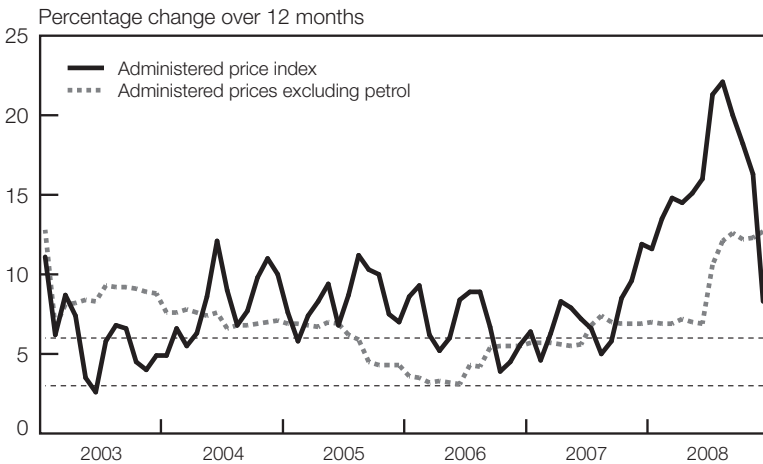
Batini and Laxton (2007) identify the economic structure as an important requirement for successful inflation targeting. They note that prices should be deregulated fully and that the economy should not be overly sensitive to commodity price and exchange rate changes. Furthermore, if prices are generally administered, inflation control is rendered less effective.

The issue of sensitivity to commodity prices and exchange rates will be revisited in section 6 of this paper. Although the need for full deregulation of prices is probably an overstatement, monetary policy should be able to influence a significant proportion of the price index. The pervasiveness of administered prices, which are often under the control of the fiscus, could also undermine the ability of central banks to control inflation

successfully; particularly when these prices are set without regard to underlying supply and demand conditions.

Administered prices in South Africa currently account for a substantial 20 per cent of the consumer price index excluding mortgage interest cost for metropolitan and other urban areas (CPIX) basket. Excluding petrol prices, administered prices would account for about 15 per cent of the index. Figure 2 shows that administered prices initially posed a considerable challenge due to their stickiness, a fact repeatedly referred to in Monetary Policy Committee (MPC) statements. Subsequent changes in the regulatory environment, and perhaps recognition of the importance of prices being set on a market-related basis, saw administered price inflation falling to relatively low levels between mid-2005 and the end of 2006. More recently, there has been a resurgence in administered price inflation, mainly driven by electricity price increases of around 30 per cent.

Figure 2: Administered price index



Sources: Statistics South Africa and South African Reserve Bank

5.4 Technical infrastructure

The inflation forecast is central to any inflation-targeting regime and requires a well-developed technical infrastructure, including quality data, and forecasting and modelling capabilities. A forward-looking inflation-targeting framework is, in fact, “inflation *forecast* targeting” (Svensson, 1997). The forecast should not be used in a mechanical way, but it does nevertheless provide an important guide to policy.

The lack of technical capabilities can be overcome with appropriate, focused and targeted training, as well as technical assistance from other central banks. When South Africa moved to inflation targeting, the Bank’s

forecasting models were still in their infancy. Valuable assistance and peer review were rendered by a number of central banks, including those from Canada, Sweden and the UK. Model development remains a continuous process and collaboration between central banks has become widespread.

Data deficiencies, however, are more problematic as emerging markets often lack extensive and accurate time series. Former centrally planned economies in central and eastern Europe faced particular problems. Although they had long time series in some instances, the extent of the structural change was so profound that the data were generally useless for modelling and forecasting purposes. Even price series were of no value, given the pervasive regulation of prices. A related issue is the measurement of the output gap, which is central to most conventional inflation forecasting models. The output gap is unobservable and has to be estimated. This is a challenge even in countries with good data and limited structural change over time. The Czech Republic, which adopted inflation targeting in 1998, overcame these problems by using dynamic stochastic general equilibrium (DSGE) models that require calibration rather than long time series.

6. External volatilities or vulnerabilities

The impact of exchange rate changes on inflation and the real economy are generally larger in emerging economies, and their exchange rates are more prone to overshooting. Emerging economies are also vulnerable to terms-of-trade swings and 'sudden stops' of capital inflows (see, for example, Calvo and Reinhart, 2000), driven by fundamentals or contagion effects from risk-averse investors.

Large exchange rate movements might have significant real effects, especially where levels of foreign currency-denominated liabilities are high. Depreciation by increasing the domestic currency value of this debt could undermine financial stability. Several countries therefore tend to resist exchange rate changes – the so-called fear of floating (Calvo and Reinhart, 2002). However, reacting to exchange rate changes can create confusion about the objectives of monetary policy and the commitment to the inflation target, particularly when a conflict between the objectives arises. An inflation-targeting framework requires exchange rate flexibility, although Ho and McCauley (2003) note that some intervention is not inconsistent with the framework, as long as the motives are fully communicated and understood, and that precedence is given to the inflation objective when a conflict between the objectives arises.

The monetary policy reaction to exchange rate changes that are seen to be inflationary could pose a challenge for communication. It needs to be clarified that the reaction is to the inflationary impact of the exchange rate

change and not an attempt to target the exchange rate. The exchange rate is one of a number of determinants of inflation, so any response to an exchange rate change would have to be assessed in conjunction with the simultaneous impact of changes in other variables, some of which may be offsetting.

Emerging markets also tend to have a higher pass-through from exchange rate changes to domestic inflation, because of lower credibility of monetary policy, less competitive markets and a relatively higher proportion of traded goods in the consumer basket (Eichengreen, 2001). Thus, the exchange rate is often the focal point of inflation expectations. However, several studies have found that the extent of the pass-through is regime-dependent and has declined in a number of inflation-targeting countries, including South Africa (Mihaljek and Klau, 2008; Rigobon, 2007). The extent of the pass-through is also complicated by the possibility of non-linearities or threshold effects in the response of inflation to exchange rate changes.

The appropriate response to exchange rate changes in an inflation-targeting environment depends on the nature of the shock (Eichengreen, 2001; Jonas and Mishkin, 2002). A purely monetary shock, where the exchange rate is driven by fundamentals, would require an interest rate response. A portfolio shock or 'sudden stop', which emanates from international financial markets, would require a monetary policy response. The size of the response would be determined by the expected sustainability of the shock and the expected impact of the exchange rate change on inflation. Eichengreen (2001) also identifies a 'Prebisch shock', where the exchange rate reacts to a change in the terms of trade or export demand. In this instance there are two offsetting effects on inflation. In the event of a terms of trade deterioration, the weaker exchange rate will cause domestic inflation to rise, but the lower aggregate demand will be deflationary. Should the second effect dominate, the appropriate response would be to lower interest rates. Simply tightening monetary policy in response to a depreciation under these circumstances may lead to procyclical monetary policy.

The significant depreciation of the South African rand in the final quarter of 2001 provided the first real challenge to the South African targeting regime. Monetary policy was adjusted in 2002 as the forecasts showed a strong pass-through from the exchange rate to inflation. The repurchase (repo) rate was increased by 100 basis points on four occasions during 2002. CPIX inflation peaked in September 2002 at a level of 11,3 per cent and returned to within the target range by September 2003.²

The response of the MPC was not an attempt to stem the depreciation and the initial monetary policy response was only on 15 January 2002

after the rand had stabilised somewhat. The response was directed at the expected increase in inflation, which had fed through strongly to generalised price increases. Consistent with the forward-looking application of monetary policy, the interest rate cycle was reversed in June 2003 on the basis of the expected return of inflation to within the target range.

7. Dealing with supply-side shocks

Supply-side shocks provide a particular challenge to monetary policy. This section elaborates on this issue and characterises different types of shocks. Based on simulations for the South African economy, it shows how a flexible monetary policy could respond differently to these types of shocks.

The problem of dealing with supply-side shocks is not unique to inflation targeting. Fixed exchange rate systems are particularly vulnerable to such shocks and adjustments have to be made, either in terms of output or through real exchange rate changes (i.e., a change in the price of non-tradeables), with possible implications for the sustainability of the peg.

Frankel et al. (2007), in their review of the South African macroeconomic policy environment, are critical of the inflation-targeting framework on the grounds of its supposed inflexibility in the face of shocks. In particular, they argue that the response to supply-side shocks leads to procyclical monetary policy. For example, a sharp increase in the international oil prices would cause headline inflation to increase, requiring a tighter monetary policy response at a time when the higher oil prices would already be moving output in the opposite direction. However, they implicitly assume that monetary policy would respond in the same way, irrespective of the *nature* of the shock. Importantly, along with others, including Stiglitz (2008), they also implicitly assume a 'strict' inflation-targeting framework. The empirical evidence, as discussed in section 9, shows that there was only evidence of some procyclicality in 2004 and 2005.

It is generally accepted that while central banks should respond to demand shocks, there is very little that can be done about the first-round effects of supply-side shocks. Monetary policy, however, needs to be concerned with the possible impact on inflation expectations and the emergence of second-round effects. This focus would allow the monetary authorities to look through the impact effect of the shock and, depending on the extent to which inflation expectations are anchored, also take a more flexible approach by extending the policy time horizon. The reaction will also be determined by the nature and duration of the shocks, although they are not always easy to discern *ex ante*. The countervailing impact on prices as a result of a widening output gap will also need to be taken into account.

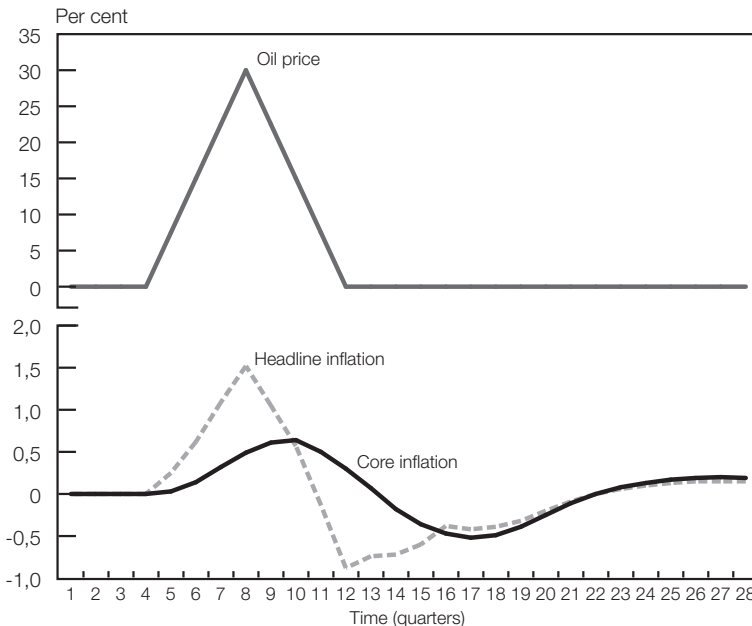
The challenge for forward-looking monetary policy-makers is to distinguish *ex ante* between three broad categories of commodity price

shocks: (1) those of relatively short duration (prices are mean reverting); (2) those that involve one-off relative price adjustments that are then sustained at the new levels; and (3) those that involve a sustained increase in the price of the commodity over a number of years, for example, raised international oil price behaviour between 2004 and 2008.

The first case – that of a short-term shock – requires little, if any, monetary policy reaction. This is particularly the case if there is a high degree of monetary policy credibility and if it is generally accepted that the shock is temporary (e.g. in the case of a supply disruption). In this case there would be an increase in the headline inflation rate (depending on the weight of the commodity in the index), followed by an undershoot of inflation when the price falls back to its original level. Inflation then returns to more or less its original level. Core inflation under these circumstances should be relatively unaffected, but this would depend on the credibility of monetary policy.

To illustrate the point, following Blinder and Rudd (2008), the Bank’s core model was shocked, assuming a 30 per cent increase in the international oil price, which peaks after a year and returns to its original level a year later (assuming for simplicity that there is an even distribution over the period). The outcome, seen in Figure 3a, shows that headline inflation increases, then declines (the inflationary shock turns into a deflationary shock) and finally returns to more or less its original level. The impact on core inflation (defined here for simplicity as CPIX excluding administered prices³) is relatively muted, since there is some, although limited,

Figure 3a: Short-term temporary increase in the oil price

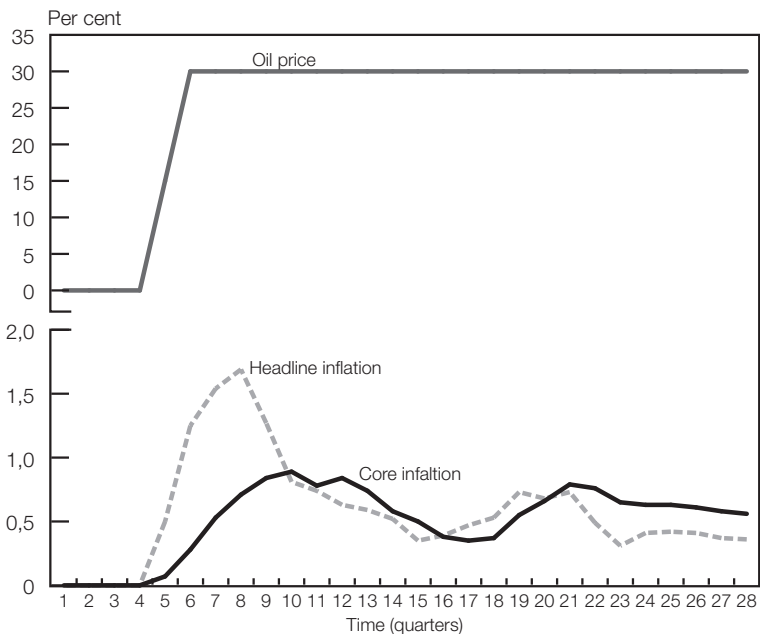


pass-through to headline inflation. The impact on inflation beyond eight quarters is relatively small. A policy focus on core inflation, or ‘looking through the spike’, should call for a relatively unchanged monetary policy stance. This result depends on perfect foresight as to the duration of the shock, as well as a high degree of credibility of monetary policy so that second-round effects are not generated.

If there is a monetary policy reaction, lags in monetary policy mean that by the time the tighter stance of monetary policy takes effect, it will be acting in the wrong direction. This case underscores the point that an inflation-targeting policy, or any monetary policy for that matter, needs to focus on the medium term and not be concerned about short-run deviations of inflation from the target.⁴

In the second example the model is shocked with a 30 per cent increase in the oil price and this is a permanent relative price change (Figure 3b). The impact here is quite different and the policy response is less straightforward. Theoretically, the direct contribution to headline inflation should dissipate over time, with core inflation being more muted. In the simulation, headline inflation increases quickly and then declines quite rapidly after a year. However, as in the Blinder–Rudd simulation, headline inflation remains persistently higher than before the shock. Thus, the policy response is more ambiguous and will depend on the initial persistence of inflation, and the second-round effects following this increase in

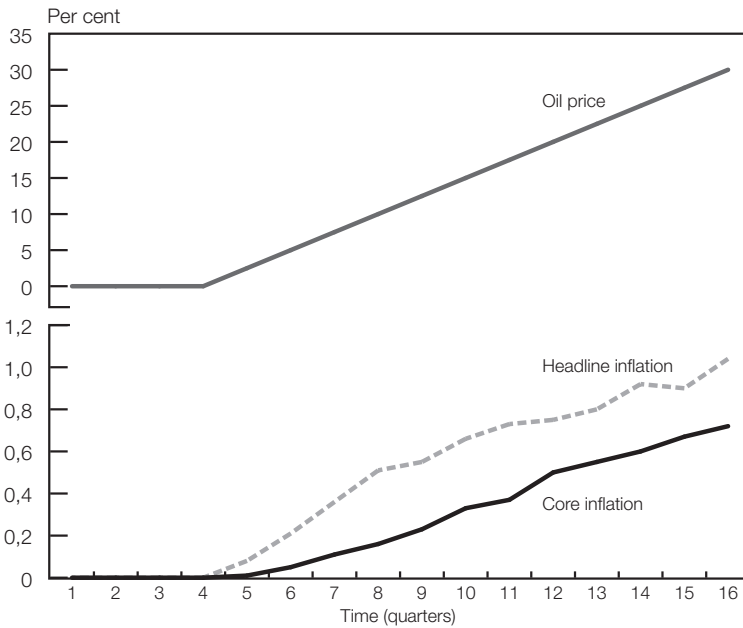
Figure 3b: One-off permanent increase in the oil price



inflation. If monetary policy accommodates fully the increase in relative prices, then higher inflation dynamics could evolve and eventually a monetary response may be required.

The third case is a gradual, long-lasting persistent increase in relative prices. Relative price changes cannot increase indefinitely, but with a protracted increase it is not obvious when and at what level this process will end. Recent events in the international oil markets have also shown that these relative price adjustments, which were thought to be permanent, can also reverse and very quickly. For illustrative purposes a 5 per cent gradual and persistent increase in the international oil price has been assumed (see Figure 3c). The simulation shows that, while core is more muted than headline inflation as expected, both show a persistent increase and, in this case, a monetary policy response is called for.

Figure 3c: Gradual and persistent increase in the oil price



The story is complicated by the fact that supply-side shocks may lead to offsetting effects on the demand side. As discussed earlier, a higher oil price may cause real incomes to fall, and the output gap could increase. Furthermore, if demand for oil is inelastic, expenditure on other goods will decline further. The monetary policy reaction would have to take all these countervailing effects into consideration.

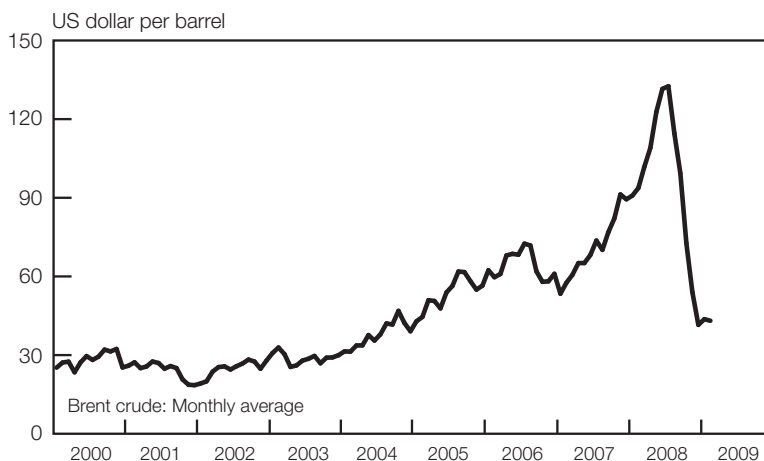
The monetary policy reaction will determine to an important degree the extent to which the supply-side shock impacts on real output and

inflation. If monetary policy remains unchanged and accommodates the shock, the impact on inflation will be larger with smaller effects on output and employment. However, in cases 2 and 3, in particular, failure to respond may require even stronger monetary policy responses in the future, if expectations become unanchored and strong second-round effects ensue.

The above scenarios assume an unchanged monetary policy stance. In summary, in case 1 monetary policy could accommodate the shock because it is temporary. There is no need for monetary policy to be tightened. In case 2, inflation does not fully disappear because of the presence of second-round effects. This would require monetary tightening if the central bank did not wish to see permanent inflation effects. In the final case a stronger monetary response may be required. As noted, the problem facing monetary policy in this case is to try and anticipate the extent and duration of the relative price increase, and the extent of the second-round effects.

The experience of monetary policy in South Africa in identifying the nature of shocks is illustrative. As seen in Figure 4, international oil prices began to increase from US\$30 per barrel in January 2004; a trend that was initially thought to be temporary. The price then appeared to settle in the US\$60–US\$70 per barrel range for some time, as in a type 2 shock. From the beginning of 2007 the price began to increase persistently (a type 3 shock or perhaps a series of type 2 shocks). Statements of the MPC since February 2007 illustrate that oil price increases continuously

Figure 4: International oil price



Source: IMF *International Financial Statistics* and South African Reserve Bank

surprised on the upside; also evidenced by the persistent increase in the inflation forecast. Each forecast round resulted in a higher trajectory, partly as a result of higher-than-expected oil prices, which implied a higher starting point for the forecast and a raised oil price assumption.⁵

Furthermore, market forecasts were less confident that the oil price would return to its earlier levels, and the forecasts began to take on the characteristics of types 2 and/or 3, that is, that there would be a continued increase for some time and then a levelling-off. While the type 2 assumption still helped to reduce the overall forecast in the outer years, the speed of decline was much lower than in the case of a type 1 shock.

The monetary policy reaction in South Africa to recent supply-side shocks was complicated by the concurrent strong state of domestic demand. The monetary policy stance was tightened from June 2006 as general inflation pressures began to emerge. However, it would be difficult to argue that monetary policy was reacting only to oil and food price shocks, or that it was acting in a procyclical manner. Real growth in household consumption expenditure reached a level of 9 per cent in the final quarter of 2006 and economic growth in excess of 5 per cent was significantly above the estimated potential output growth of between 4,1 and 4,5 per cent.

The unexpected persistence of the oil price increase meant that the economy was, in effect, experiencing a type 3 shock or a succession of type 2 shocks. Much of the focus of monetary policy was then on the emerging second-round effects, as evidenced in the continued increase in core inflation. Inflation expectations, which for some time had been anchored within the inflation target range, also showed evidence of increasing along with wage settlements. While expectations appeared to be no longer anchored within the target range, there was still an expectation that inflation would moderate over the next two years (see Figures 5a and 5b).

8. How successful has inflation targeting been?

Over the years a number of studies have been undertaken to assess the success of inflation targeting. It is often difficult to know whether the purported success of inflation targeting is a result of the framework itself, or if it is a result of a benign macroeconomic environment in the form of low volatility shocks for much of the period reviewed. As Ball and Sheridan (2005) note, there is no necessary causal link between improved inflation outcomes and inflation targeting, as all OECD countries, irrespective of their monetary policy frameworks, enjoyed lower inflation. Their study, however, gives some support to inflation targeting, as they conclude that the introduction of the framework did not make countries any worse off in terms of output volatility. The evidence generally shows (see Walsh,

Figure 5a: BER surveys of CPIX inflation expectations

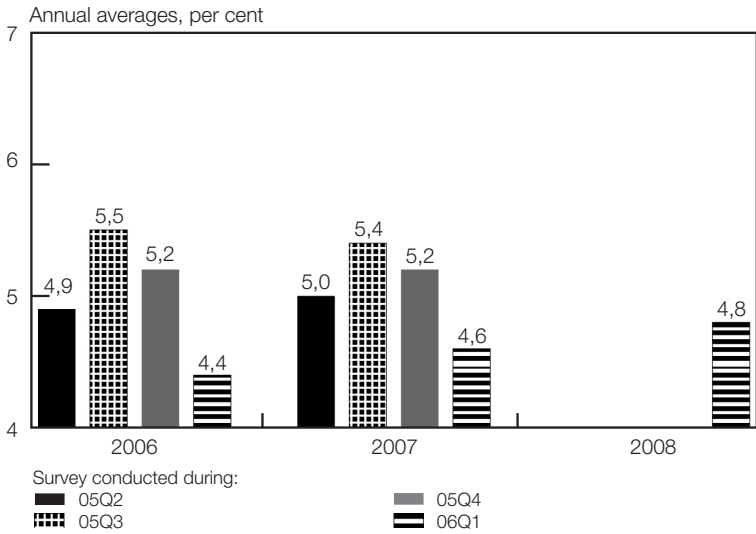
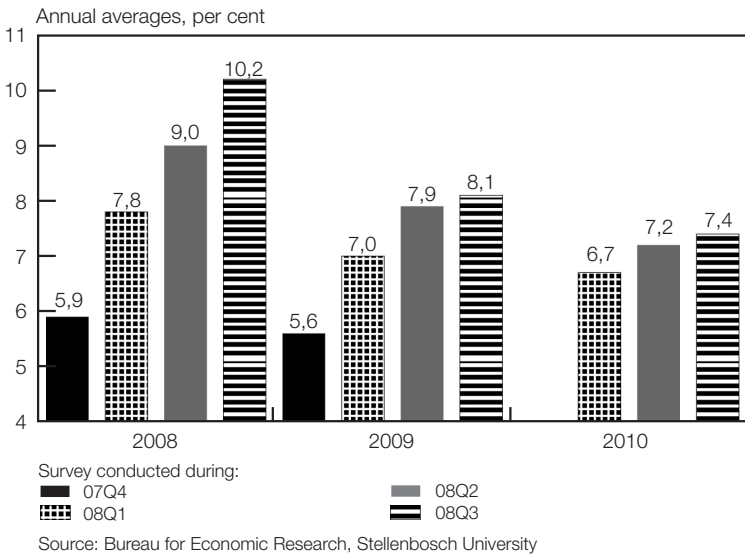


Figure 5b: BER surveys of CPIX inflation expectations



2008) that inflation and economic variability have been lower in the inflation-targeting period as compared to the pre-targeting period, but that the performance of targeters is not significantly better than that of the non-targeters.

The evidence for developing or emerging-market economies is more convincing, despite the challenges faced by these countries in implementing the framework. A number of studies (Gonçalves and Salles, 2008; Walsh, 2008) show that not only has inflation targeting been associated with a reduction in inflation, it is also associated with a lowering of real output volatility (Table 1). The evidence on inflation volatility is, however, less clear. The finding on output volatility is significant, because it suggests that the general fear that inflation targeting could result in increased output volatility has been unfounded. This led Walsh (2008: 18) to suggest that inflation targeting is in fact a “free lunch”.

Table 1: Comparison of emerging-market targeters and non-targeters

Inflation	Initial inflation (per cent)	Final inflation (per cent)	Fall (percentage points)
Targeters: Mean	17	5,5	-11,4
Non-targeters: Mean	13,4	6,9	-6,5
GDP growth volatility	Initial volatility (per cent)	Final volatility (per cent)	Fall (percentage points)
Targeters: Mean	4,1	2,2	-2,0
Non-targeters: Mean	4,7	3,6	-1,1

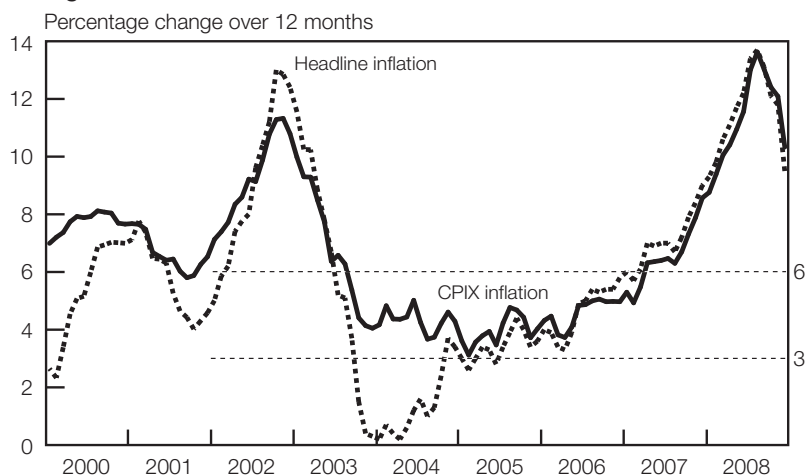
Rounding differences may influence the numbers in the final column

Source: Derived from Gonçalves and Salles (2008)

9. The South African experience with inflation targeting⁶

Inflation targeting was introduced in South Africa in 2000. Initially, the target was for CPIX inflation (headline inflation excluding mortgage interest costs) to average between 3 and 6 per cent to be achieved in the 2002 calendar year. This specification was subsequently changed in 2003 when the requirement was changed for the target to be achieved on a continuous basis.⁷ With respect to inflation outcomes, Figure 6 shows that CPIX inflation was within the target range between September 2003 and April 2007. For most of this period, inflation was well within the target range, mostly around or below the mid-point of the target range.

With respect to inflation and output variability, if one were to compare the inflation-targeting period (first quarter of 2000 until the second quarter of 2008) with the period of the 1990s (first quarter of 1991 until the fourth quarter of 1999), one would see (Table 2) that in the pre-targeting period CPIX inflation averaged 9,7 per cent and this declined to 6,5 per cent in the targeting period. The average growth rates in the two periods were 1,6 per cent and 4,3 per cent respectively (measured as a percentage

Figure 6: Headline and CPIX inflation

change on the same quarter in the previous year). This shows that inflation targeting has been consistent with (although not necessarily the cause of) higher average growth. In terms of variability, the standard deviation of inflation declined from 3,5 to 2,2, while the standard deviation of output growth declined from 2,3 to 1,1. In other words, not only has average inflation and inflation variability declined, but output growth variability has declined as well, while output growth has increased.

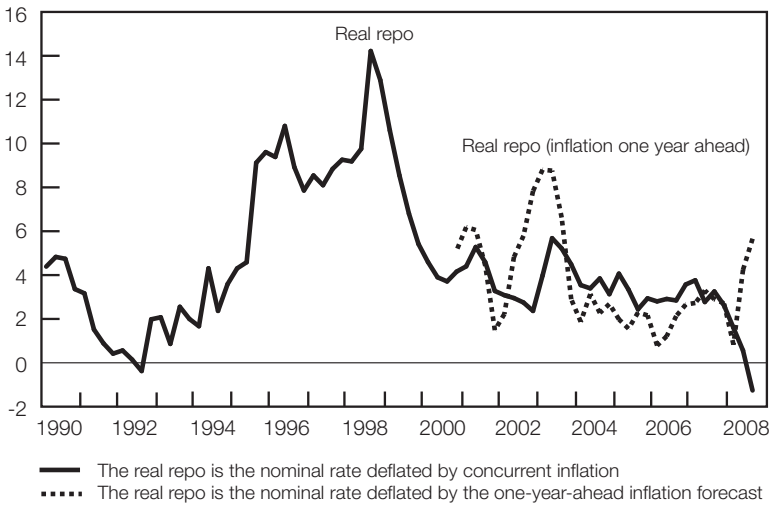
Table 2: South African inflation and growth in the pre-targeting and targeting periods

Inflation	Mean (per cent)	Standard deviation
Pre-targeting period	9,7	3,5
Targeting period	6,5	2,2
Gross domestic product growth		
Pre-targeting period	1,6	2,3
Targeting period	4,3	1,1
Real policy rate		
Pre-targeting period	5,7	4,1
Targeting period	3,3	1,3

Note: The pre-targeting period is 1991Q1–1999Q4
The targeting period is 2000Q1–2008Q2

Figure 7 shows that there has been greater stability in the real interest rate, measured as the official policy rate (bank rate and repo rate) deflated by the contemporaneous inflation rate. On this basis, the real policy rate averaged 5,7 per cent in the 1990s and 3,3 per cent in the inflation-targeting period. Of greater significance perhaps is the relative *stability* of the real rate in the inflation-targeting period, with the standard deviation falling from 4,1 in the 1990s to 1,3 in the 2000s.⁸ Aron and Muellbauer (2007) also show that inflation targeting has not disadvantaged potential investment in terms of the level of tax-adjusted real interest rates. It is clear that monetary policy has not resulted in a tighter stance of monetary policy on average when measured in terms of real interest rate developments.

Figure 7: Real repurchase (repo) rate



As discussed in previous sections, the South African experience has illustrated the difficulties that are faced when dealing with exchange rate or supply-side shocks. Aron and Muellbauer (2007, 2009) argue that the monetary policy decisions taken in response to the sizeable domestic and external shocks have improved significantly during the inflation-targeting period.⁹

In response to these exchange rate and commodity price shocks, the MPC adopted a relatively flexible approach and did not attempt to get back to within the target over the shortest possible time horizon. In general, the MPC attempted to look through the short-term impacts of the shocks and to focus on the second-round effects. Some interest rate smoothing was applied as evidenced in the gradual changes that were applied during the interest rate cycles.

With respect to the cyclicity of monetary policy, du Plessis et al. (2008) made use of a structured vector autoregression (SVAR) approach, confirming monetary policy's mainly countercyclical stance since 1994, with some evidence of procyclicality from 2004 during the inflation-targeting period. However, no clear conclusion could be drawn with respect to the stabilising impact of monetary policy. In line with these results Frankel et al. (2007), who also made use of the SVAR methodology, found that monetary policy was mainly countercyclical, but somewhat procyclical in 2004 and 2005. While it appears that there may be some evidence of procyclicality in the period, the change in the monetary policy stance in 2006 would have reversed that somewhat.

Ortiz and Sturzenegger (2007) found that the monetary policy reaction rule of the Bank had been stable and in line with those estimated for Canada, the UK, New Zealand and Australia. Compared to emerging markets, the South African monetary policy has been more stable, with a more consistent anti-inflation bias, a somewhat larger weight on output and a very low weight on the exchange rate. The authors ascribed the latter to the low levels of foreign-currency liabilities and the well-developed capital markets in South Africa.

Although the recent debate in South Africa has focused on the impact of the inflation-targeting regime on output, there are other positive aspects of the system that have been identified. Monetary policy has also become more transparent. Aron and Muellbauer (2007), using an adjusted Geraats index, show the significant improvement in transparency after the implementation of inflation targeting. As they note, increased transparency reduces uncertainty, and raises the level of investment and quality of decision-making. However, they note that there is scope for further improvement. They also show that monetary policy has become more predictable. They show that the forward market anticipated repo rate changes well and has done so from the very beginning of explicit inflation targeting in 2000, and this remained true when controlling for recent macroeconomic volatility and the recent volatility of the repo rate (see also Ballim and Moolman, 2005). Furthermore, they show that credibility has increased, as evidenced in the behaviour of inflation expectations (see also Rigobon, 2007). At the same time, communication has been improved with the production of the Bank's publication the *Monetary Policy Review* in addition to the *Quarterly Bulletin*, and also the introduction of the Monetary Policy Forums that are held twice a year around South Africa.

10. Conclusion

The inflation-targeting framework has not led to excessively restrictive policies in advanced or emerging-market economies. This is due in part to the generally flexible implementation of the framework that has allowed for a variable time horizon for policy. While inflation targeters would want to be within their targets at all times, it was argued above that most

inflation-targeting monetary frameworks accept that this is not only unlikely, but not always desirable. The various central banks have different ways of dealing with deviations from their targets, but all generally recognise that some flexibility should be allowed. The target is an anchoring device, and central banks should take credible action to get back to within the target. But this does not have to be achieved in as short a time-frame as possible. However, there is always a difficult trade-off between such flexibility and building or maintaining credibility.

Most central banks are currently outside their target ranges, raising the question of whether inflation targeting has failed in the face of large supply-side shocks. Emerging markets have been exposed to these shocks more acutely, particularly given the higher weight of food in their consumption baskets. Walsh (2008: 30) suggests that breaches of the target are not necessarily a bad development: "It is these target misses that provide central banks with the best opportunity to explain to the public why inflation has temporarily moved higher and to show they have a consistent policy for ensuring a return to low inflation. Accountability is strengthened by this process."

In South Africa, despite the challenges posed by supply-side and exchange rate shocks, the variability of both output and real interest rates has declined during the inflation-targeting period. Fears that the implementation of inflation targeting has been inimical to growth in South Africa are therefore unfounded. The constitutional mandate of the Bank is the achievement of price stability. The contribution that monetary policy and price stability make to long-run growth is by reducing uncertainty and promoting a stable environment for growth. In the absence of an explicit target for inflation, as provided for in the inflation-targeting framework, monetary policy would still have remained focused on achieving price stability, responding to the self-same supply shocks that the economy has recently faced. The advantage of inflation targeting is that it provides an explicit anchor for managing inflation expectations: if successful, this significantly reduces the costs of bringing inflation down.

Notes

¹ This raises the question as to what level of inflation is acceptable. Some argue that below certain levels there are no benefits to bringing inflation down further and therefore the costs of disinflation exceed the benefits. (See, e.g. Khan and Senhadji, 2001).

² It may, of course, be argued that this had a lot to do with a reversal of the depreciation. But against this it could be argued that failure by the MPC to react could have caused inflation expectations to become totally unanchored, and the higher inflation expectations could, in fact, have led to further depreciation and further inflation pressures.

³ The petrol price is part of the administered price index.

⁴ Real interest rates, where the nominal interest rate is deflated by expected inflation, would remain relatively unchanged if there was a general expectation of a temporary spike.

⁵ In the South African Reserve Bank's forecasting model assumptions have to be made regarding the international oil price for the forecast period of three years. The oil price assumption is made after analysing the conditions in the oil market, the forecasts of about 16 international analysts and futures prices.

⁶ See van der Merwe (2004) for a discussion of the early implementation of inflation targeting in South Africa.

⁷ The target will be changed to headline CPI from 2009 as Statistics South Africa will move to a rental equivalence measure for housing and no longer use mortgage interest costs.

⁸ An alternative measure is also shown in Figure 7, where the real repo rate has been deflated by the ten-year-ahead inflation forecast of the Bank since 2000. This shows a different picture for the most recent period, given the expectation that consumer inflation had peaked in the third quarter of 2008.

⁹ See Aron and Muellbauer (2009) for a discussion of the 1998 and the 2001 exchange rate shocks and the differences in the response.

Acknowledgement

The author thanks Janine Aron for valuable comments and Shaun de Jager for assistance with the simulations.

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Commentary: Challenges of inflation targeting for emerging-market economies: The South African case

Stan du Plessis

Fourteen years ago Charles Goodhart – the famous monetary economist and central banker – spoke to an audience in Stellenbosch, South Africa, about the experience of the pioneers of inflation targeting: the Reserve Bank of New Zealand. He focused on the potential role that this policy framework could play in helping to build credibility for the commitments made by the monetary authorities, while leaving discretion to allow for flexible responses to potential disruptive shocks. A substantial body of literature has since confirmed that reality for New Zealand and other developed country inflation targeters have been consistent with Goodhart's optimistic early expectations (see, for example, Bernanke et al., 1999). Brian Kahn's excellent paper shows that these ideas are applicable to the emerging-market world too, and specifically to South Africa. In particular, he shows evidence of (1) observed inflation, (2) real interest rates, (3) real output, and (4) the cyclical nature of monetary policy and its response to various shocks. The evidence he presents is not just favourable for the South African case, but also, as he points out, for the experience of inflation-targeting countries more broadly, especially for the emerging-markets group.

But this is an extraordinary story: approximately 30 years ago Arthur Burns – then recently retired as the Chairman of the Federal Reserve Board – spoke memorably about the challenges of central banking in his Per Jacobsson lecture. His concern was with the following paradox:

Why . . . have central bankers, whose main business one might suppose is to fight inflation, been so ineffective in dealing with the worldwide problem? . . . [D]espite their antipathy to inflation and powerful weapons they could wield against it, central bankers have failed so utterly in this mission in recent years. In this paradox lies the anguish of central banking. (Burns, 1979: 7.)

Since Burns spoke, and leaving aside present problems for the moment, central bankers have lost this anguish. Most crucially, they have accepted the fact that “the inflation rate in a monetary economy is ultimately decided by the monetary authorities” (Buiter, 2006: 13) and while Burns knew this, he felt unable to act against inflation in any way stronger than ‘undernourishing’ inflation for a while. The constraints were institutional, or so he saw it, and associated with what he called “the philosophical and political currents that have been transforming economic life in the United States” (Burns, 1979: 9). Milton Friedman (1977) had argued along similar lines in his Nobel acceptance lecture a few years earlier.

Kahn's paper shows how inflation targeting helps to avoid the anguish of central banking. Along many dimensions, inflation targeting captures what Marvin Goodfriend (2007) has called "the modern consensus on monetary policy"; a consensus on the following issues: assigning priority for price stability; making a serious effort to untangle absolute and relative price movements (or core and headline inflation); transparent objectives; a forward-looking operating procedure; and the importance of credibility for the successful pursuit of the goals of monetary policy. This consensus stands in sharp contrast to the environment as Burns saw it in the 1970s.

This commentary expands on two themes in Kahn's paper, instead of criticising his paper. The two themes are (1) the importance of credibility for the successful conduct of monetary policy and (2) the insufficiency of any particular rule to attain that credibility. A third theme is the social and political support needed to support any sustained efforts made to achieve monetary stability. Finally, I will briefly touch on the way that the South African Reserve Bank (the Bank) has applied inflation targeting in South Africa over the past few years, a period that has, as Kahn argued, provided a real test for inflation-targeting regimes internationally.

Rules and credibility

Kahn correctly observes that all inflation-targeting central banks implement the system flexibly, that is to say, that they are not 'inflation nutters'. In practice, this means that the horizon over which forecasted inflation is held consistent with the target is sensitive to what is happening on the real side of the economy. This sensitivity leaves substantial discretion in the hands of the policy-makers. Kahn then examines the hard question whether this flexibility might not undermine the credibility of the commitment.

He answers the question using two kinds of empirical evidence:

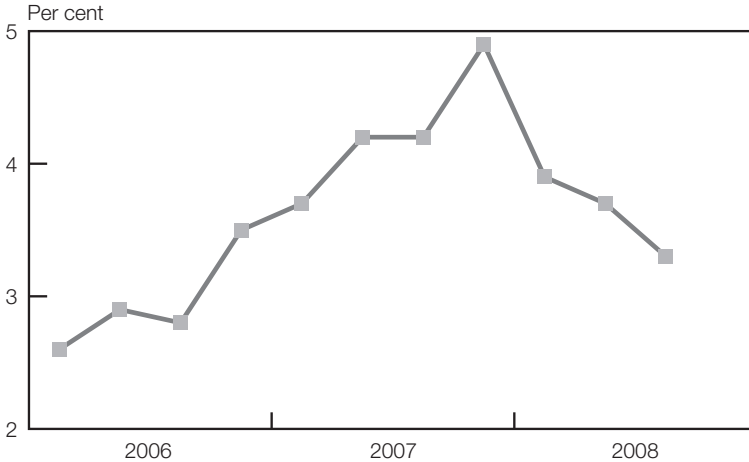
1. He reports on the improvements in outcomes with respect to inflation, real interest rates and output volatility, and he refers to the papers of Janine Aron and John Muellbauer (2007), and Geof Woglom (2005) that show, for example, the extent to which inflation has become more predictable. There is also recent work by Monique Reid (2008) following in the tradition of Gurkaynak, Sack and Swanson (2003) who uses real and nominal forward rates to consider the extent to which long-term inflation expectations have become anchored in South Africa. She finds that in South Africa, as in the United Kingdom and other inflation-targeting countries, and in contrast with the United States of America (US), these long-term expectations have indeed become firmly anchored.

2. Brian Kahn also addresses the question whether inflation targeting is too flexible, by demonstrating how the system operates when flexibility is needed, for example, when faced with a relative price shock. Such a shock is a major test for inflation targeting, and the detractors of the system both in South Africa and abroad have claimed that it is a test that inflation targeting is bound to fail. In a widely circulated, if ill-informed essay earlier in 2008, Joseph Stiglitz (2008) argued with respect to inflation-targeting countries that “[i]nflation in these countries is, for the most part, imported. Raising interest rates will not have much impact on the international price of grains or fuel”. We have heard the same views over and over again domestically: the Bank is using a “blunt instrument”, this is the wrong sort of inflation and so on (Garrow, 2007; Mondli, 2007). It is implausible that Stiglitz fails to distinguish between absolute and relative prices, but he certainly suggests that developing-country bankers would not be able to and, hence, they would chase the headline consumer prices index around, while failing to understand the nature of the price shock. Kahn’s paper shows how the Bank actually engages with the issue, with a real effort to identify the nature of the price shock before it proceeds with policy changes. He demonstrates this with his three scenarios:
 - a. A temporary mean-reverting shock, to which the appropriate response is: look through the shock.
 - b. A one-off permanent-level increase, to which the appropriate response is to tighten modestly so as not to accommodate the impact on the absolute price level. The fact that he distinguishes between the variability of the headline index (which is often dominated by relative price movements) and the core (where relative price movements are much less important) shows that the Bank’s conceptual framework does not work as Stiglitz assumed it would.
 - c. He also identifies a third category, namely persistent increases in a relative price shock. He observes, correctly in his paper, that such trends cannot last indefinitely, but that they can last long enough to be quite troublesome and it is really hard to know upfront whether one is dealing with the level change of the second kind or the long-lasting increases of the third kind. One cannot tell, but, fortunately, the policy response follows the same pattern, that is, tighten modestly to prevent the long-lasting relative price shock from becoming embedded in absolute price increases.

I think the Bank has operated in a similar fashion since the start of the most recent round of interest rate tightening back in 2006 and Figure 1 summarises the evidence. The graph shows the real forward-looking

repurchase (repo) rate in South Africa from the first quarter in 2006 until the last interest rate rise seen in the second quarter of 2008. I calculated inflation expectation by using the Bureau for Economic Research (BER) at Stellenbosch University’s inflation expectations survey for the next year.

Figure 1: Real repurchase rate in South Africa since 2006



The real interest rate was calculated as the difference between the nominal repo rate and expected inflation (for the next year) measured as the average of the three surveys conducted quarterly by the BER.

The consumer price index excluding mortgage interest cost for metropolitan and other urban areas (CPIX) proxy for inflation rose from 4,5 per cent to 13 per cent over this period, or 850 basis points. How did the Bank respond with interest rates? The repo rate was tightened in total by 500 basis points and with the pattern visible in the graph: in 2006 the real interest rate was tightened by just more than 50 basis points, with further tightening of about 100 basis points maintained through 2007, and as the economy seemed to have passed beyond the peak in the cycle in 2008 the Bank has allowed the real rate to ease very moderately. In total, the Bank raised the repo rate by 500 basis points, while this proxy of inflation (closer to core) went up by 370 basis points. It certainly was a tightening, but a modest one: just enough to maintain the Taylor principle (or a real tightening) and just enough to avoid accommodating the process of inflation, which Arthur Burns (1979) described as “undernourishing”, though accommodating inflation.

Therefore, the Bank has built credibility and it has done so not only by having a more systematic and rule-like framework, but crucially by using its flexibility, and using it in combination with a supportive policy and a social and political environment. This is not some unique insight into

inflation targeting; credibility for monetary policy regimes has always been about more than mere rules.

Recent scholarship on the gold standard highlighted this point. The gold standard has often been used as an example of a binding policy rule (though it was a little adjustable) and one that showed sufficient commitment to monetary stability to ensure credibility. The rewards of adopting this commitment mechanism would be seen in lower-risk premiums for borrowers on the gold standard. In an influential paper in the literature, Obstfeld and Taylor (2000: 260) summarised the case as follows: “Gold was apparently a good enough seal of approval by itself, and risk was priced without much references to public debt levels, the terms of trade, or whether the country was part of the British Empire.”

But this claim about the *sufficient* power of rules to establish credibility has never been wholly persuasive. In Blinder’s survey (2000) “Central bank credibility: why do we care? How do we build it?” from a few years ago not only the central bankers, but the academic economists too, gave the next-to-lowest ranking to “being rule bound” among the seven suggested ways of building credibility. Factors such as “a history of honesty” and “central bank independence” emerged as much more important contributors to credibility from that survey.

Recent scholarship has revealed that this was also true of the gold standard. Ferguson and Schularick (2008) have recently constructed a much larger dataset of bond investments under the gold standard to remove the kind of sample selection bias that also plagued the early convergence literature. Their results are striking: for all the countries combined in their broader dataset, they find little benefit in terms of risk premium for going onto the gold standard after controlling for other features of the economy, such as fiscal circumstances and other macro-economic aggregates. Furthermore, they found that the more developed countries experienced a credibility gain (as measured) from joining the gold standard. However, in countries with higher political risk and vulnerability to economic shocks “monetary policy commitments” did not offer a short cut to credibility.

An important lesson from the gold standard, Bretton Woods and from the anguish of Arthur Burns is that one needs more than technically appropriate policy design and even a good institutional structure for the monetary policy regime. One also needs political and social support for the focus on low and stable inflation.

Brian Kahn has reminded us of the same with respect to inflation targeting. For the constrained discretion of inflation targeting to improve credibility, the supporting institutions need to be in place. Fiscal policy

and the instrument independence of the central bank are major issues and on both these counts the Bank has benefited over the past decade and more from a highly supportive environment, and this has been seen in the studies on credibility too.

However, I want to add to this a set of metrics not usually covered in the assessment of inflation targeting, but which is highly pertinent to the circumstance of developing countries, namely the international dimension. Inflation targeting combined with a floating exchange rate regime and openness to capital markets is a coherent monetary policy regime. So too is money growth targeting instead of inflation targeting in the same configuration or, alternatively, a hard peg with capital flows. The Bretton Woods system, with fixed but adjustable exchange rates and little capital flow was another coherent, though ultimately unsustainable system.

Andrew Rose (2006) has placed the well-known observation that no country has ever abandoned inflation targeting against the history of other monetary policy regimes in the post-war era and found the following striking results:

First, inflation targeting has been more robust than any of the rival systems, with only three exceptions: (1) the eclectic system in the US and (2) Japan, and (3) the currency board in Hong Kong. The South African inflation target is now almost nine years old. Rose (2006: 9) found that in a population of inflation-targeting countries and a control group of 42 comparable countries, the probability of sustaining any given monetary policy regime for even eight years was less than one third.

Rose goes on to describe inflation targeting as achieving a sustainable, though unplanned, international monetary system, which he called "Bretton Woods reversed". The features of the reversed Bretton Woods based on inflation targeting can be seen from a series of contrasts with the erstwhile Bretton Woods system (Rose, 2006: 9).

Second, monetary policy was partly focused on external events under Bretton Woods, while it focuses locally under inflation targeting.

Third, capital flows were controlled and the scope for current-account imbalances were severely limited under Bretton Woods, while capital flows have surged and current-account imbalances have been facilitated by inflation targeting.

Fourth, while Bretton Woods required continuous and sometimes difficult international co-operation, none is required under inflation targeting.

Fifth, while the International Monetary Fund, the US and gold had central roles under Bretton Woods, none of that is true under inflation targeting.

Sixth, central banks had little transparency, but with greater political dependency under Bretton Woods, while they have achieved extensive independence, transparency and accountability under inflation targeting.

The reason for repeating Rose's contrast is that I wanted to contrast the outcomes under various monetary policy regimes; all of which are or were characterised by constrained discretion, that is, they were rules-based. The point I want to emphasise is that the success is not only, or even mainly, a function of the fact of having a rule. It turns out that rules are not enough to build and maintain credible monetary policy; one also needs supportive institutions and a supportive environment.

In summary, the answer to Kahn's question: "Does the flexibility of inflation targeting undermine its credibility?" is therefore "no".

Social and political support for low and stable inflation

The flexibility of inflation targeting is also important to help the central bank to prioritise the goal of low and stable inflation in the long run. Burns and Friedman, and the scholars of the seventies argued precisely that central banks did not have the scope to prioritise inflation and to take responsibility for the outcomes. Indeed, Burns felt that he could do no better than undernourishing inflation and Allan Meltzer has, in his study of the US Federal Reserve System's (the Fed) history, argued that this kind of self-censoring had been true for the Fed throughout the post-war period. If the Bank responds inflexibly to the threat of inflation, there is a real risk that the social and political support for the system would be eroded and, ultimately, there is no independence for the central bank from society and from politics.

Practically, this means that the Bank needs to double and redouble its efforts to explain the nature of the price developments that are being experienced. To confront head-on the claims about over-reaction which, as Brian Kahn argues and as shown above, are empirically unsupported. The Bank needs to persist with this, or it might lose the larger debate; the debate in the public domain.

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Commentary: Challenges of inflation targeting for emerging-market economies: The South African case

Colen Garrow

For inflation to be outside its target range for 18 consecutive months, amid a cycle of monetary tightening, suggests that there are shortcomings in the price mechanism; either in its application by monetary policy-makers, or in the mechanism itself, for example, the designated range being too ambitious for the South African economy to reach. Indeed, there is strong criticism that the cycle of monetary tightening, first embarked on in June 2006, has pushed interest rates up by 500 basis points, but that the desired result of lowering the consumer price index excluding mortgage interest cost for metropolitan and other urban areas (CPIX) to within its 3–6 per cent target range has not been achieved. When viewed in this context, inflation targeting may be considered a failure.

Since its implementation in 2001, changes have only been made once to the inflation target and that was in 2003. Firstly, to the range, which was widened from 3–5 per cent to 3–6 per cent and, secondly, to the target being monitored not against an annual average of CPIX, but against where CPIX is each month. Since these changes were implemented, the dynamics in the economy have changed considerably:

- South Africa is in the midst of its most ambitious infrastructural spending programme on record, with some R600 billion intended to be spent over the next three to five years.
- Between 2005 and 2007, some 2,3 million consumers have migrated from low-income Living Standards Measure (LSM) categories to higher-income, middle-class categories. In many instances, these consumers have reduced their asset deficits, accumulated pursuant to a number of legacy issues, and relied on credit to facilitate such consumption. (Refer to Table 1.)

With dynamics as intense as these, the inflation-targeting mechanism has become something of a straightjacket for the economy, where gross domestic product (GDP) growth and job creation are compromised. If these changes are to be more sustainable, it would be prudent to widen the inflation band to 3–7 per cent, and then, once these effects of consumer migration and infrastructure spending come off their highs, to revert to the previous band of 3–6 per cent.

Table 1: Migration of households in Living Standards Measures (LSM) categories

Living Standard Measure	Household income per month (R)	2005	2003	Change 2005 versus 2003	2007	Change 2007 versus 2005
LSM 1	1 028	2 317 000	2 828 435	(728 735)	1 287 000	(1 030 000)
LSM 2	1 275	3 745 000	3 900 263	(315 980)	3 034 000	(711 000)
LSM 3	1 638	3 979 000	4 287 312	(169 001)	3 366 000	(613 000)
LSM 4	2 141	4 582 000	4 168 220	579 034	4 290 000	(292 000)
LSM 5	2 952	4 132 000	3 810 944	506 125	4 516 000	384 000
LSM 6	5 096	4 451 000	3 930 036	796 118	5 379 000	928 000
LSM 7	8 320	2 174 000	1 935 245	433 580	2 885 000	711 000
LSM 8	11 227	1 609 000	1 756 607	(73 406)	2 096 000	487 000
LSM 9	14 741	1 971 000	1 637 515	404 622	2 359 000	388 000
LSM 10	20 902	1 695 000	1 518 423	215 643	1 898 000	203 000
Migration						
LSM 1–3		10 041 000	11 016 010	(1 213 716)	7 687 000	(2 354 000)
LSM 4–7		15 339 000	13 844 445	2 314 857	17 070 000	1 731 000
LSM 8		1 609 000	1 756 607	(73 406)	2 096 000	487 000
LSM 9–10		3 666 000	3 155 938	620 265	4 257 000	591 000

Source: South African Advertising Research Foundation, Brait

Early in its implementation, the inflation-targeting mechanism faced criticism in that monetary authorities were felt not to be passing the full extent of interest rate cuts to the economy. This kept the high-yield attraction of the rand strong between 2003 and 2005. The South African Reserve Bank (the Bank) may not have been explicitly targeting a strong rand, or for that matter, any level in the local exchange rate, but the perception was that a “strong rand policy” was allowed to operate, which kept imported inflationary pressures at bay and made the inflation target easier to reach. The criticism, that such a policy risked pushing interest rates higher than they should be, and therefore compromised GDP growth and job creation, is entirely valid, as is the criticism that exogenous food and fuel price shocks should not be responded to with monetary tightening. Monetary policy has no control over prices of commodities set on international markets. This highlights the tenuous trade-off between flexibility and credibility the Monetary Policy Committee (MPC) must strike. The price mechanism is inflexible in handling the exogenous prices, which prompted interest rates higher, to the extent that the MPC faces criticism for maintaining a restrictive monetary route, which did not deliver the intended goal of bringing prices within the 3–6 per cent range. A different approach is now needed to protect what economic growth there is.

While inflation targeting handles demand pressures well, the same cannot be said for supply-side shocks. Oil price spikes and drought, which affect fuel and food inflation respectively, and in the current environment, financial contagion, are issues over which consumers, and monetary and government authorities have no control. A somewhat different response is required under such circumstances. This raises the matter of the explanation clause and why it has not been invoked.

South African Reserve Bank Governor Tito Mboweni has said that the clause would not be invoked and that he would not operate in a way similar to that where Mervyn King, Governor of the Bank of England, wrote to the then Chancellor of the Exchequer Gordon Brown, explaining why the British central bank was missing its inflation target. In South Africa there is no point in having a clause if it will not be invoked. However, as with exchange control regulations, which are formulated by government, but implemented by the Bank, amendments to the inflation target need to come from the National Treasury.

Why should central banks push interest rates any higher, when monetary tightening will have a negligible effect on these price pressures? Put more simply, commodity prices are set on international markets. Monetary tightening will therefore be little more than a blunt instrument. The duration of such shocks may not be known, but if the central bank is as forward-looking on monetary policy as it says it is, then on a balance of probabilities the effect of financial contagion the world economy is now experiencing will be reflected in disinflation/deflationary pressures over the next 12–18 months. A monetary response under such conditions suggests aggressive accommodation from the Bank, similar to that undertaken by most G-20 central banks over the past few months. The question therefore asked is why is it taking the MPC this long to cut interest rates?

An answer can probably be found in the application of the new inflation target – consumer price index (CPI), which includes owner equivalent rent – the first data of the reweighted and rebased data released by the time the MPC meets in the new year (2009). The MPC is likely to wait for the new inflation data before making its move on interest rates.

If there is a problem created by having a high interest rate environment and, in particular, high interest rate differentials, it must be the bubble created in the balance of payments, when carry-trade-type transactions are created. The mismatch between short-term, speculative capital flows and long-term, foreign direct investment inflows is that speculative flows are susceptible to the fickle ebb and flow of sentiment. Carry-trade positions, which are accumulated over many months, are often unwound over much shorter time frames, creating disruptive patterns of volatility for

the rand, at times inviting a restrictive monetary response to a rising inflationary environment. The challenge for monetary authorities is therefore to monitor an interest rate differential attractive enough to boost portfolio inflows, but not sufficient to attract abnormally large amounts of speculative, carry-trade-type transactions. It must be stressed, however, that a monetary response is insufficient on its own to address the mismatch between short- and long-term capital flows through the financial account. A less stringent regulatory environment, more flexible labour legislation and incentives for exporters are all issues that must be handled by government, if longer-term foreign direct investment is to be attracted.

Another challenge for inflation targeters has been the lack of control it has over administered prices, such as the series of price hikes in electricity and property rates. Verbal intervention from the central bank is generally not effective, yet the MPC has to flex its monetary policy around price hikes over which it has no control.

While the aforementioned may be viewed as criticisms that highlight a need to fine-tune the mechanism, inflation targeting has had its successes. Among these are an important anchor being created for price adjustments, a useful benchmark against which wages and prices can be adjusted, and an efficient signal for when rate changes are pending.

Some issues in modelling and forecasting inflation in South Africa

Janine Aron and John Muellbauer

1. Introduction

This invited overview paper draws on our South African and United States (US) inflation modelling and forecasting experience. The current global crisis highlights the importance for policy-makers of having good models for forecasting inflation. Central banks' caution about inflation risks (expressed, for example, in the Federal Reserve minutes of 16 September 2008, released on 7 October, and the European Central Bank's 2 October 2008 statement about the decision to leave interest rates unchanged) may have been understandable, given the inflation shocks of 2008. However, it suggested the major central banks were 'behind the curve'.

Forecasting inflation is notoriously difficult. There have been big structural shifts in the world economy, including trade and financial globalisation; and in individual economies, such as the decline in trade union power in the US and the opening of the South African economy to international trade. Monetary policy itself has shifted to a far greater focus on inflation. Clements and Hendry (1998, 2002) have highlighted the role of structural breaks in accounting for forecasting failures. As the 2008 experience graphically demonstrated, energy and food price shocks can be large and difficult to predict. Indeed, the speed of price changes tends to increase with big shocks. Most forecasting models used by central banks therefore put a large weight on recent inflation. This tracks inflation quite well, *except at turning points*, because the models miss key underlying long-run influences. Yet, it is at the turning points that good models are crucial.

What are the characteristics of a 'good model'? We argue that models with good predictability at turning points have some particular features. Instead of modelling inflation only or mainly in terms of *differences*, they include long-run relationships between the economic variables, especially relative prices. They use more richly specified models than, for instance, vector autoregressive (VAR) models with their degrees of freedom problems. They take account of structural breaks. They use longer lags to allow time for relationships to feed through than is common, say, in VAR models. They test for asymmetries and non-linearities.

We have used models of this type for our work on inflation in South Africa, and, more recently, in the US. Our US work has had particular policy

relevance in the global economic environment of 2008 and 2009 (e.g. Aron and Muellbauer, 2008a, 2008b). Our results in October 2008 predicted that we were on the cusp of the most significant turning point for US (but not South African) inflation in the past 20 years, so that many of the standard models would go badly wrong. The economics were straightforward. With global output probably falling faster in the fourth quarter of 2008 than at any rate since the war, large excess capacity would be expected to develop, while commodity prices fell. Some still believed that emerging markets would provide a stabilising influence on the world economy, but we suggested that the opposite was likely. Countries such as China are highly geared to exports and, above all, investment, which in China exceeds consumer spending. Apart from infrastructure, investment in health care and education, investment is geared to growth. So if growth fell more sharply than the reduction from 11 per cent to 9,3 per cent for 2009 predicted by the October International Monetary Fund (IMF) *World Economic Outlook*, the amplification on the fall in growth of a sharp fall in investment was likely to be considerable. As over-capacity developed, investment in goods production would fall even further, with serious implications for gross domestic product (GDP). It seemed unlikely that the Chinese government could act swiftly enough to boost domestic consumption to compensate. Hence the demand for commodities, which has been driven by emerging-market growth, would fall sharply. Eventually, however, lower commodity prices and lower inflation act like a large tax cut for households and will allow global interest rates to fall further and contribute to the stabilisation of economic activity in those countries not heavily dependent on primary commodity exports.

South Africa is caught in the cross-fire between two major trends: (1) global disinflation and (2) the collapse of the non-gold commodities super cycle. By early 2009, most metal prices and agricultural export prices had already fallen sharply. Gold prices remained high, reflecting the metal's multiple roles of inflation hedge, important industrial material and a 'safe haven' when other assets are perceived as risky. However, eventually, if policy-makers succeed in stabilising the global banking system, the gold price is likely to succumb to recession and low inflation, and this remaining support for the rand would be reduced.

Our research on new forecasting models for the US and South African inflation is closely relevant to the above issues (Aron and Muellbauer, 2008b, 2008c). Our monthly US inflation models for the US consumer price index (defined using the personal consumption expenditure deflator) build in a wide range of factors, including oil prices; producer prices; unit labour costs; import prices; prices in other countries and the

exchange rate; house prices; trade union density; and the unemployment rate. We have estimated similar inflation models for the three underlying components of the consumer expenditure deflator: (1) durable goods, (2) non-durable goods and (3) services. The models have been tested out of sample on monthly data from 2000 to the present, and they surpass by large margins the naïve models widely seen to be hard to beat (e.g. see Stock and Watson, 2003). For South Africa, our quarterly inflation models in the same 'genre', both for the total consumer price index excluding interest mortgage cost for metropolitan and other urban areas (CPIX) and for its ten sub-components, also outperform naïve models.¹

A key element in these models is the *long-run* adjustment in consumer prices to costs and other prices. For instance, the US models suggest a long-run solution for US consumer prices as a function of unit labour costs, US house prices and foreign prices converted into dollars. Unit labour costs in the US have a weight of 50 per cent and are thus central to the model; they have remained low despite higher goods price inflation. House prices have a powerful effect in the model, entering with a long lag. Their importance lies in the role of rents in the CPI, but they may also reflect other macroeconomic influences. Viewed in October 2008, house price falls had offset some of the recent inflation from higher oil and food prices, and our results suggested that lower and still-falling house prices would be a significant deflationary force. Declining foreign inflation and recent dollar appreciation suggested little prospect of imported inflation. Since oil and food prices had fallen sharply, with further to fall, while unemployment was escalating, our models suggested that US consumer price inflation must *fall at record rates* for the 6–12 months measured from the final quarter of 2008. Our models of the underlying components, durable and non-durable goods and services inflation, further reinforced this view.²

In Section 2 we discuss our research on modelling producer price inflation in South Africa (Aron and Muellbauer, 2007a, 2009a), and its extension to forecasting producer price inflation at horizons of one, two and four quarters with a similar methodology to that in our US paper. At all horizons, the models incorporate unit labour costs, the output gap, import prices, the real exchange rate, a measure of trade openness and a monetary policy indicator based on the interest rate differential between South Africa and the US. The real exchange rate by definition incorporates foreign prices as well as the nominal exchange rate. While dollar oil prices and global inflation decline, the exchange-rate depreciation will be inflationary, though pass-through of the depreciation into producer prices may be incomplete. It will likely be substantially offset by a sharp domestic slowdown, with a declining output gap, and a wide interest rate differential, as interest rates in South Africa will have to remain relatively high for a time relative to the US and most industrial countries.

Section 3 summarises our recent paper on forecasting CPIX in South Africa. Recently, there has been renewed interest, especially on the part of central banks, in the potential for greater accuracy from forecasting the sub-components of the overall CPI and aggregating these forecasts, as against forecasting the aggregate itself. We compare this approach with single-equation forecasting models for aggregate CPIX.

One of the components that will become even more important is housing, with the introduction in January, 2009 by Statistics South Africa (Stats SA) of a new CPI measure, where owner-occupied housing is measured by imputed rents. Section 4 discusses these issues. We have long called for such a change, following the US, Australia and other countries, since using mortgage rates to proxy housing costs was conceptually flawed and damaging for policy (Aron and Muellbauer, 2004, 2005, 2007b, 2009b). Imputed rents will have to follow market rents, which then become much more influential for inflation. Given their importance, good-quality data will be important. To understand the likely future behaviour of the rent component, building good models of its past behaviour would be advantageous. Unfortunately, Stats SA has no data on rents before 1997, and this is too short a period for robust modelling, while data quality for some of the period is not all it could be. However, we do have data on the overall cost of housing excluding mortgage interest payments and we discuss some of our findings for this. The coming decline in real house prices in South Africa is likely eventually to have a larger influence on the new CPI than it would have had on the old. We refer to the US experience of switching to the new CPI in 1983 to illustrate the dangers of making such a switch when interest rates are far from being in a neutral position. Unfortunately, the switch in South Africa has occurred close to the peak of the interest rate cycle, and will lead to the overstatement of the CPI inflation rate.

Section 5 concludes with a brief discussion of recent criticisms of inflation targeting.

2. Modelling and forecasting wholesale prices in an open economy

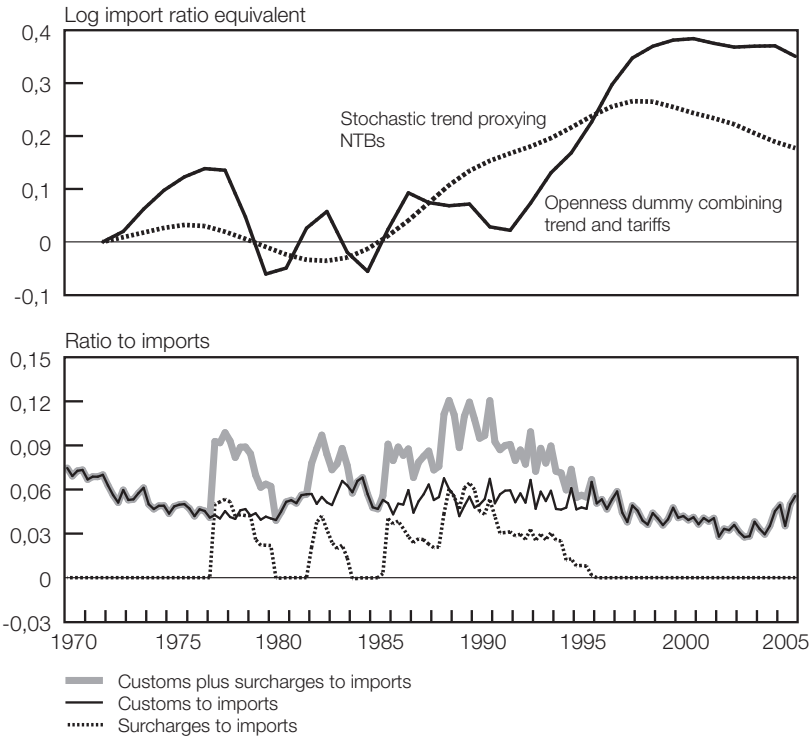
In the 1990s, South Africa became globally more integrated after years of isolation. Our recent work argues that accounting for changing trade openness plays a crucial role in obtaining stable and well-fitting equations for producer price inflation over longer samples (Aron and Muellbauer, 2007a, 2009a). In this section we explain how we measure openness, and discuss the estimation results, including those for an improved and more robust version of the South African Reserve Bank's own producer

price inflation equation. We then demonstrate similar findings in a forecasting context for the redefined producer price index now produced by Stats SA.

Evolving trade liberalisation represents a structural break, the omission of which can bias the determinants of inflation and output. Long time series measures of openness should improve the modelling and forecasting of output and inflation. Aron and Muellbauer (2007a) offer an innovative technique to measure evolving trade openness and provide evidence for the role of openness in explaining inflation. Our technique measures openness encompassing both observable trade policy (tariffs and surcharges) and unobservable trade openness (quotas and other non-tariff barriers), capturing the latter by a smooth non-linear stochastic trend³ in a model for the share of manufactured imports in home demand for manufactured goods, controlling for the business cycle and exchange rate. The measure is constructed as a weighted combination of known trade policy and the stochastic trend, with weights from the regression coefficients in the model. In relation to South Africa, the shape of the trend is likely to reflect such factors as the lifting of capital controls and unification of dual exchange rates in the 1990s (as often used in composite measures of openness), and the lifting of externally imposed trade sanctions. It is possible that this measure also captures changing institutional aspects of the effectiveness of South African competition policy: limited competition is a factor behind the mark-up on costs charged by South African manufacturers emphasised by Fedderke et al. (2007), see also the overview discussion in Fedderke (2009).⁴ The measure is shown in Figure 1, and correlates with known institutional changes in openness. Our survey demonstrates that the measure overcomes many of the shortcomings of existing measures.

The evidence for South Africa in Aron and Muellbauer (2007a) suggests that increased openness significantly reduced inflation in the 1990s. The non-tariff barriers proxy and tariff rates (excluding temporary surcharges) have a powerful effect on the mark-up charged by manufacturers in the long run. This results in a stable equation explaining the fluctuations in producer prices charged by manufacturers in South Africa from 1979 to 2005, a period of major structural changes. Paradoxically, given observed price stickiness, the negative effect of increased openness on labour and import costs probably *raised* the observed mark-up in the short run. Crude indicators of trade openness do less well in explaining the behaviour of producer prices, though the *constant price* version of exports plus imports relative to GDP is the best of them and has the merit of simplicity and ease for updating.

Figure 1: Openness measure and stochastic trend, plus the tariff ratios for South Africa



Sources: South African Reserve Bank *Quarterly Bulletin*, and Aron and Muellbauer (2007a)

We (Aron and Muellbauer, 2009a) further demonstrate how the producer price inflation equation in the South African Reserve Bank core model can be improved by taking account of greater openness, using *either* our innovative time-series openness measures or a more conventional measure, defined by exports plus imports divided by GDP, all measured in *constant* prices. The strong influence on producer price inflation of the real exchange rate and the interest rate differential, found in our earlier work, is confirmed. This makes explicit the foreign-exchange channel of monetary transmission on inflation, which is important in open economies. The (asymmetric) short-term role of food price inflation in the South African inflation process is also confirmed, and is relevant given record rises in world food prices in 2008. The result is a model for producer price inflation with a greatly improved fit and greater stability over longer samples, and a role for the *level* of the output gap rather than simply a short-run effect, as in the South African Reserve Bank’s model. This helps mitigate

the arguments regarding the apparent unconcern of inflation-targeting policy for the level of economic activity: the important role for the output gap means inflation targeting automatically tends to stabilise output. Finally, our improvements to the South African Reserve Bank's producer price inflation model are easy to implement: essentially, we add five new regressors (including openness) to this model and relax a restriction on the short-term dynamics.

Further evidence in favour of this extended model for producer price inflation comes from a cointegration analysis (see Johansen, 1988; Johansen and Juselius, 1990). We consider a set of five endogenous $I(1)$ variables: (1) log producer price index, (2) log import prices, (3) log unit labour costs, (4) log real exchange rate and (5) the interest rate spread.⁵ We treat the openness indicator like an exogenous trend and together with a step dummy, DUM2000, for the influence of inflation targeting, it is treated as part of the cointegration space. The homogeneity restrictions suggesting there is no money illusion in the long run are accepted, but we do not impose short-run homogeneity.⁶ There are four cointegrating vectors, of which one can be interpreted as a long-run solution for the log producer price index. Only this vector is relevant for the inflation dynamics and corresponds quite well with the single-equation model for producer price inflation (see Aron and Muellbauer, 2009a).

Finally, we model current producer price inflation, and forecast producer price inflation one, two and four quarters ahead, using similar models to the above, for the *new* definition of the producer price index, as published in the South African Reserve Bank *Quarterly Bulletin* in June, 2008.⁷ The variables are defined in Table 1 and results are presented in Table 2. All variables are $I(1)$, save the output gap and the asymmetric terms.⁸ Autometrics (Doornik, 2009) was used to reduce a general specification to parsimonious models. The general specification includes in the long-run solution for the log producer price index, equilibrium correction terms defined using import prices, unit labour costs, oil prices measured in rand, and producer prices for food. These are all defined by the log ratio relative to the producer price index. The long-run solution also includes a conventional *constant price* trade volume-based measure of trade openness measured as a four-quarter moving average, the log real exchange rate, the output gap,⁹ the log terms of trade and the interest rate differential with the US. A shift dummy, Dum2000, which is zero before 2000 and 1 from the first quarter of 2000, is included to reflect the impact of inflation targeting on inflation. The dynamics include changes with lags up to three quarters in most variables, except in the asymmetric terms in oil and food prices. These enter only at the shortest lag, since we expect asymmetries to be relevant only over short periods.

Table 1: Variable definitions for parsimonious equations

Variable name	Variable definition	Mean	Standard deviation
log(PPI)	Log of new producer price index including exports and excluding imports	-0,665	0,716
log(ULC)	Unit labour costs measured as: log of National Accounts remuneration relative to real GDP	-1,52	0,814
log(ULC/PPI)	Long-run cost component: unit labour costs relative to PPI	-0,854	0,109
log(IMPP)	Import prices measured as: log of National Accounts total imports deflator	-0,739	0,718
log(IMPP/PPI)	Long-run cost component: import prices relative to PPI. Import prices measured as: log of National Accounts total imports deflator	-0,0743	0,104
log(TOT)	Log of the terms of trade	4,70	0,0747
log(REER)	Log of real effective exchange rate. A rise is appreciation	4,75	0,148
USSPREAD	Spread between the SA prime rate and US government Treasury Bill rate	0,108	0,0466
Log(FOODP)	Log of the raw price of food, from the agricultural food component of the new PPI	4,11	0,573
log(FOODP/PPI)	Long-run cost component: food prices relative to PPI	4,78	0,156
ASYMFOOD	Asymmetric effect of food price changes: $\Delta\log(\text{FOODP})$ if $\Delta\log(\text{FOODP}) > 0$, and zero otherwise	0,0258	0,0311
log(POILR)	Log of the dollar Brent oil price converted into rands with the bilateral US\$/ZAR exchange rate	4,28	0,749
log(POILR/PPI)	Long-run cost component: oil prices relative to PPI	4,95	0,397
ASYMOIL	Asymmetric effect of oil price changes: $\Delta\log(\text{POILR})$ if $\Delta\log(\text{POILR}) > 0$, and zero otherwise	0,0657	0,0843
OUTGAP	The output gap measured as: log real GDP adjusted with a Hodrick Prescott filter ($\lambda = 1600$) for potential GDP	0,107	1,67
MA4TRVOL	Conventional trade policy measure in real terms: ratio of real exports plus real imports to real GDP, 4-quarter moving average	32,0	7,71
DUM2000	Step dummy, 0 up to 1999 quarter 4, 1 from 2000 quarter 1		

Source: All variables from the *Quarterly Bulletin*, South African Reserve Bank, except the US Treasury bill and South African prime rates (from International Financial Statistics, International Monetary Fund). Mean and standard deviation measured over the sample, 1980Q1–2008Q2

This kind of reduced form inflation model captures inflation expectations indirectly, though some of the regressors may be more closely linked to expectations than others. For example, the inflation-targeting dummy probably has mainly an expectations interpretation. The interest rate differential probably acts, in part, on expectations of the exchange rate and hence inflation. Aron, Muellbauer and Smit (2003) confirm that it has a significant effect on the exchange rate.

The version of Autometrics used includes an outlier correction.¹⁰ This searches for residuals approximately three or more times as large as the equation standard error and automatically inserts an impulse dummy for such residuals. In a forecasting context, very big shocks to oil prices, food prices and the exchange rate will typically cause large forecast errors. Controlling for the worst of these allows the systematic parts of the model, which track the transmission lags of shocks into producer prices, to be more accurately estimated. The resulting equation standard errors greatly understate forecast accuracy in a real-time setting since such large shocks can occur at any time.¹¹ Indeed, some of the largest shocks in the post-war period occurred to oil and food prices in 2008, and may yet occur in the exchange rate.

The results reported in Table 2 for the new definition of the producer price index are reassuring for the robustness of our earlier research, which had employed the previous measure of the producer price index. At all horizons, the unit labour cost and import price elements of the equilibrium correction term are strongly significant, with the latter having about half the weight of unit labour costs at all horizons. This is so, despite the fact that import prices are no longer directly included in the producer price index, which is based on prices of domestically produced goods, including exports. One difference from models for the old definition is that the log terms of trade are now relevant at all horizons. Since export prices are currently in the producer price index, log terms of trade defined as export prices/import prices should clearly enter the model with a positive coefficient and this is confirmed. The trade openness indicator, the output gap and the interest rate spread are also significant at all horizons.¹² The real exchange rate is typically insignificant – made redundant by import prices, oil prices and the terms of trade, which seem to capture the joint effects of the exchange rate and foreign prices.¹³

In the forecasting models, but not the model for the current quarter's rate of producer price inflation, the equilibrium correction term in rand oil prices is strongly significant. The dates at which large outliers occur are unsurprising. They reflect the large exchange rate and food¹⁴ price shocks of late 2001, and the food and oil price shocks of 2008. The inflation-targeting dummy is significant at forecasting horizons of one, two and four quarters, and could be interpreted as a measure of the success of

Table 2: Quarterly producer price index estimation and multi-step producer price index forecast equations for the new measure of producer price index in South Africa

1		2		3		4	
Modelling: $\Delta \log(\text{PPI})$ 31 Mar 1980 – 30 Jun 2008		Forecasting: $\Delta \log(\text{PPI})(+1)$ 31 Mar 1980 – 31 Mar 2008		Forecasting: $\Delta \log(\text{PPI})(+2)$ 31 Mar 1980 – 31 Dec 2007		Forecasting: $\Delta \log(\text{PPI})(+4)$ 31 Mar 1980 – 30 Jun 2007	
Coefficient	t-value	Coefficient	t-value	Coefficient	t-HACSE	Coefficient	t-HACSE
Dynamic terms and seasonals:							
$\Delta \log(\text{PPI})(-2)$	2,3	$\Delta \log(\text{PPI})$	2,09	$\Delta \log(\text{PPI})$	2,23	$\Delta \log(\text{PPI})$	-0,232
$\Delta \log(\text{PPI})(-3)$	3,16	$\Delta \log(\text{PPI})(-2)$	3,02	$\Delta \log(\text{IMPP})$	-1,42	Q1	0,00343
Q1	3,99	$\Delta \log(\text{POILR})(-1)$	-2,16	$\Delta \log(\text{POILR})$	-0,0149	$\Delta \log(\text{ULC})$	-0,111
Q2	2,12			$\Delta \log(\text{TOT})$	-0,0357	$\Delta \log(\text{POILR})(-1)$	-0,0130
$\Delta \log(\text{IMPP})$	6,36						-2,05
$\Delta \log(\text{IMPP})(-1)$	3,66						
$\Delta \log(\text{FOODP})$	5,21						
ASYMOIL	3,58						
$\Delta \log(\text{TOT})$	2,14						
Outliers:							
i:2008-06-30	0,0532	7	4,65	i:2001-09-30	0,0389	17,1	0,0628
			6,24	i:2007-12-31	0,0555	12,9	16,1
Long-run terms and dummies:							
Constant	-0,129	Constant	-0,171	Constant	-0,190	Constant	-0,132
DUM2000	-0,00467	DUM2000	-0,0136	DUM2000	-0,0152	DUM2000	-0,0185
MA4TRVOL(-4)	-0,00064	MA4TRVOL(-4)	-3,42	MA4TRVOL(-4)	-0,00098	MA4TRVOL(-4)	-0,00163
USSPREAD(-1)	-0,0405	USSPREAD(-1)	-0,00075	USSPREAD(-1)	-0,0748	USSPREAD(-1)	-0,1058
OUTGAP(-1)	0,00158	OUTGAP	4,17	OUTGAP	0,00230	OUTGAP	0,00317
$\log(\text{TOT})(-1)$	0,0458	$\log(\text{TOT})$	3,99	$\log(\text{TOT})$	0,0634	$\log(\text{TOT})$	0,0637
$\log(\text{IMPP})(-1)$	3,87	$\log(\text{IMPP})(-1)$	0,0528	$\log(\text{IMPP})(-1)$	0,0545	$\log(\text{IMPP})(-1)$	0,0796
$\log(\text{ULC})(-1)$	3,58	$\log(\text{ULC})(-1)$	0,109	$\log(\text{ULC})(-1)$	0,113	$\log(\text{ULC})(-1)$	0,146
$\log(\text{ULC})(-1)$	3,8	$\log(\text{POILR})(-1)$	0,00799	$\log(\text{POILR})(-1)$	0,0109	$\log(\text{POILR})(-1)$	0,0121
			2,42				
Diagnostics:							
Equation standard error	0,005939						0,00847
Adjusted R ²	1,820						0,616359
DW	1,93						1,66
Chow (mid-sample)	$p = 0,00$						0,08
Normality test	$p = 0,47$						0,003
AR/MA1-test	$p = 0,731$						0,09
AR/MA4-test	$p = 0,024$						0,27
hetero test (Breusch)	$p = 0,115$						0,11

the inflation-targeting regime, probably working through inflation expectations, as noted above. This supports our finding in Aron and Muellbauer (2007b, 2008d, 2009b) that the new policy framework became quickly embedded in interest rate expectations.

Individual equations are now discussed in more detail. Column 1 in Table 2 shows results for the current log change in the producer price index. This equation includes three potentially endogenous terms: the current log changes in import and food prices and an asymmetric term in rand oil prices (defined to be zero if the log change is negative, otherwise equal to the log change). The last term is consistent with the widespread view that oil price increases are passed on more quickly than decreases. Our previous work suggests that instrumenting these variables does reduce some of the coefficients slightly, but otherwise has a negligible impact on the results (Aron and Muellbauer, 2007a, 2009a). We have not tested this here, as our principal focus is the forecasting models. The inflation-targeting dummy has a negative, but insignificant coefficient in this specification, probably because much of the effect on inflation expectations is already reflected in the three potentially endogenous variables. The reported equation fails the mid-point Chow test, possibly because of the endogeneity bias. However, approximating an instrumented equation by excluding current import price inflation and the current change in the terms of trade yields a similar equation that passes the Chow test and has a significant inflation-targeting dummy.

The one outlier added to the model is for the second quarter of 2008. Despite the inclusion of contemporaneous oil, food and import prices, the model fails to capture the sharp rise in producer price inflation in that quarter. This may suggest a specification problem.¹⁵ In this exercise, we have not included the non-linear lagged inflation terms found so relevant in our US consumer price inflation forecasting model. The latter was interpreted as a symptom of 'state-dependent' pricing in which, when cost inflation goes to high levels, the speed of price adjustment rises and inflation jumps further. This will be covered in a future investigation of this issue for South Africa.

Column 2 presents results for the one-quarter ahead forecasting horizon. All the key variables discussed above appear. The lagged log change in rand oil prices appears with a seemingly anomalous negative coefficient, but it is only marginally significant. Omitting it makes little difference to the results. The outliers are dated 2001Q4 and 2008Q1, but given that the dependent variable is one quarter ahead, this means they refer to producer price inflation shocks in the first quarter of 2002 and the second quarter of 2008.

Column 3 presents very similar results for the two-quarter forecasting horizon. The outliers capture the same shocks as in column 2. The

negative coefficients on the log change in oil prices can be interpreted to mean the equilibrium correction term can be lagged one quarter. The negative coefficient on the log change in import prices and the terms of trade suggest that a two-quarter moving average of the level of log import prices and the terms of trade would be a more parsimonious representation of these long-run effects.

Column 4 shows that for the four-quarter ahead forecasting horizon, very similar drivers are selected. At this horizon, the effect of the inflation-targeting dummy is estimated at minus 0,018. This could be interpreted as a 1,8 per cent benefit in terms of annual inflation of introducing the new monetary policy framework. However, several other variables are included in the model, such as the interest rate spread, which could themselves have been affected by the policy shift. Nevertheless, it is an encouraging result.

One of the remarkable features of the four-quarter-ahead model is that the equation standard error is only a little above that of the two-quarter-ahead model, despite the greater uncertainty that should be associated with the longer horizon. This may also indicate effectiveness of the new monetary policy regime, in that over longer horizons, successful policy should bring inflation back on track and so reduce the private sector's uncertainty about future inflation. The South African Reserve Bank's fan charts for the inflation outlook should reflect this feature at longer horizons.

One implication of these models is that forecasts made recently on second quarter of 2008 data will need radical revision when the forecasts based on fourth quarter of 2008 data are made. The fall in oil prices, the decline in the output gap and the rise in the US spread are all deflationary. It looks as though the fall in the terms of trade due to the collapse of South Africa's commodity export prices will be larger than the corresponding decline in the rand exchange rate, and is likely to be deflationary for producer prices. So the main source of inflation in 2009 could be from import prices, if the decline in underlying foreign currency prices of imports is more than offset by the fall in the rand. For rand oil prices, the opposite is true: the decline in dollar oil prices exceeds the fall in the rand. One can make a case that for 2009 the overall consequences for producer prices are on the deflationary side, though obviously South Africa will not experience the complete collapse of inflation that is already visible in the US (Aron and Muellbauer, 2008a), to be followed by Europe.

We have treated structural breaks in this reduced form model in two ways: (1) by including a dummy for the inflation-targeting period and (2) by including a continuous but slowly moving openness variable, which we treat like a dummy. The effects from structural change may, however, be more complex than we represent here, that is, not just inducing

changes in the intercept coefficient. We might expect to find varying parameters if we were to test for interactions between say the dummies and particular variables, such as the exchange rate (e.g. see Aron and Muellbauer, 2002). This deserves further exploration in the current context. Plots of recursive betas for the models reported in Table 2 (not shown here) are fairly reassuring on parameter stability. Certainly, parameter stability is far superior than for models excluding the openness indicator and the inflation-targeting dummy.

3. Modelling and forecasting CPIX and the components of CPIX

We have also worked on modelling and forecasting the consumer price index, using models embodying the same principles we emphasised above: (1) the importance of including long-run relationships between the economic variables, especially relative prices, rather than casting the inflation models only or mainly in terms of *differences*; (2) using far more richly specified models than is common with many techniques, especially those constrained by degrees of freedom problems; (3) enhancing the robustness of models by taking account of structural breaks (e.g. greater openness), and testing for potentially changing coefficients with structural change; (4) using longer lags to allow time for relationships to feed through, than is common say in VAR models; and (5) testing for asymmetries and non-linearities, though the latter issues remain to be explored further in the current version of the work.

Our recent paper (Aron and Muellbauer, 2008b) on modelling and forecasting the CPIX and the ten underlying sub-components applies these principles in both aggregate and sectoral models. Apart from shedding light on the underlying sectoral sources of inflation, potentially useful to monetary policy, our aim was to see if we could *outperform* an aggregate forecasting equation for CPIX (the *direct* forecast) by a weighted sum of the individual forecasts for each of the underlying ten components in the CPIX basket, for example, food, housing, clothing and transport goods (the *indirect* forecast). There has been renewed interest, mainly by central banks, in investigating whether there are gains to forecast accuracy in aggregating weighted forecasts of the sub-component price indices, as against forecasting the aggregate itself.¹⁶ This makes sense because inflation is a far from homogeneous phenomenon. Disaggregating the price index into its sub-components potentially can increase information in the forecasting process. Different information sets tend to apply to different sectors, for example, technological innovation, taxation and the extent of competition may vary, and trends in sub-components may differ for structural reasons. If the econometric specifications can be allowed to vary across disaggregated components, and the dynamic properties of individual components alter depending on the sector, the

result may be better than forcing the same response across all sectors in an aggregate model. The sectoral approach is also useful for examining the impact of changes in weights, both for regular reweighting and for the kind of change in CPI planned for January 2009.

In our paper, four-quarter-ahead forecasting models for CPIX and the ten main sub-components of CPIX were developed, combining equilibrium correction, trade openness and split trends¹⁷ to handle structural shifts. These models permit the adjustment of prices to trends in relative prices and in prices relative to input costs to be part of the inflation process. Plausible restrictions were applied to overcome the ‘curse of dimensionality’ in order to select parsimonious models. We selected models for 1979–2003 and recursively forecast to the end of 2007, to compare the performance of models corresponding to differing information sets. The sectoral four-quarter ahead forecasts from the sub-component equations were aggregated using actual sub-component weights from the CPIX basket. The ‘indirect’ forecast thus obtained was then compared with various forecasts of the aggregate CPIX index.

The exercise involved a considerable amount of data construction and manipulation. For instance, as the CPIX data were only policy-relevant from 2000, and only constructed by Stats SA back to 1997, we used our own consistent construction of monthly CPIX data back to 1970 from Aron and Muellbauer (2004). This paper, in the absence of an official handbook and drawing on Haglund (2000), has contributed to greater clarity on the methods used by Stats SA on constructing the CPI.¹⁸ We also constructed HX, the housing component less the mortgage interest cost, back to the start of the sample, for both the “metropolitan” component before 1997 and the “metropolitan and urban” component from 1997, using the methods of Aron and Muellbauer (2004) and appropriate weights, and splicing the two in January 1997.¹⁹

To summarise the results, we find that increasing trade openness has substantially reduced the inflation rate in South Africa. An aggregate CPIX equation incorporating only *changes* in the wholesale price index, unit labour costs, the real exchange rate, import prices, terms of trade, oil prices, the output gap and trade balance to GDP ratio, and the level of trade openness achieves a 28 per cent reduction in the root mean squared forecast error (RMSFE) relative to the best of the naïve models based only on lags in CPIX inflation rates. Applying the same methods to each of the inflation components, and weighting the forecasts using the CPIX weight to obtain an ‘indirect’ forecast for CPIX, brings a further gain of 4 per cent relative to the naïve model benchmark, see Stock and Watson (2003) on the use of these hard-to-beat benchmarks. In a further extension of the data to bring in equilibrium correction components in relative prices, and the level of the output gap, trade balance, terms of trade, the real exchange

rate, and split trends, forecasts from the aggregate CPIX equation have an RMSFE, 32,5 per cent lower than the best of the naïve models. Applying these extensions to the data set for the individual CPIX components and, in addition, bringing in specific sectoral information, such as house prices in the housing cost equation and the wholesale price index for food manufacturing in the food equation, we can obtain a further 8 per cent reduction in RMSFE relative to the naïve benchmark.

Moreover, using naïve models based only on lagged CPIX inflation rates, the weighted 'indirect' forecast does not improve on the 'direct' forecast for aggregate CPIX inflation. However, in the model incorporating producer price inflation, the real exchange rate and so forth, but without equilibrium correction, the weighted 'indirect' forecast improves on 'direct' forecasts bringing in similar data. In the models with equilibrium correction, the weighted 'indirect' forecast further outperforms the 'direct' forecast using similar data.

At the aggregate CPIX level, we find long lags in strongly significant equilibrium correction terms with respect to unit labour costs and to oil prices, and in the terms of trade and the output gap. Indeed, we more generally find that far longer lags are relevant than conventionally considered in VAR modelling. These lags have been brought to light by our technique of using parsimonious representations of longer lags (such as four-quarter moving averages) to overcome the 'curse of dimensionality'. Instead of taking nine parameters to represent a maximum lag of nine quarters, we use four. This saving makes it possible to consider a richer menu of driving variables than conventionally used in VAR studies. The further parsimony from use of automatic model selection helps to overcome an important source of forecast error, namely parameter estimation uncertainty, which is an aspect of the 'curse of dimensionality'.²⁰

Thus, as well as serving as a prelude to designing practical forecasting models for overall inflation, these models cast important light on the complex forces acting on the relative prices and inflation rates of the different goods and services, explaining higher inflation rates in some sectors and the different persistence of shocks in the different sectors. We concentrated on forecasting four quarters ahead. But exactly the same exercise could be carried out at shorter and less challenging horizons one and two quarters ahead. This has further practical policy connotations. Corresponding to each horizon, an estimate of the RMSFE could be obtained for the selected forecasting period. These could be used to calibrate the fan chart for inflation forecasts over different horizons using these methods. To extend this work, the inclusion of sectoral information, such as an explicit treatment of tax policy, regulatory information and announced administered price rises, should further enhance these forecasting methods.

4. Modelling housing costs and the rent component

Our inflation forecasting work for CPIX and its components is now particularly germane, as South African Reserve Bank economists and other South African economists need to assess the implications of the introduction by Stats SA of the new CPI measure in January 2009, in which imputed rent is adopted as the measure of homeowners' housing costs. The adoption of the new CPI as the targeted inflation rate needs careful consideration for two reasons. The first is quality assurance. The US Bureau of Labor Statistics (BLS) ran an experimental version of the new CPI where homeowners' costs were measured by equivalent rents, from 1980 to 1982, before making the switch in January 1983. Careful research went into the sampling frame and the imputation methods used to estimate for owner-occupied houses of various types, what the rent would have been if such a house had been let on the rental market. Since the composition of the stocks of rental and owner-occupied housing is different, it is unlikely that imputed rents will necessarily follow an aggregate rent index very closely, though it is likely to be subject to the same influences. The second is to avoid the mistake made in the US in making the switch at a very far from neutral point in the cycle in 1983. The pre-1983 CPI was based on an investment cost approach to measuring housing costs of homeowners. Apart from repairs, maintenance and insurance, both the mortgage interest rate and the level of US house prices entered the pre-1983 CPI-U for all urban households (see BLS, 2007, for a recent summary of the methodology).

In a 1985 study (BLS, 1985) the BLS showed that under the new measure of homeowners' costs, the index would have increased by 165 per cent from 1967 to January 1983. By contrast, the official CPI-U climbed by almost 188 per cent during the 16-year period, as both house prices and mortgage interest rates rose over the period. When interest rates subsequently fell, the new rental equivalence measure of CPI-U fell far less than the old measure would have done. By linking the two in January 1983, inflation was overstated, and pensions and social security payments rose more than intended. It is likely that interest rates were kept higher than necessary to bring down measured inflation.

Research on modelling US rents suggests that, in the long run, rents are driven by mortgage interest rates, property taxes, consumer prices more generally and house prices.²¹ However, the speed of adjustment is remarkably slow, which is why imputed rents only responded moderately to the rises in US mortgage rates from 1979 to 1982, and moderately to their subsequent decline.

We originally intended to run models for past rents for South Africa in order to understand the role of house prices, interest rates and other costs in

driving rents, since imputed rents will be based on the rent data. We expected the rent measurement error uncovered in 2003 to contaminate the data and intended to test the robustness of equations to the omission of the years most affected by poor data. However, the data series on the disaggregated housing component were so short as to make this exercise pointless: the monthly *disaggregated* indices go back only to 1997.²² We have previously referred critically to the loss of pre-1997 information on price indices (Aron and Muellbauer, 2004: 907). For modellers, the loss of pre-1997 information continues to be a big disappointment.

In consequence, we, instead, briefly examine the drivers in the equation for our housing component excluding the mortgage interest rate, HX, referred to in section 3. HX comprises several weighted sub-components, including rents, interest rates, insurance, repairs and maintenance, rates and water.²³ We expect some of the same variables to influence the rental component. In the present paper, we have taken the modelling of HX further, using the following economic considerations. If one thinks about the cash-flow costs of a landlord, major elements are the price of a house and the mortgage cost of servicing a loan. For a given loan-to-value ratio, the log cost to the landlord is determined, on average, by the log nominal mortgage rate plus the log of the house price index. However, landlords are also interested in the capital appreciation relative to the interest cost of borrowing and are willing to accept a lower rent in exchange for capital appreciation. One can also think of this return as the negative of what is often called 'user cost', defined as the interest rate minus the rate of capital appreciation. The landlord also has other outgoings related to prices of inputs and perhaps the general cost of living.

Using the equilibrium correction framework outlined in section 2, we have modelled log HX using a rich set of variables and lags. We used Autometrics to find a parsimonious equation. In the long-run solution, from a four-quarter-ahead equation:

$$\begin{aligned} \log HX = & 0.07*(\log \text{prime} + \log \text{HP}) + 0.22*\log \text{CPIX} + 0.71*\log \text{IMPP} \\ & + 0.46* \text{USERCOST} - 1.0*\text{RCURBAL} + 0.018*\text{trade openness} \\ & - 0.0034*(\text{SPLIT TREND 1985}) \end{aligned}$$

The quarterly equation also includes short-term dynamics and was fitted for 1979 to 2007. Prime is used as a proxy for the mortgage rate; HP is the house price index for medium-sized houses; IMPP captures import prices (measured as the log of National Accounts total imports deflator), which probably has some bearing on forecasting other elements of housing costs, one year ahead. Its coefficient is lower in other specifications and not too much weight should be placed on this particular estimate. USERCOST is defined as $\text{prime}_t - (\log \text{HP}_t - \log \text{HP}_{t-4})$. In other words, the user cost is the interest rate minus the rate of appreciation of house

prices, using recent appreciation for expected appreciation. RCURBAL is the ratio of the current-account surplus to GDP. It has a dual role, both as an excess demand indicator, and for its implications for the exchange rate and hence next year's inflation, and its negative sign is consistent with this. Trade openness appears with a positive coefficient, which might appear paradoxical, given the anti-inflationary role of trade openness. However, the long-run solution includes import prices, which have fallen a great deal relative to prices of non-tradeables. Hence the openness indicator may be needed to stabilise the long-run solution.²⁴ The general specification included split trends beginning in 1985 and 1995 to capture potential long-run shifts due, for example, to demography, taxation or political changes. Only the former split trend was found significant.

Given the heterogeneous elements included in HX – it is not itself a rent index, and given serious issues of data quality, we do not want to over-interpret these particular findings above. The estimated role of interest rates and house prices is, however, interesting for policy. The dynamics suggest that log HX four quarters ahead responds positively to interest rates two and more quarters ago, giving a total lag of six or more quarters. The lagged positive reaction to house price rises is partly offset by the temporary reduction in user costs with house price appreciation. This may help explain why rents tend not to soar in house price booms, nor necessarily decline in downturns. House prices themselves are, of course, sensitive to interest rates, declining with higher rates.

The bottom line is that our evidence suggests a muted and quite delayed response of housing costs to interest rates. Unlike the current headline CPI, which includes mortgage interest rates (but illogically does not include house prices), the new CPI would give scope for monetary policy to lower inflation before any direct feed-through from higher mortgage costs into rents occurred.

The National Treasury announced in October 2008 that from January 2009 the inflation target would be based on the new CPI including homeowners' equivalent rent. Switching at such an extreme point in the cycle risks building the kinds of biases that occurred in the US, on account of the 1983 switch. Our earlier discussion suggested that it would be unlikely for South Africa to be able to participate fully in the decline in global interest rates by January 2009, as inflation will still be high because of the fall in the rand.²⁵ Later in 2009, as the economy follows the rest of the world into recession, and global inflation is sharply lower, further cuts are bound to follow. It is perfectly plausible that by January 2010, mortgage bond rates could be 11 per cent, compared with 15 per cent in January 2009, a proportionate fall of 27 per cent. The old CPI, with a weight of around 10 per cent on the mortgage bond rate, would therefore have fallen by almost three per cent, given other prices. Moreover, there is a risk,

highlighted by our research on non-mortgage housing costs summarised above, that rents in 2009 might still be catching up with the inflation and rate rises of 2007–08. It is therefore *possible* that, by January 2010, the new CPI will be measuring annual inflation as much as four percentage points higher than the old CPI would have done.

From January 2009, Stats SA will be measuring the 12-month inflation rate using data on owner equivalent rent going back to January 2008.²⁶ A longer-term retrospective, of the kind carried out by BLS (1985), on what inflation would have been had the new methodology been in place years earlier, is not possible. This is because the new methods of measuring rents were phased in gradually in 2006 and 2007 as Stats SA extended its new quarterly rental survey to all CPI collection areas (see Stats SA, 2008, 2009). The implied linking of the old and new CPI data in January 2008, will result in the overstatement of inflation in the period 2005–11. This is because the linked CPI would capture the rise in mortgage rates from 2005 to the end of 2007, as interest rates were embodied in the old CPI, but not their subsequent fall, since the new CPI does not include interest rates, but imputed rents. A better longer-term perspective on inflation in this period is likely to be offered by CPIX, which excludes mortgage interest rates altogether. Unfortunately, CPIX will no longer be published. Analysts would be well advised to use the consumer expenditure deflator from the National Accounts for a consistent measure of the consumer price level for 2005–11.

As a result of the switch in the definition of CPI, holders of CPI-linked indexed bonds are likely to make an unexpected gain of the order of four per cent in 2009, at considerable cost to taxpayers. To the extent that wages and other prices are linked to headline CPI, inflation in 2009 and interest rates will turn out to be higher as a result of the switch, at some cost to the economy.

5. Conclusions

Western central banks faced unprecedented challenges in 2007, and even more so in 2008 and 2009. Their actions have been forced to extend far beyond their conventional interest-setting remit. Many have had to co-operate with national treasuries in a way that compromises their independence and raises questions about the democratic accountability of unelected central bankers. Some have also faced heavy criticism for inadequate anticipation of events, for policy errors in earlier years and for inadequate regulation of the financial system – where central banks share such responsibility. Less-than-adequate econometric models used by many Western central banks, with little or no role for the credit channel and simplistic textbook views of the inflation process, have contributed to some of the lack of foresight now revealed. The research

discussed in this paper, with a more open-minded approach to learning from data, should help to clarify the international inflation context.

As the international financial crisis and the global recession have spread to emerging markets, serious challenges have developed for emerging-market central banks. Those countries where there have been credit-driven house price and consumption booms, with large current-account deficits and with commodity price dependence face unpleasant currency falls and stagflationary shocks. Monetary policy in South Africa has wisely been on a tightening course for some years, financial regulation has been relatively cautious (see Llewellyn, 2009, and a discussion of this paper by Dykes and Nel), debt denominated in foreign currency remains low and household indebtedness relative to income is substantially below levels in the UK, the US and other liberal credit market countries. Despite these positives, South Africa is not immune from these challenges. For South Africa, the inflation models we have discussed should prove helpful to the policy debate.

Inflation targeting has come in for increased criticism, see the Stiglitz (2008)–Mishkin (2008) debate, and the question of leaning against asset price ‘bubbles’ has received much re-examination. It is important to emphasise that fiscal policy, the design of the institutional and regulatory framework, and other political decisions have an important role to play in supporting central banks to maintain stability. Though the origins of the US crisis are multi-fold, the following contributed significantly: the US tax system, which gives unlimited tax relief on mortgage interest; the implicit guarantees on Fannie Mae and Freddie Mac, which disguised the true riskiness of mortgage-borrowing decisions to US households; and the government’s drive to extend homeownership to low-income families, using private debt. With a slight question mark over the last of these, these problems have been avoided by South Africa. However, for the future, it is worth drawing the attention of politicians and the South African National Treasury to the merits of the stabilising property tax reforms discussed in Aron and Muellbauer (2005, 2007b, 2009b) to reduce the risk of future asset price inflation.

A significant issue for monetary policy in South Africa in 2009 and 2010 will be the change in the treatment of homeowners’ housing costs introduced in January 2009, from the old mortgage interest cost basis to the new owners’ equivalent rent basis. Unfortunately, this occurred virtually at the top of the interest rate cycle, as it did in the US in 1983. To the extent that wage negotiators and price setters pay attention to headline CPI, the rise in CPI caused by the rise in interest rates from 2005 to 2007 will not be offset by the prospective fall in rates in 2009, as rates no longer feature in the new index from January 2008. Instead, the imputed rental component of the new CPI may still be catching up in 2009 with the previous year’s inflation and interest rate rises, thus biasing upwards the public’s perception of

inflation since 2005 (see section 4). A useful check on possible biases, in our view, would be for the South African Reserve Bank to construct its own CPIX index (i.e., removing the owner-equivalent rent component) and to monitor deviations between this old targeted measure and the new targeted CPI measure.

Acknowledgement

The authors acknowledge funding support from the Economic and Social Research Council, UK (grant RES-000-22-2066). We appreciate comments from Johannes Fedderke and Coen Pretorius, our discussants, and from other commentators at the conference; and from Theo van Rensburg, of the National Treasury. We are grateful for data obtained from Rashad Cassim and Patrick Kelly, Statistics South Africa; Mish Naicker, South African Reserve Bank; and Jacques du Toit, Absa Bank.

Notes

¹ For details on the naive models, see Table 3 in Aron and Muellbauer (2008c). These models did not include structural breaks and are mainly, but not only, univariate.

² Between October 2008 and January 2009, record falls in US consumer prices suggest the US 12-month inflation rate could be negative early in 2009. It was essentially zero for December 2008.

³ In a model that captures known influences on the import ratio, any unexplained variance (apart from white noise error) is then represented by the stochastic trend estimated using STAMP (Koopman et al., 2000).

⁴ Fedderke et al. (2007) support our analysis, however, by showing that mark-ups are lower in sectors with higher import and export penetration ratios. Fedderke (2009) also stresses the differential effect on firms of opening the economy, depending on their distance from the technology frontier, though the macro implications of this are unclear.

⁵ This is an extended data set compared with Fedderke and Schaling (2005), who model the GDP deflator, and incorporate unit labour costs and the real exchange rate in the long-run solution, and also find a significant output gap effect, but do not include trade openness. Pretorius and Smal (1994) also find an important role for unit labour costs and the exchange rate.

⁶ Long-run homogeneity implies that the sum of the coefficients in the equation on logs of levels of nominal variables is zero or, equivalently, that they all appear in log relative price form. Short-run homogeneity would imply that the sum of coefficients on quarterly log changes of nominal variables sums to zero.

⁷ The new definition of the PPI correlates less well with the CPI, including as it does export prices (see Table 1, and for details, see the Stats SA website).

⁸ The results of non-stationarity testing were given in Aron and Muellbauer (2009a, Table 2) for most of the variables over a slightly shorter period, using critical values from MacKinnon (1991).

⁹ While the output gap is stationary, it is properly included in the long-run solution as a very persistent variable in the medium run. Our use of the HP filter to construct the gap resulted in little difference compared with more sophisticated methods, for example, in Aron et al. (2003).

¹⁰ Autometrics is an objective and easily reproducible tool, not affected by the subjective choices of the modeller. Any other investigator with the same data and the same specification of the general unrestricted model (GUM), will then make the same model selection, given the chosen settings in Autometrics. This software examines a full set of general to simple reduction paths to select a parsimonious form of the GUM to satisfy a set of test criteria. The test criteria include tests for normality, heteroscedasticity, ARCH residuals, residual autocorrelation, parameter stability in the form of a Chow test, and the RESET test. There is also the option of automatically dummifying out large outliers. In our context, the overlapping nature of the dependent variable means that residuals will be autocorrelated and so the corresponding tests, including portmanteau tests, are switched off. Further, outliers can easily arise, especially over 6- or 12-month horizons because of unpredictable changes in energy and other commodity prices. Heteroscedasticity could therefore be endemic. The corresponding tests are also switched off, but use heteroscedasticity and autocorrelation corrected (HAC) *t*-ratios and *F*-tests for model selection.

¹¹ The square root of the out-of-sample forecast errors for an extended sample, say the past five to ten years, is a guide to the uncertainty that surrounds inflation forecasts over different horizons, making it possible to construct a fan chart akin to those in the South African Reserve Bank *Monetary Policy Review*. The multi-step forecasting method, while different from the recursive forecasts from the system of estimated equations in the South African Reserve Bank model, as noted by our discussant Coen Pretorius, provides a useful benchmark for comparing forecast accuracy.

¹² It is possible to test for the relevance of the real spread, simply by including US producer price inflation on the right-hand side, given that lags of domestic producer price inflation are already included. The test supports the specification shown in Table 2.

¹³ There are specifications where the real exchange rate is significant, but then import prices and the unit labour cost lose relevance. On *a priori* grounds, we prefer models with plausible unit labour cost effects. Autometrics has an option in which selected variables are required to be included in the parsimonious reduction from the general unrestricted model. This is a way of allowing priors to influence model selection. But the evidence can contradict the prior if the relevant variable has the wrong sign or is insignificant. Our priors for the relevance of the output gap; the equilibrium correction terms in unit labour costs; import prices and oil prices; the inflation-targeting dummy; and the interest rate spread are supported at all three forecasting horizons. In all specifications, we require the constant term to be included in the model.

¹⁴ In the one-, two- and four-quarters ahead forecasting models, food prices do not appear directly. Evidently, food price shocks are transmitted so fast and food prices are so hard to forecast, that lagged food prices have little information content for forecasting producer price inflation.

¹⁵ It was suggested by a discussant at the conference that measurement error may have affected producer price index data for the second quarter of 2008.

¹⁶ The majority of studies applies to the euro area, and two to the US – none for the UK or other countries, including emerging-market countries, see Aron and Muellbauer (2008a) for a literature survey.

¹⁷ In Aron, Muellbauer and Pretorius (2009c), we developed a stochastic estimation framework for components of the basket of consumer spending. Potential structural breaks were explored by modelling the four-quarter ahead price index components for 1979–2002 using smooth non-linear stochastic trends to help indicate such shifts, and estimating via the Kalman filter in the STAMP package (Koopman et al., 2000). The shapes of these trends then suggested the design of deterministic split trends for use in recursive forecasting models.

¹⁸ In this paper and others we urged a shift to the imputed rent measure of homeowners' costs in the CPI measure. This has now occurred in January 2009, replacing the poorly based mortgage interest measure used up to now: see "Housing in the consumer price index", July, 2008, Stats SA website. See section 4.

¹⁹ To create long time series of CPIX components, we used the available sub-component CPI data for "metropolitan and urban" households, and spliced it to the earlier CPI "metropolitan" components in January 1997 (all seasonally adjusted). Our constructed overall CPIX had to be seasonally adjusted, as it is based on Stats SA's seasonally unadjusted data. The unavoidable assumption to create historical data for the CPIX and its sub-components is that the price movements at the sub-component level do not differ greatly between the two types of survey.

²⁰ In practical forecasting work regular re-selection is advisable. In Aron and Muellbauer (2008b) on US monthly data we find that the absence of regular re-selection handicaps forecast performance relative to simply retaining the general model.

²¹ Unpublished mimeo by J Duca (Dallas Federal Reserve, US), J Muellbauer and A Murphy.

²² Stats SA tells us that prior to 1997 the computer program did not store the detailed indices on a monthly basis. Only the published (aggregated) information was stored. In 1997 a new program was written which does store the information in this format.

²³ The rental categories: house, flat and townhouse rent comprise 40 per cent of the weight in HX (which excludes the mortgage interest rate) using 2000 weights for "metropolitan and urban" CPI. The bulk of the remainder is made up of insurance, maintenance and repairs, water, assessment rates, and sanitation.

²⁴ A conceivable alternative interpretation is that the positive coefficient on openness might be reflecting lower future expected inflation and hence interest rates, with a positive impact on house prices.

²⁵ Indeed, the first 0.5 percentage point cut in the repurchase (repo) rate occurred only in December 2008.

²⁶ Conventionally, CPI is not revised. The South African procedure of retrospective linkage thus differs from that of the US where methodology has altered; the

new CPI in the US has been linked from the date of introduction, not retrospectively. Obviously, anyone with a hand-calculator could splice later in 2008 than in January, since the old CPI continued to be published to the end of 2008.

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Commentary: Some issues in modelling and forecasting inflation in South Africa

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The paper presented by Aron and Muellbauer provides a carefully executed modelling and forecasting exercise on South African inflation. Insights emerge on the producer price index (PPI); the consumer price index (CPI), including its core interpretation relevant to the South African inflation-targeting framework (CPI/consumer price index excluding mortgage interest cost for metropolitan and other urban areas (CPIX)); and housing costs and rent.

The critical conclusions that emerge from the paper are an affirmation of the importance of structural modelling of inflation and the significance of unit labour cost; the output gap; import prices; the real exchange rate; trade openness; and the interest rate differential in modelling and forecasting.

In the case of the PPI, the particular importance of the foreign-exchange channel of monetary transmission (real exchange rate and interest rate differential); the asymmetric short-term role of food price inflation; and the nature of the role of the level of the output gap, which imply that in South Africa inflation targeting stabilises output as well as prices, are all additional results of particular interest.

Finally, the paper also provides useful cautionary advice on the best practice of approaching the introduction of the new CPI measure in 2009.

However, the paper raises some significant questions that invite further investigation.

The most fundamental of these relates to the interaction of openness, prices and productivity growth in the modelling. In their paper, Aron and Muellbauer allow for the presence of mark-up pricing (price over unit labour cost). Specifically, they note a substantial impact of their openness measure in reducing the mark-up, though they allow that in the short run price stickiness, together with the impact of openness on labour costs and import costs, may raise the mark-up.

However, the South African evidence on the interaction between inflation, productivity and openness suggests that the association is potentially complex, and thus perhaps worthy of further investigation in the context of either structural or forecasting models of inflation. The literature on the question is reasonably extensive.

Early evidence of cost-push inflation was provided by Fedderke and Schaling (2005), while Fedderke, Kularatne and Mariotti (2007) confirmed the presence of significant industry-level pricing power in the South African manufacturing industry, with Edwards and van de Winkel (2005) providing supporting evidence for later periods. Aghion, Braun and Fedderke (2008) again confirmed not only the presence and non-declining time trend in industry and firm-level mark-ups, but also identified an impact of the pricing power on productivity growth in South African manufacturing.¹

However, the results presented by Rodrick (2008) pose some challenge to these findings, consistent as they have been over time in terms of both the presence and persistence of mark-up pricing in South African manufacturing. Rodrick, much as does the Aron and Muellbauer paper, points to a significant opening of the South African economy in the 1990s, suggesting that the pricing power of the manufacturing sector must have been under pressure. A declining price of manufacturing relative to other sectors of the economy is interpreted as corroborating evidence.²

What is of significance for the Aron and Muellbauer results is that Aghion et al. (2009) have further explored the interaction between trade liberalisation and productivity growth, including the channel exercised via the pricing power of industry, both theoretically and in an application to South African data. The study highlights that the impact of trade liberalisation is likely non-linear, and operates both directly on productivity growth and indirectly through differential impacts on industries or firms conditional on their distance from the technological frontier and scale.

Aghion et al.'s findings confirm the presence of an (insignificant) catch-up effect, positive benefits from scale, compounded by the fact that large sectors close to the technological frontier grow fastest. The strongest impact of trade liberalisation is found to emerge through indirect rather than direct channels of influence.

Crucial to the present context, however, is that the pricing power of industry continues to have a negative impact on productivity growth, even when there is control for the impact of trade liberalisation. What is more, while in Aghion et al. (2008) a 0,1 unit increase in the Lerner index of pricing power resulted in a loss of 1 per cent in productivity growth, under Aghion et al. (2009) the change in the pricing power measure results in a loss of 2–3,5 per cent in productivity growth.

The point here is that made at the outset of this digression. The interaction between inflation, productivity and openness in South Africa (and perhaps elsewhere) is complex. For a modelling exercise that claims to place structural associations at its heart, further investigation of these

associations may be fruitful, especially given the magnitude of the impact afforded the mark-up on inflationary pressures. Empirically, it would appear that the question of whether mark-ups have declined under trade liberalisation (Rodrick–Aron–Muellbauer), or show little sign of falling (Aghion et al.) is of central monetary policy importance, given the results of the Aron–Muellbauer results. Significant data collection and quality control questions arise in this context.

Further questions that arise from Aron and Muellbauer's paper relate to the openness measure used in the paper, and pioneered in the authors' earlier work (see Aron and Muellbauer, 2007). The measure aims to incorporate both observables (tariffs and surcharges) and unobservables (quotas and non-tariff barriers), capturing the latter by means of a smooth non-linear stochastic trend, obtained from the variance in the import penetration ratio not explained by the business cycle and exchange rate. While suggestive, for a developing or emerging-market economy in which imports are arguably substantially influenced by the capital goods and technological catch-up requirements of output growth, the interpretation of the openness measure remains a source of some potential ambiguity.

Further conceptual questions arise in terms of the inclusion of food prices in the PPI rather than the CPI measure.

In terms of modelling questions, the use of the Autometrics estimation procedure pioneered by Hendry remains sufficiently new (and challenging to many applied econometricians) to merit more explicit justification and treatment in the paper. Questions of endogeneity potentially requiring instrumentation strategies are raised by a number of the empirical specifications estimated in the paper. While reference is made to earlier work suggesting that results are robust to instrumentation, it is not clear to the reader what modelling strategy was adopted in the earlier work.

Given the emphasis on forecasting in the paper, and the reference to the work of Hendry and Clements in emphasising the impact of structural breaks on forecasting, it comes as some surprise to the reader that more emphasis is not placed on the impact of breaks and robustness of the model to potential breaks in the discussion of results. Elaboration on these dimensions would be useful in interpreting the results.

Further on the forecasting front, to evaluate the usefulness of the structural model presented by the authors, it would have been helpful to compare the forecasting ability of the preferred models with alternative structural models presented in the literature.

Finally, I, for one, would have valued a more extended discussion of the inflation-targeting dummy interpretation in Aron and Muellbauer's paper,

since the authors argue that their results indicate that inflation targeting rapidly became embedded in price expectations, and the new policy framework quickly embedded in interest rate expectations. Given the significance of this finding to monetary policy conduct in South Africa, greater detail would have been useful, particularly at a time when the inflation-targeting approach is, once again, a matter of public debate.

Despite this set of comments, the authors have provided another significant contribution to the debate on the drivers and forecasting of inflation in South Africa.

Notes

¹ In related vein, both Fedderke and Szalontai (2009), and Fedderke and Naumann (2009) confirm a negative impact of industry concentration on investment.

² In a more direct challenge, du Plessis and Gilbert (2008) have questioned the presence of significant pricing power in the South African industry. On a dataset of 25 listed firms from the Johannesburg Securities Exchange they find little evidence of mark-up pricing in South Africa.

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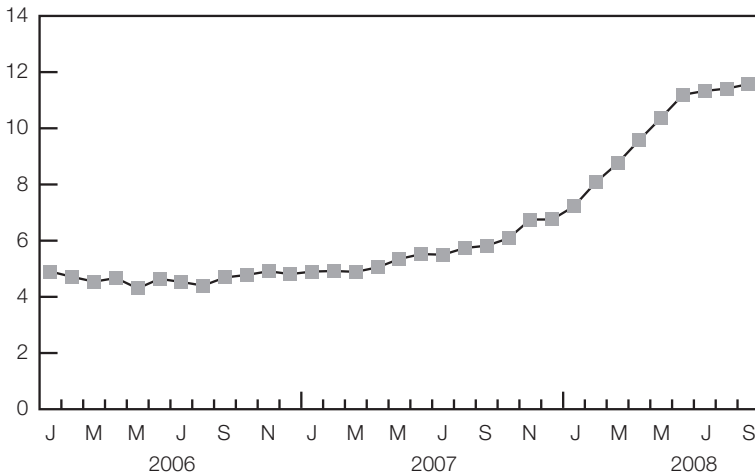
Commentary: Some issues in modelling and forecasting inflation in South Africa

Coen Pretorius

Monetary policy and forecasts

Regardless of the monetary policy framework, policy-makers must have a view of the future because of the existence of variable and long lags in the transmission mechanism of monetary policy. Forecasts are even more important in an inflation-targeting monetary policy framework as a result of the forward-looking policy process. Alan Greenspan (1994: 241), the former Chairman of the United States Federal Reserve has stated that “[i]mplicit in any monetary policy action or inaction is an expectation of how the future will unfold, that is, a forecast. There is no way to avoid making a forecast, either explicitly or implicitly.”

Figure 1: Change in Reuters Consensus CPIX (μ) forecast



The main reasons for the substantial change in the Reuters Consensus CPIX inflation forecasts can be attributed to supply-side shocks emanating from increased oil and food prices, especially since the beginning of 2008. However, the increase in oil and food prices appears to be an international phenomenon, and has had a similar impact on inflation in most economies. Although it is widely agreed that monetary policy should react to second-round effects of exogenous supply-side shocks, it is extremely

difficult to measure these second-round effects. Normally, second-round effects are visible in

- the price increases from products excluding food and energy prices
- increases in inflation expectations
- increases in salary and wage negotiation settlements.

There is currently clear evidence of second-round effects in all three indicators in South Africa.

Furthermore, South Africa has additional challenges on the inflation front in the form of

- increasing electricity prices, and the announced additional price increases in 2009 and 2010
- the South African rand, which has depreciated substantially since the beginning of 2008
- the growing deficit on the current account of the balance of payments, which is also cause for concern.

Central banks generally have to make a choice between a single and multiple modelling route. No single model can cover all aspects of the inflation-forming process and the South Africa Reserve Bank (the Bank) therefore follows a pluralistic approach, that is, by not making use of one model for all occasions, but rather using a suite-of-models approach. The multiple modelling route provides the advantage that the results of the various models can be compared with one another in order to emphasise different aspects of the inflation process. The models are, furthermore, supplemented with surveys and value judgements. Some models might depict early-warning signs of inflationary pressure before others do.

I am therefore in full agreement with the advantages of modelling the components of the consumer price index (CPI) separately in the form of a disaggregated inflation model approach. The main components of the CPI are modelled independently with monthly data, using the weights of the CPI to compile the total CPI. The Bank essentially models the inflation components mainly as a function of unit labour costs, import prices and the output gap. Additional explanatory variables are also used in the equations to explain the movements of the components. An estimate of administered price inflation is obtained, which is then used as an exogenous assumption in the core model of the Bank. However, some individual components, such as food prices, will always remain difficult to forecast.

More recently, most central banks have dedicated their resources and conducted research on the development of quarterly projection models (QPMs) and dynamic stochastic general equilibrium (DSGE) models. These models provide policy-makers with a tool that tells a consistent story with regard to the economic interpretation and impact of economic

shocks on the economy. The models also reflect the policy-makers' views of the monetary policy transmission mechanism. Normally, the parameters of these models are calibrated rather than estimated. The models are also able to recommend an interest rate path to policy-makers that will ensure that inflation returns to the target after a period.

The authors, Aron and Muellbauer, compare the forecasting ability of their producer price inflation (PPI) single equation against the PPI equation in the core model of the Bank. In this regard, it is important to distinguish between a forecast produced with a single-equation model and a forecast produced with a full macroeconomic estimated model. In a model context the same equation is used for the forecast of all the periods into the future in contrast with Aron and Muellbauer's paper where four different equations are used for the same variable. The selection of numerous explanatory variables is, to a certain extent, also limited in a macro model. A new equation or a new assumption is required for all additional explanatory variables in the model. In a macro model all the very volatile variables, such as the stock exchange or even house prices, are avoided because of the difficulty in forecasting or even assuming these variables accurately. The inter-linkages between variables in a macro model provide additional information in the forecasting process, which is not usually the case in a single-equation forecast. For example, inflation expectations are not an explanatory variable in the Bank's PPI equation, but the impact thereof works through the other equations in the model to the PPI. In addition, the rebasing and reweighting exercise that will be done from January 2009 might be helpful in lowering inflation expectations, as a result of the lower expected value of actual inflation. Since inflation expectations are not captured in the PPI equations in Aron and Muellbauer's paper, the lowering of expectations cannot be taken into consideration in the forecast.

The creation of the openness variable in the paper is a useful and valuable addition to the research on the price-forming process in South Africa, and the inclusion of the openness measure variable improves the fit of the equations. The Bank's own experience of including a 'crude measure' of openness in the model was not successful during the forecasting process. Both imports and exports are extremely volatile series and cause much volatility in the forecasting process. The authors do not explain how the openness variable should be treated during a forecast. If it is held constant, then it would not help to explain movements in the PPI.

The negative sign of the rand price of oil in the dynamic terms is difficult to explain and it is suggested that it should be excluded from the equation. The different dynamic terms and seasonal factors that are used in the various PPI equations are also difficult to explain. It is not surprising that the first two quarters of the PPI data of 2008 are classified as "outliers" by the authors, because the movements in the new PPI data

are somewhat ambiguous. The much higher weight of some of the commodity prices in the new PPI from January 2008 has caused the volatility of the series to increase substantially. Early indications suggest that the movements in the new PPI from the beginning of 2008 are less correlated with the movements in the CPI. The authors' statement that the new PPI equations are better equipped to predict a turning point in PPI inflation is less than convincing. Volatile exogenous variables such as oil prices, food prices and the exchange rate will, nevertheless, continue to have a huge influence in determining the turning point and trend.

It is very clear from the long list of publications written by Aron and Muellbauer on modelling and monetary policy in South Africa that they have made, and still make, a valued contribution on various research topics and in the building of research capacity.

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Abbreviations

ABS	asset-backed security
Alsi	All-Share Index
ARM	adjustable-rate mortgage
BER	Bureau for Economic Research
BIS	Bank for International Settlements
BJM	Barnard Jacobs Mellet
BLS	Bureau of Labor Statistics
BoE	Bank of England
BRIC	Brazil, Russia, India and China
CDF	comprehensive development framework
CDO	collateralised debt obligation
CDS	credit default swap
COSATU	Congress of South African Trade Unions
CEPR	Centre for Economic Policy Research
CPI	consumer price index
CPIX	consumer price index excluding mortgage interest cost for metropolitan and other urban areas
CRT	credit risk transfer
CTOT	commodity terms of trade
DFI	direct foreign investment
DSGE	dynamic stochastic general equilibrium
ECB	European Central Bank
EEMEA	Eastern Europe, Middle East, Africa
FDI	foreign direct investment
FDIC	Federal Deposit Insurance Corporation
FinStab	Financial Stability
FSA	Financial Services Authority
GDE	gross domestic expenditure
GDP	gross domestic product
GUM	general unrestricted model
IMF	International Monetary Fund
LPHI	low-probability high-impact
LSM	Living Standards Measure
MBS	mortgage-backed security
MIGDETT	Mining Industry Growth, Development and Employment Task Team
MPC	Monetary Policy Committee
MPRDA	Mineral and Petroleum Resources Development Act
NBER	National Bureau of Economic Research
NEER	nominal effective exchange rate (of the rand)
O&D	originate and distribute
OECD	Organisation for Economic Co-operation and Development
PPI	producer price index
QDII	Qualified Domestic Institutional Investor
QFII	Qualified Foreign Institutional Investor

QPM	quarterly projection model
RM	ringgit
RMSFE	root mean squared forecast error
ROE	return on equity
SACU	Southern Africa Customs Union
SAFE	State Administration of Foreign Exchange
SIV	structured investment vehicle
SPV	special-purpose vehicle
Stats SA	Statistics South Africa
SVAR	structured vector autoregression
TOT	terms of trade
UK	United Kingdom
UNDP	United Nations Development Programme
URR	unremunerated reserve requirements
US	United States
VAR	vector autoregressive
ZAR	South African rand

Glossary

the Bank	South African Reserve Bank
the Fed	United States Federal Reserve System
Fed funds	federal funds
repo	repurchase