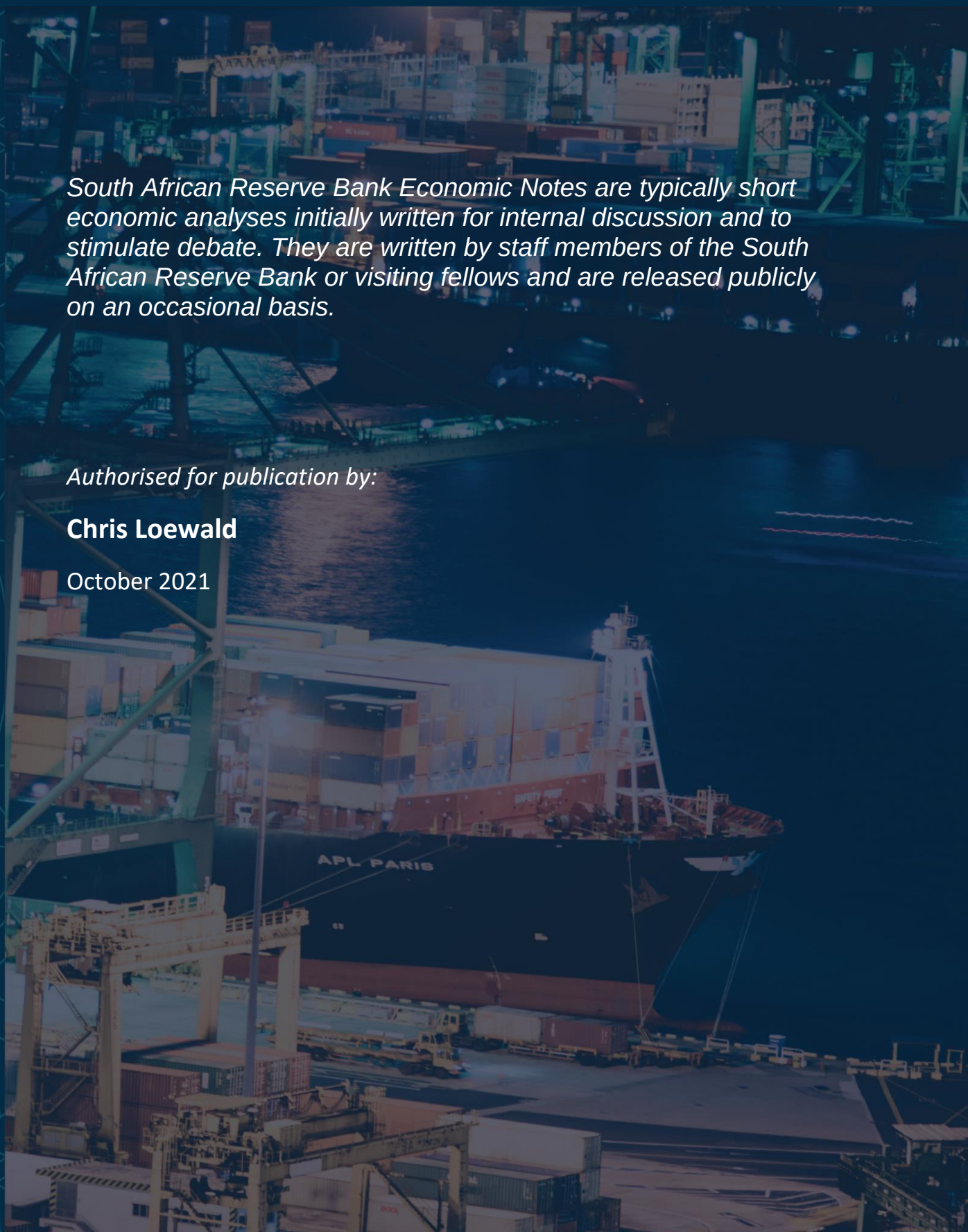
South African Reserve Bank

Occasional Bulletin of Economic Notes

OBEN/21/01

SOUTH AFRICAN RESERVE BANK

SARB 100 YEARS 1921–2021 A purposeful journey



South African Reserve Bank Economic Notes are typically short economic analyses initially written for internal discussion and to stimulate debate. They are written by staff members of the South African Reserve Bank or visiting fellows and are released publicly on an occasional basis.

Authorised for publication by:

Chris Loewald

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OBEN 2101* – January 2021

Why the pandemic is lowering medical insurance inflation

Kathryn Bankart, Elise Green, Dineo Lekgeu, Koketso Mano and Mpho Rapapali

Abstract

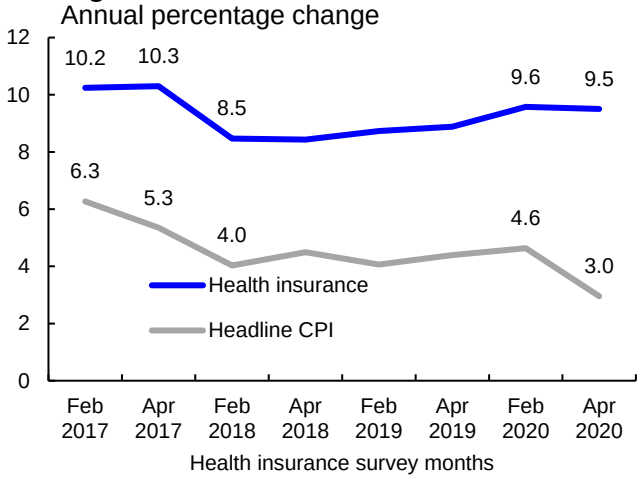
Medical insurance inflation is one of a few CPI components with inflation rates persistently above the midpoint of the target range. Since 2017, headline inflation has averaged 4.4%, while health insurance inflation has averaged 9.3%. The drivers of high inflation for this category include aging, shrinking membership pools as well as sub-optimal regulations. Health insurance inflation is expected to slow sharply during 2021, however, from 9.5% to around 5%. This is because medical schemes have accumulated large surpluses during 2020, as members responded to the COVID-19 pandemic by avoiding medical facilities wherever possible. It is likely that medical insurance inflation will rebound from 2022, once the excess reserves built in 2020 are used up, given that the structural drivers of high medical insurance have not changed.

1. Introduction[1]

Since 2017, headline inflation has averaged 4.4%, while health insurance inflation has averaged 9.3% (Figure 1). This places health insurance inflation amongst only a few CPI components with inflation rates persistently above the midpoint of the target range - and in the company of public-sector prices, such as water, electricity and municipal assessments. Medical insurance inflation is expected to slow to 5% in 2021, which would be a record low, at 4.5 percentage points below the 2020 outcome. This slowdown is largely due to people having avoided medical facilities wherever possible during the Covid-19 pandemic, which allowed medical schemes to build up large excess reserve funds. Lower 2021 premium increases are expected to deplete these excess reserves, after which medical insurance inflation is likely to rebound to pre-crisis rates.

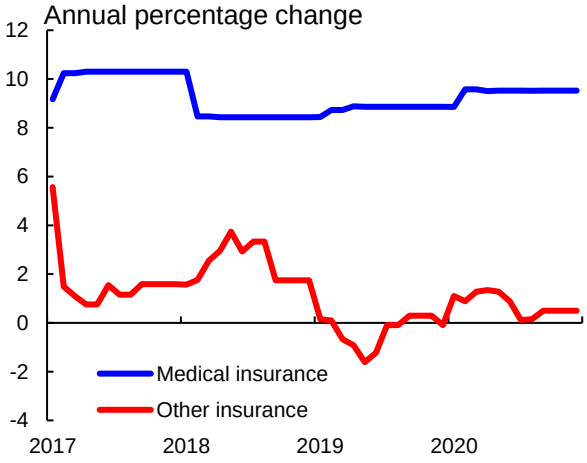
[1] Special thanks to David Fowkes, Pamela Mjandana and Theo Janse van Rensburg for valuable comments and supervision of this research. Thanks also to Discovery, Fedhealth, Bestmed, Genesis, and Keymed for valuable, industry-specific information.

Figure 1: Health insurance vs headline
Annual percentage change



Source: Stats SA and SARB

Figure 2: Insurance inflation
Annual percentage change



Source: Stats SA and SARB

2. Background

Health insurance has a weight of 7.5% in Stats SA's consumer price index (CPI). It is a component of insurance, not medical expenditure, and it has had much higher inflation rates than other insurance categories, such as life and vehicle insurance. Since 2017, health insurance has averaged around 9% versus just over 1% for the remaining insurance products (Figure 2). Only 16% of the population are covered by private medical insurance, but given South Africa's high inequality, and the plutocratic weights[2] used for constructing the CPI, this item nonetheless has a significant weight in the CPI basket. Between 2017 and 2020, it contributed an average of 0.8pp to an average headline inflation outcome of 4.4%.

Private medical insurance is provided by two kinds of schemes, open and restricted. Open schemes must by law accept all applicants, whereas restricted schemes limit their membership to specific groups, such as employees of a certain industry or organisation, or members of a professional association or union. The open scheme market is dominated by Discovery, while the biggest restricted scheme is GEMS, which serves government employees (Figures 3 and 4).

Persistently high medical inflation has attracted some scrutiny, with the recent Competition Commission inquiry representing the most thorough investigation to date. The report, published in 2019, concluded that competition in the sector has been distorted by regulatory problems. Specifically, the current regulatory framework is incomplete and allows insurance providers to attract younger, healthier members with lower medical costs, rather than sharing risk across schemes.[3] The Commission also identified problems in market concentration, consumer knowledge, and the prescribed minimum benefit list.

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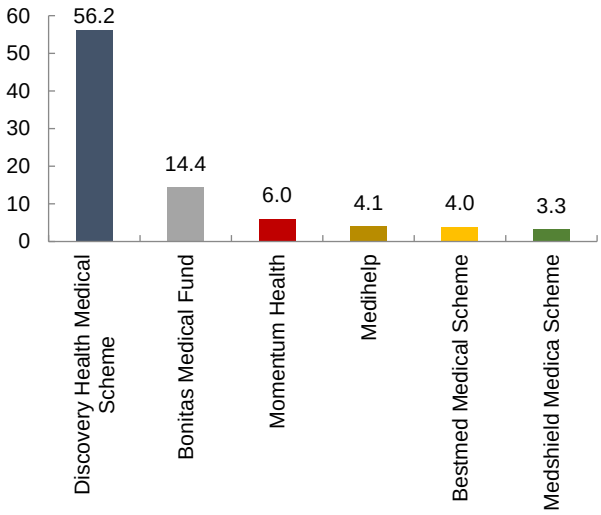
[2] Solomons, J., & Sing, M. (2018). The Plutocratic Gap in South Africa: How representative is target CPI? SARB Economic Note.

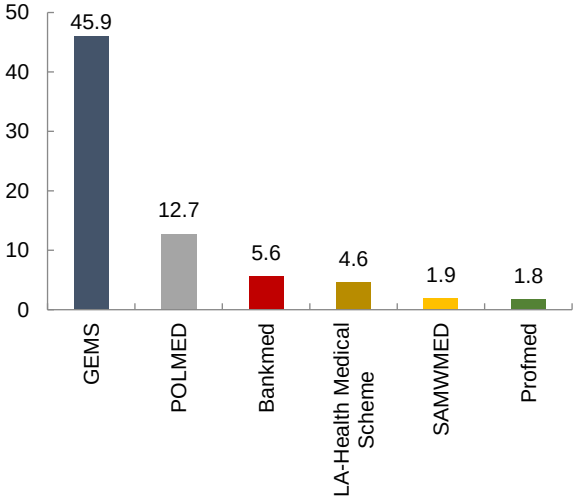
[3] The current regulatory framework does not include a risk adjustment mechanism. This mechanism makes financial adjustments across insurance providers to mitigate the risk-profile related effects on scheme costs, thus removing the incentive for providers to attract younger and healthier members.

Figure 3: Open scheme market
Per cent of total no. of beneficiaries



Source: Council for Medical Schemes

Figure 4: Restricted scheme market
Per cent of total no. of beneficiaries



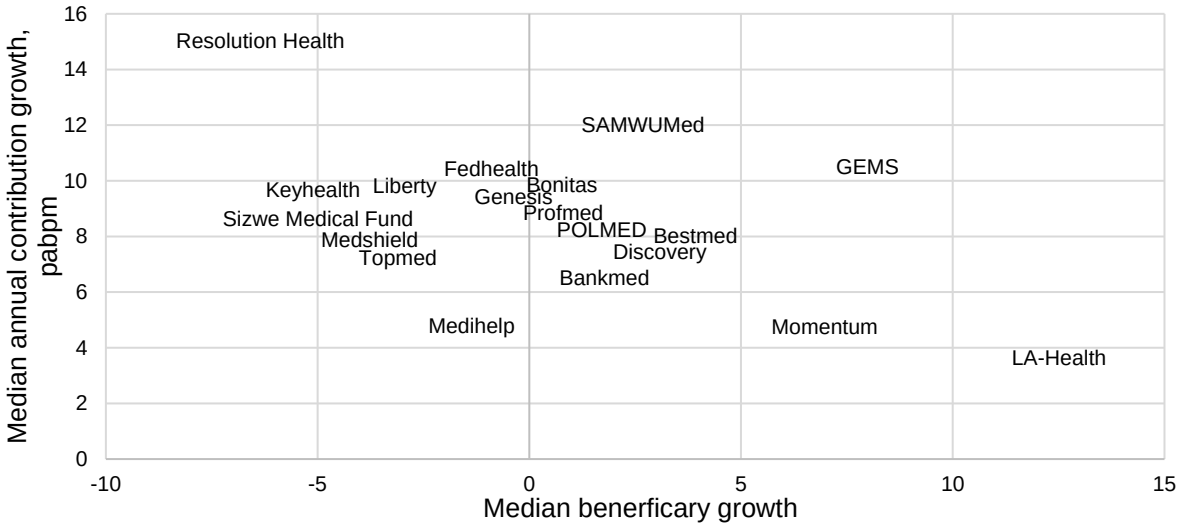
Source: Council for Medical Schemes

Insurers also point to the Prescribed Minimum Benefit list as problematic. This list specifies treatments which all schemes are expected to cover in full. In doing so, it effectively cuts the connection between supply and demand in pricing: since all PMB conditions *must* be covered by insurers, pricing power shifts to healthcare practitioners. Because many PMB conditions are catastrophic illnesses which require hospitalisation, this system has also encouraged the creation of minimal 'hospital plans', which (perversely) incentivise hospitalisation for conditions which could have been treated out-of-hospital, in order to secure scheme pay-out. Lastly, the PMB list is supposed to be updated regularly, but in practice there have been persistent delays. This means cheaper or more effective treatments are not replacing older, prescribed treatments, with consequences for both treatment quality and cost.[4]

Regarding consumer knowledge, the sector suffers from opacity in insurance cost and benefits. It also appears consumers treat medical insurance as a grudge purchase, and are therefore less motivated to invest time in understanding the fine print of agreements. This means they are less likely to punish a scheme for overpricing by switching schemes, which may help explain why there is no apparent relationship between price changes and membership changes across schemes (Figure 5).

[4] The Competition Commission. Health Market Inquiry Final Findings and Recommendations Report, 2019.

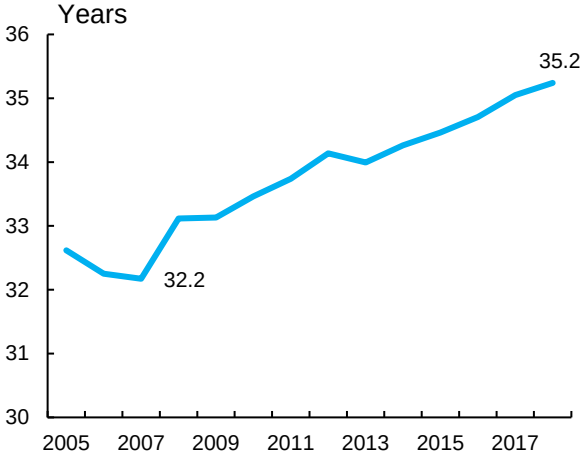
Figure 5: Member vs contribution growth (2005-2018)



Source: Council for Medical Schemes

Figure 6: Average beneficiary age across 19 schemes

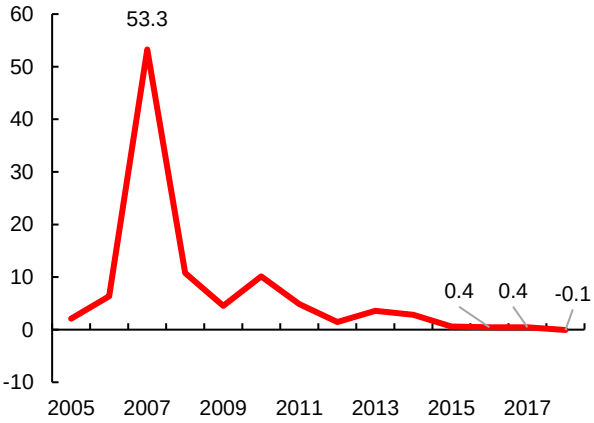
Years



Source: Council for Medical Schemes

Figure 7: Average growth in members across 19 schemes

Annual percentage change

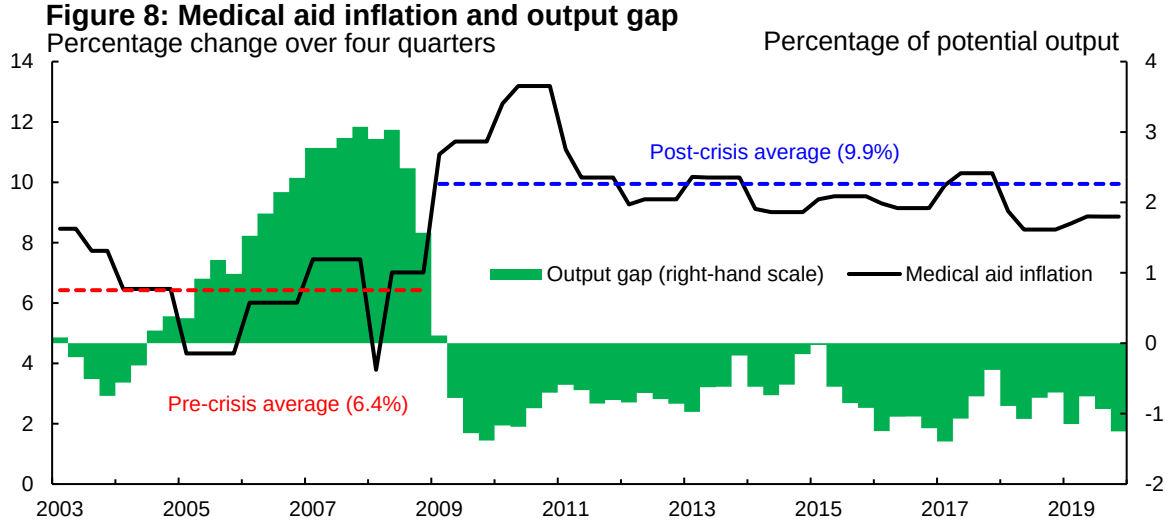


Source: Council for Medical Schemes

It is also worth considering macroeconomic explanations for high health insurance inflation. Over the past decade, South Africa's macroeconomic performance has been extremely disappointing, with low growth and rising unemployment. Most people access medical insurance through formal sector employment, so where job growth is weak it will be more difficult for new entrants to the labour force to find formal sector employment and thereby qualify for private medical insurance. As a result, the average age of medical scheme beneficiaries has risen over the past decade (Figures 6 and 7).

Given that older people have higher health costs, on average, this has increased medical insurance costs. It has also further disincentivised young people from joining schemes, given that they face levies higher than their expected returns. Indeed, with households pressured to cut costs in an environment of declining per capita growth, healthier, younger people have had better reasons to take on risk by foregoing medical cover, thereby preserving spending power for other priorities. For these reasons, rather than ignoring the economic cycle, medical insurance inflation has behaved counter-cyclically (Figure 8). This also helps explain why it was significantly lower in the 2000s, averaging 6.4% versus 9.9% for the 2010s.

Figure 8: Medical aid inflation and output gap



Sources: Stats SA and SARB

3. The Covid-19 impact

In May 2020, Discovery released a white paper quantifying the likely medical costs of COVID-19. Claims were projected to range between R7.3 – R31.8 billion by June 2021. This would have equated to additional costs of R816 – R3 561 per beneficiary. This provided a formal statement of a common intuition that Covid-19 would drive up medical costs and feed into higher medical insurance inflation.

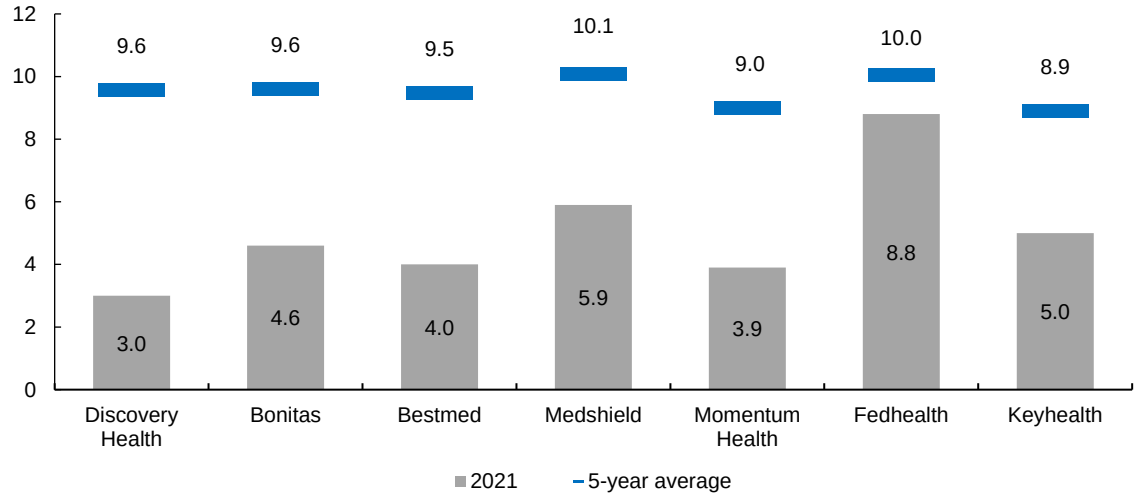
Contrary to these expectations, COVID-19 and related lockdown restrictions has so far resulted in less insurance utilisation. People cut back on visits to medical facilities as much as possible, to avoid exposure to the virus. Lockdowns also limited mobility and access to alcohol, which are common causes of harm. For example, non-trauma surgery admissions declined nearly 50% from 7.96 to 4.49 per day.[5] In itself, Covid-19 obviously created new medical costs, but its net effect on the medical industry was actually to lower expenditure.

In this context, medical schemes began accumulating additional surpluses. For example, Discovery's net surplus (as a percentage of contributions) rose from 2.7% in 2019 to about 6.5% in 2020. These surpluses will feed into reserve holdings, but are not expected to

[5] Moustakis, J., Piperidis, A. A., & Ogunrombi, A. B. (2020). The effect of COVID-19 on essential surgical admissions in South Africa: A retrospective observational analysis of admissions before and during lockdown at a tertiary healthcare complex. *South African Medical Journal*, *110*(9), 910-915.

remain elevated indefinitely, as beneficiaries undertake postponed procedures and as overall conditions normalise. However, it is not necessary for schemes to hold such large reserves, so most schemes are returning them to beneficiaries by implementing lower 2021 increases (Figure 9). Based on SARB data collection, medical insurance inflation is therefore likely to average 5% in 2021. This will lower headline inflation by 0.3 percentage points, and services inflation by 0.7 percentage points.

Figure 9: Medical scheme contribution increases
Annual percentage change



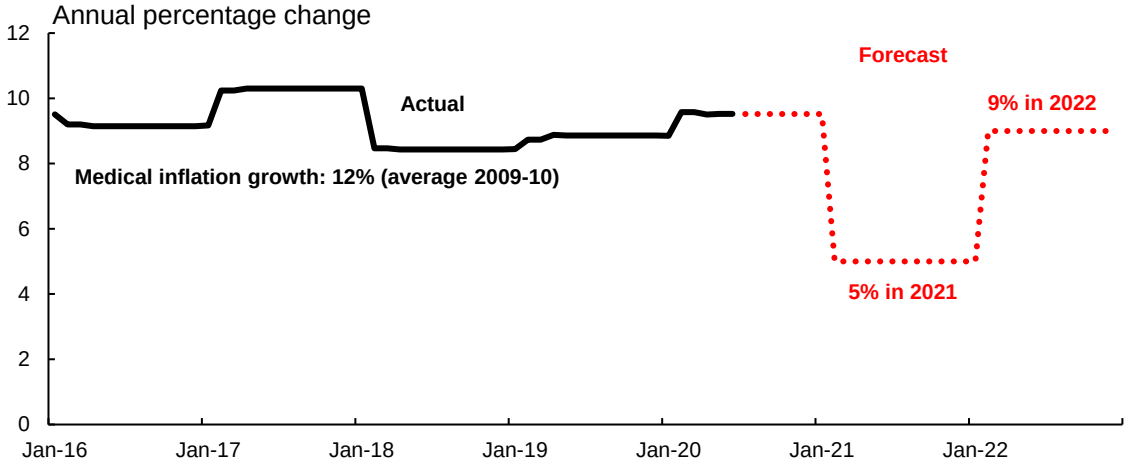
Source: SARB

Beyond 2021, there are both upside and downside risks to the forecast. On the upside, it is possible demand will surge in 2021 given both regular demand plus catch-up from 2020. Practitioners may also work longer hours and raise prices to accommodate this demand. Covid-related costs, including vaccines and chronic symptoms of the virus, will raise expenditure. There could also be higher health care costs linked to other conditions not being diagnosed or treated timeously. On the downside, the supply of medical services is quite inelastic, which probably caps the scope for catch-up consumption of medical services. Additional Covid-19 waves and lockdown measures could limit medical spending further, as they did in 2020. Finally, the 2020 experience has revealed areas of inefficiency and overutilization - information which may help lower cost pressures in future.

As of January 2021, the SARB disaggregated inflation model forecast has medical insurance inflation at 9% for 2022 (Figure 10), implying the 2021 moderation is purely temporary.

Figure 10: Medical aid insurance inflation (forecast)

Annual percentage change



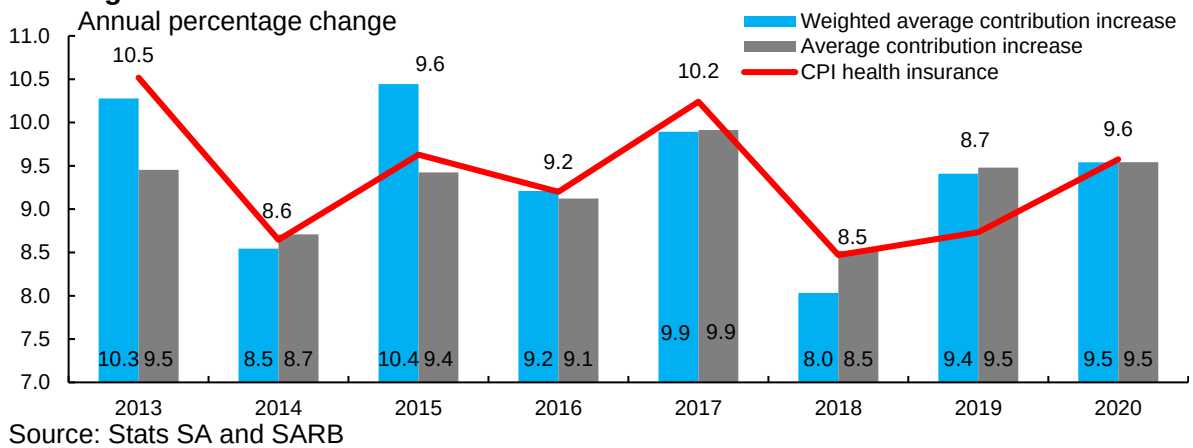
Source: SARB

4. Survey method and insurer dynamics

In surveying medical insurance, Stats SA uses a simple, unweighted average of medical scheme increases. Unweighted indices are standard practice for the CPI, where prices are recorded based on availability of a good or service and not market share: for example, if Coca Cola is most of the soft drink market, but a shop also stocks Pepsi, the CPI data collection team will record the price of each and both will have an equal impact on the price index.

In general, for medical insurance, this methodological choice does not appear to have had meaningful consequences. Based on SARB data collected for historical forecasts, dating back to 2013 and covering 90% of the open-scheme market, weighted and unweighted inflation rates have been comparable over time (Figure 11). It will be a factor in 2021, however, as most schemes are implementing lower increases for the year as a whole, Discovery will leave prices unchanged for the first half of the year and then implement its increase later. This would have created more CPI volatility were the schemes weighted by market share, and it appears to be the reason some analysts have projected much lower medical insurance for the first half of 2021, but Discovery's influence on the CPI will not be magnified by its market share.

Figure 11: Health insurance inflation



Source: Stats SA and SARB

Normally, Stats SA captures medical insurance in two surveys, one in February and one in April. The February survey covers most schemes and the April one applies to government employee schemes, so the medical insurance inflation index moves most markedly in the first quarter and then a further, smaller adjustment follows in the second quarter. The index is then typically flat for the remainder of the year. For 2021, however, Stats SA is aware that at least one increase (Discovery's) will take place later in the year, and will therefore expand its surveys to capture additional increases. This will affect normal seasonal patterns in CPI.

5. Conclusion

Health insurance inflation has long been high relative to headline CPI. This trend has been disrupted by COVID-19, which has led – unexpectedly – to reduced utilisation of benefits and therefore lower increases in 2021 medical scheme contributions. This, however, does not correct the structural issues in the medical industry, so medical insurance inflation is likely to return to pre-crisis levels from 2022. Accordingly, we expect 5% health insurance inflation in 2021, down 4.5 percentage points from 2020, with a rebound to 9% inflation in 2022.

Appendix A: Public health insurance

It is unclear what the impact of introducing public health insurance on inflation will be. Reducing health insurance inflation could be assisted by improved economic performance and better regulation. However, what emerging market experiences have taught us is that poor quality of public healthcare complicates attempts at unifying the medical industry, and many still rely on the private sector – at an additional cost.

Together with SA, India has one of the most privatized healthcare systems in the world, as 65% of total health expenditures are on out-of-pocket payments for higher-priced private care. Public health insurance is of low quality, short on resources, and mostly ineffective. [6] While average inflation is to average 6.7% from 2006-2021,[7] Oxford Economics forecasts revenue from health insurance premiums to reach US$3.5 billion by 2021 - more than 12% average growth from 2006-2021.

Other emerging market economies have made significant progress in building a public health insurance system, as they strive to reach universal health coverage. Brazil's national health system, *Sistema Único de Saúde* (SUS, established in 1988), has proved largely successful and high-quality, free healthcare is used by about 75% of Brazil's population. China also achieved universal health coverage in 2011, with 95% of the population covered by public health insurance,[8] and rapid economic growth has enabled greater public financing for the health sector.[9] However, the system has become overwhelmed and more use of private health care has resumed.[10]

Ultimately, private financing of healthcare – through out-of-pocket payments and supplemental private insurance – in Brazil, China, India, Russia and South Africa still contributed to 54%, 44%, 69%, 40% and 52% of total health spending in 2014, respectively. This makes the immediate effect of public health schemes on inflation in emerging countries generally difficult to distinguish - the continued demand for private health services suggests introduction of public programs had a negligible impact on market power.[11]

SA is still in the process of introducing its public health insurance scheme, the NHI. The aim is to design a health financing system to pool funds for the provision of personal health services to all South Africans, irrespective of socio-economic status. Supposedly, transforming the current two-tiered health system into a unified health system will lower the cost of private healthcare. However, as we have learned from international experience, the introduction of public health insurance does not necessarily lower individual healthcare

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6 Gupta, I. 2020, "India," International Health Care System Profiles, The Commonwealth Fund, 2020. (Link)

7 IMF Data Mapper 2020 (own calculation).

8 Yu 2015, "Universal health insurance coverage for 1.3 billion people: What accounts for China's success? Health Policy 119 (2015) 1145–1152. (Link)

9 Xu et al. 2019, "Global Spending on Health: A World in Transition," WHO, p.30

10 Romaniuk, P., Poznańska, A., Brukało, K., & Holecki, T. (2020). Health System Outcomes in BRICS Countries and Their Association with the Economic Context. Frontiers in public health, 8, 80. (Link)

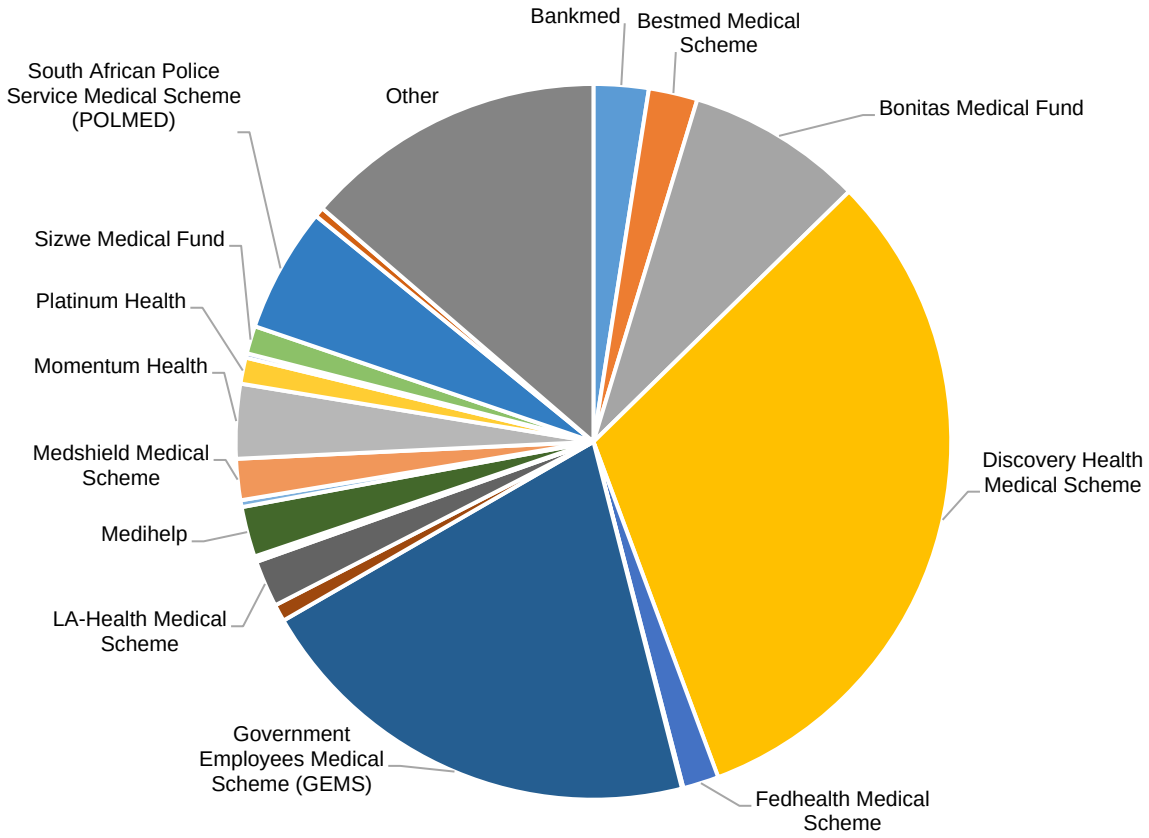
11 In the US, the introduction of Medicare/Medicaid (public health insurance) in 1965 led to an increase in relative health care prices in the short term, but prices moderated in the long term due to capacity adjustments, consistent with an 8.1% increase in total US health spending from 1965-72.11 Obamacare, enacted in 2010, may have managed to imprint permanently lower inflation.

costs, especially when resources are still constrained and private services remain superior. From a CPI perspective, this would just shift weight from insurance to medical service costs (out-of-pocket spending).

Under the NHI, the current role of insurers will be restricted to only providing cover for health services not covered by the fund (i.e. complementary services, cosmetic, and other non-essential surgeries). The NHI would largely be funded by general taxes. Additional sources of funds would come from contributions made by individuals earning above a given amount and their employers. The NHI Bill of 2018 sets out three phases for implementation, with the final phase being complete by 2026. However, this will likely be delayed. Arguably, COVID-19 highlighted the need for a unified healthcare system,[12] but growth constraints leave no scope for increased spending. In fact, currently budgeted spending will need to be sharply reduced.

Given SA's high youth unemployment, the NHI could improve access by making private healthcare accessible to more of the population. This is important but needs to be assessed against funding and quality issues. Also, if the employed (healthy) youth can afford to give up health cover for other priorities, this may not be addressing the plight of the unemployed youth.

Figure 12: Medical aid scheme market share, 2018

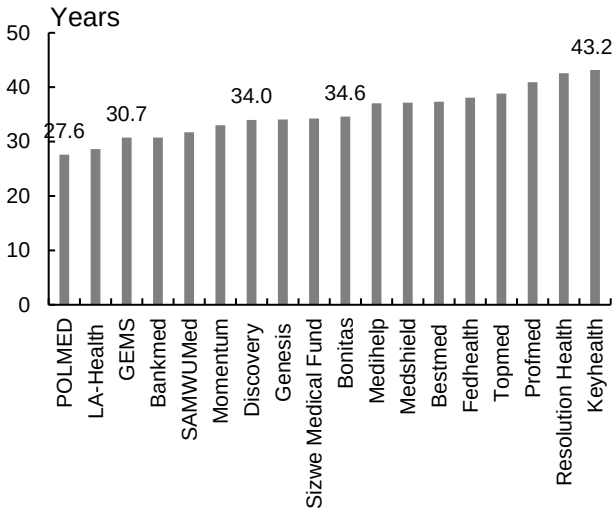


Source: Council for medical schemes

[12] Given how beds had to be pooled across private and public hospitals to meet demand.

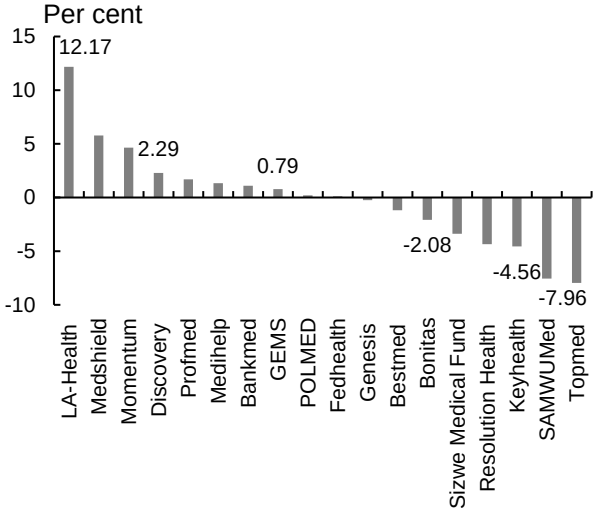
Appendix B: Descriptive charts and tables

Figure 13: Average beneficiary age



Source: Council for Medical Schemes

Figure 14: Annual growth in members



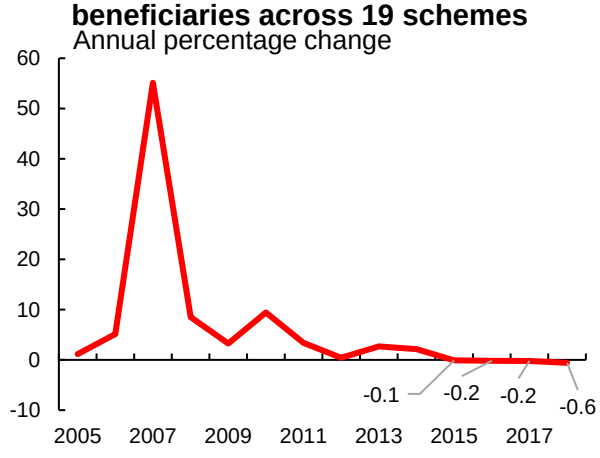
Source: Council for Medical Schemes

Table 1: Medical cost inflation (2020 projections)[13]

	North America	Asia-Pacific (APAC)	Europe	Latin America and Caribbean excl. Venezuela	Middle East and Africa	South Africa
Regional Average Gross Medical Trend Rate (nominal)	6.4%	8.7%	5.7%	13.1%	12.2%	10%
Annual general inflation rate (YTD Haver estimates in brackets)	2.6% (1.0%)	2.8% (3.4%)	2.1% (0.9%)	5.6% (3.2%)	5.6% (7.6%)	5.4% (3.4%)

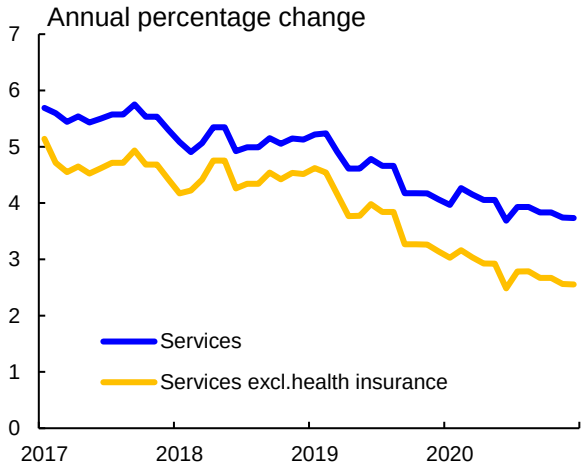
Source: AON 2020 and Haver Analytics

Figure 15: Average growth in beneficiaries across 19 schemes



Source: Council for Medical Schemes

Figure 16: Services inflation

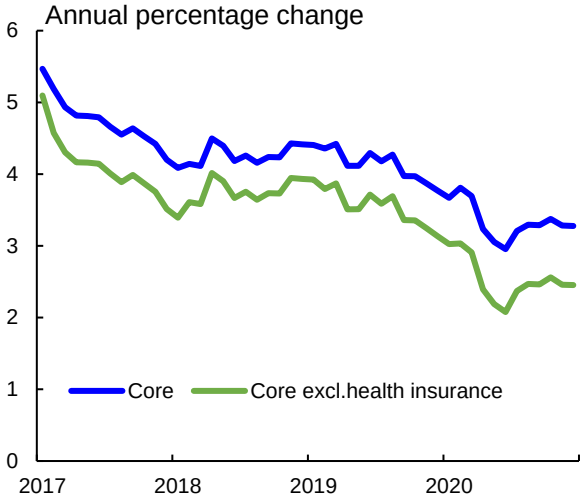


Source: Stats SA and SARB

[13] The medical trend rate is the expected nominal percentage change in the cost of health care prior to any cost-containment measure undertaken by plan sponsors. Inflation rates are as per the IMF WEO April 2019 estimates.

Figure 17: Core inflation

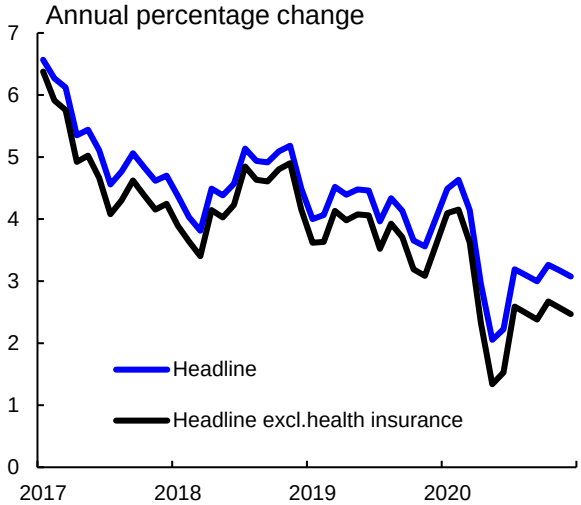
Annual percentage change



Source: Stats SA and SARB

Figure 18: Headline inflation

Annual percentage change



Source: Stats SA and SARB

OBEN 2101* – March 2021

Has publication of a repo path provided guidance?

Luchelle Soobyah and Daan Steenkamp

Abstract

Since September 2017, the SARB has published a projection of the policy rate (repo) alongside its Monetary Policy statements. We construct measures of monetary policy surprises based on various measures of market expectations of the future level of the policy rate in South Africa. We find that there have been fewer meaningful monetary policy surprises since the publication of the projected policy path. We then test whether this communication has improved how the market incorporates expectations of the policy rate into future interest rates. We find that communication of the SARB projections has improved the market's response to this information. However, policy guidance through the publication of the policy path still plays a relatively limited role in guiding market pricing. We argue there is still room for improvement in the SARB's monetary policy communication by better clarifying the conditionalities associated with the SARB's projections of its future policy path.

1 Introduction[1]

Measuring market expectations of the policy rate is important for a central bank for two reasons. The first is because financial markets tend to react to unanticipated policy actions, with implications for monetary conditions in the economy. More simply the central bank wants to avoid unnecessary market volatility which occurs if the market has different expectations from it. In this way, clear communication of the central bank's policy decisions can help to reduce market volatility. The second reason central banks monitor market expectations is that it helps them to understand how their underlying assumptions about the economic outlook account for differences between the Monetary Policy Committee (MPC) projections of the policy rate and market expectations of future interest rates.

This note investigates the market reactions to South African Reserve Bank's (SARB) monetary policy announcements. We create measures of 'monetary policy surprises' by comparing policy rate expectations at various horizons in the future to actual monetary policy decisions. In this way, we distinguish between information that has already been incorporated into prices and unexpected 'news', respectively. This allows us to assess whether policy surprises contain information about short- or longer-term market expectations of the repurchase (repo) rate.

Before September 2017, the SARB monetary policy projections assumed a constant repo assumption. Since September 2017, the SARB has published the QPM implied interest rate projection (IRP) underlying the official projections. In this note, we assess the effectiveness of the SARB's repo 'path guidance'.

2 Measuring market expectations of the policy rate

We apply two approaches to gauge market expectations. Firstly, expectations for each particular announcement are inferred from surveys of economists' expectations. We use the difference between the announced repo rate and the level expected by market analysts - according to the Refinitiv (previously 'Reuters') survey to represent monetary policy surprises. We also infer expectations of the level of the policy rate from forward rate agreements (FRAs).[2]

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[1] Thanks to David Fowkes, Bruce Donald, Eyollan Naidoo, Edwin Makgopa and Rowan Walters for comments and suggestions.

[2] There is a large literature that estimates 'monetary policy shocks' in order to understand their contribution to business cycle fluctuations. In theoretical models, monetary policy shocks are typically identified by estimating the level of interest rates consistent with meeting the inflation target given macroeconomic conditions. The difficulty of identifying

Divergences between surveyed expectations and market prices could reflect a range of factors, including fluctuations in risk premia associated with counter-party risk or liquidity concerns or differences in expectations of the broader economy as surveyed by economists and traders, the latter of whom have a stronger monetary interest in the accuracy of their projections of the policy rate. An important advantage of using market pricing is also that the data is available on a more timely basis than surveys that are conducted infrequently.

2.1 Analyst Surveys

The Reuters/Refinitiv survey polls an average of roughly 40 economists for the repo rate forecast for given MPC repo announcement dates (with around half of them on average providing their forecasts over the projection horizon). We define monetary policy surprises as the difference between the actual values of the repo after the decision and its polled value for that MPC date (we consider both the mean and median values of the survey).

2.2 Market pricing

In order to estimate the monetary policy shocks to the market, we calculate the expectations by the market using various FRA rates. We use two approaches. The first we label as 'the SARB approach':

$$MP_{shock} = (repo_{t=n} - repo_t) - (FRA^h_{t-1} - JIBAR^{3M,*})$$

MP_{shock} indicates a monetary policy surprise to the market; the FRA rates of maturity are $h = n*m$; we use the 3 month Johannesburg Interbank rate (JIBAR); t is the date of each MPC meeting and the JIBAR rate is fixed at the date after the previous MPC (indicated by $*$).[3] This approach is used by most participants in South African financial markets to approximate market expectations of the policy rate. Its precision will depend on how meaningful (and time-varying) term premia are, and whether how different the premia in the JIBAR and FRA rates of different maturities are. Using the close of the day after the last repo rate adjustment accounts for any cyclical bias towards easing/hiking, where the JIBAR would persistently trade below/above the repo rate.

The second approach we use is simply the difference between the benchmark market rate and specific FRA rates at different horizons (h), labelled market forecast errors (MFE) for each MPC date (t):

$$MFE^h_t = JIBAR^{3M}_{**} - FRA^h_*$$

We use the 3 month JIBAR as the benchmark rate since it is the underlying rate for South African FRAs. To match the effective dates of the underlying rate for quoted FRA rates on days after a policy decision (denotes $*$), we compare to the market-close JIBAR at a corresponding date for FRAs with different termination dates (denoted $**$). For a 1 month effective horizon (e.g. $h = 1x4$), for example, we use the FRA^{1x4} as at the day after the last MPC decision and the ex-post realisation of the JIBAR 1 months hence. For a 1 quarter ahead horizon (i.e. $h = 3x6$), we use the FRA^{3x6} as at the day after the last MPC decision and the ex-post realisation of the JIBAR 3 months hence. As a result, the MFE measures the forward-looking market forecast errors of actual market rates after MPC decisions at different horizons, whereas the MP_{shock} measures how much a particular policy decision differed from market pricing at different horizons.[4]

Figure 1 compares survey-based measures of monetary policy surprises to those based on 1 month ahead FRAs. Since the publication of the repo projections in September 2017, there have been fewer

monetary policy shocks in this way is that the estimates are dependent on the specification of the central bank's policy reaction function.

[3] Forward rate agreements in South Africa are contracts on JIBAR, representing an agreement to settle the difference between the contracted and realised future interest rate. Their notation may be understood as follows: a 1x4 FRA is a 3 month contract starting in 1 month and terminating in 4 months. FRAs in South Africa only reference the 3 month JIBAR, which is the main reference rate used to price instruments against.

[4] Note that the SARB approach does not use the effective dates of JIBAR realisations at corresponding dates to the maturity dates of specific FRAs but quotes of different FRAs on the same date.

meaningful monetary policy surprises. These charts suggest that the market has priced in the SARB's repo projections since the publication of the policy path. Analysts had anticipated easing with the emergence of the Covid crisis, but had not anticipated that the SARB would front-load its cuts. The relatively large analyst surprise on 19 March 2020 (in red) reflected a larger than expected cut (100 basis instead of market expectations of 50 basis points). At the time, South Africa was not in lockdown yet and the crisis was still largely an international one. The approximately -75 basis point surprise in April 2020 (a cut of 100 basis points versus market pricing of a based on market pricing of one 25 basis point cut) reflected the emergency (unscheduled) Covid-related cut. By May 2020, market pricing had incorporated a further 100 basis points of cuts. Over this period, markets appear to have been backward-looking in their expectations of the repo path, treating a sub-3 percent inflation print as reason to cut in real time, even if that was not in the SARB forecast. Unfortunately, historical Refinitiv repo poll data is only available from 2011, so our econometric analysis that follows will only use FRA-based market expectations to assess the market impacts of monetary policy surprises.

Figure 1: Measures of monetary policy surprises

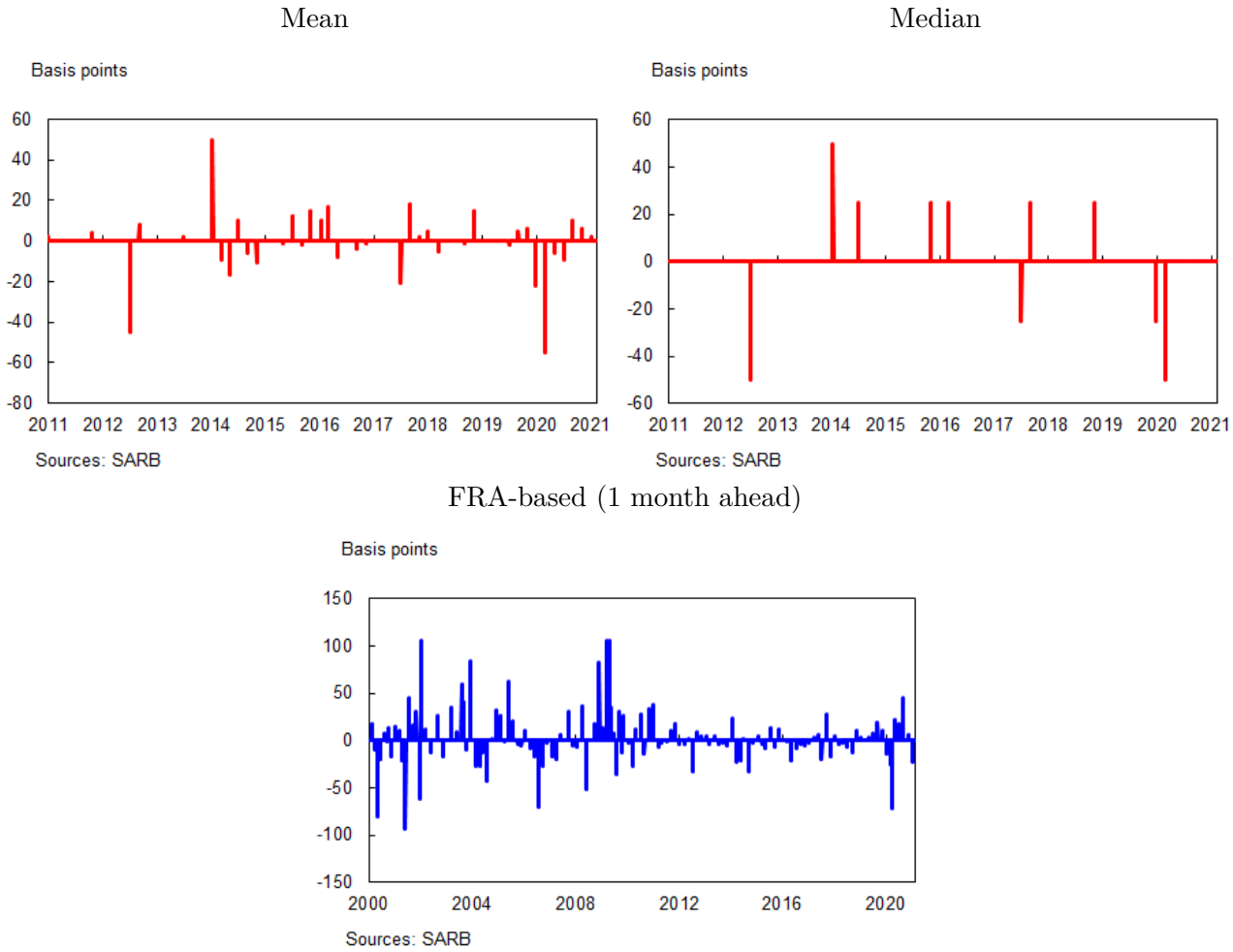
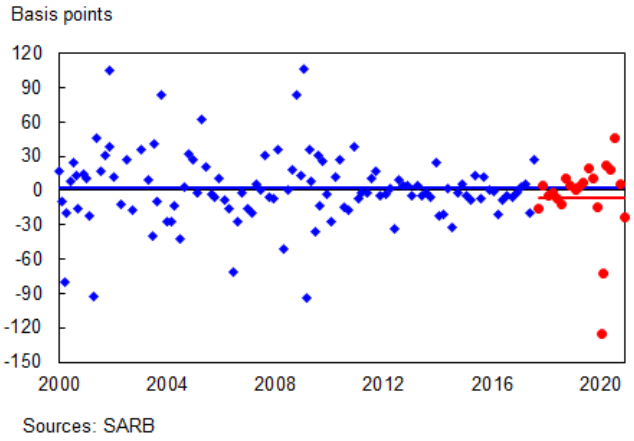


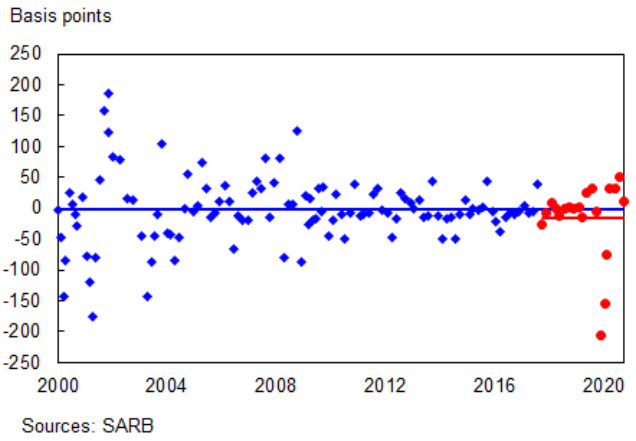
Figure 2 presents measures of policy surprises based on the SARB definition and confirms that there has been a decline in the difference between the repo and market pricing at different horizons since the publication of the repo path. This suggests that monetary policy announcements have been associated with smaller market forecast errors since publication of the SARB's implied policy path. However, the size of these surprises increased again with the Covid crisis. The negative values of monetary policy surprises in 2020 suggest that the market expected additional rate cuts that the SARB had not explicitly signalled. While longer horizon FRAs also priced in a lower policy track in the latter part of 2020 according to the SARB definition of monetary policy surprises, the Covid-related easing shows up as relatively large forecast errors based on our FRA-based measure (Figure 3).

Figure 2: Monetary policy surprises (SARB definition)

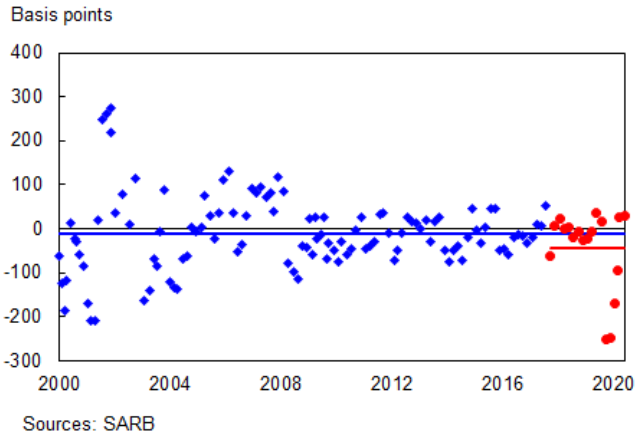
1 month ahead (FRA_{1x4})



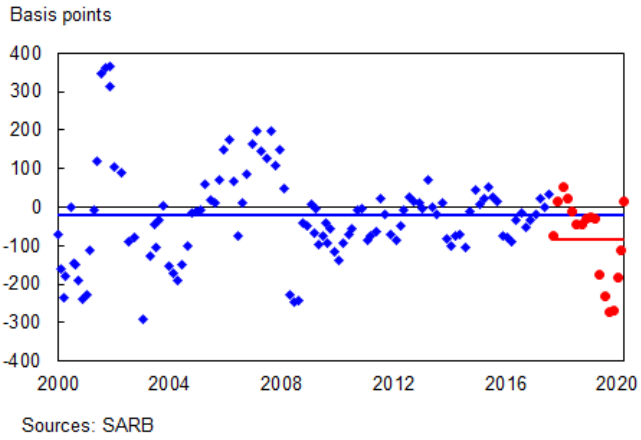
1 quarter ahead (FRA_{3x6})



2 quarters ahead (FRA_{6x9})



3 quarters ahead (FRA_{9x12})



4 quarters ahead (FRA_{12x15})

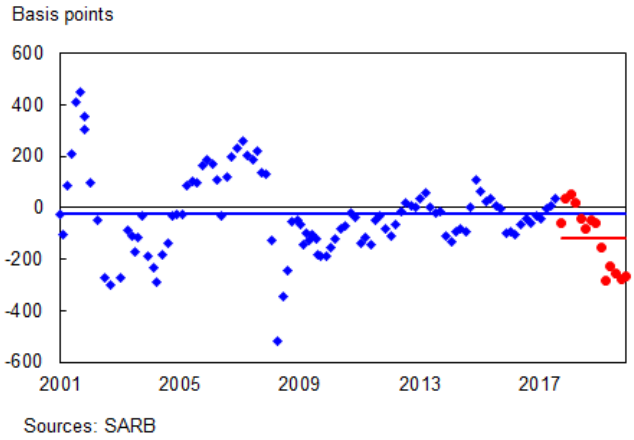
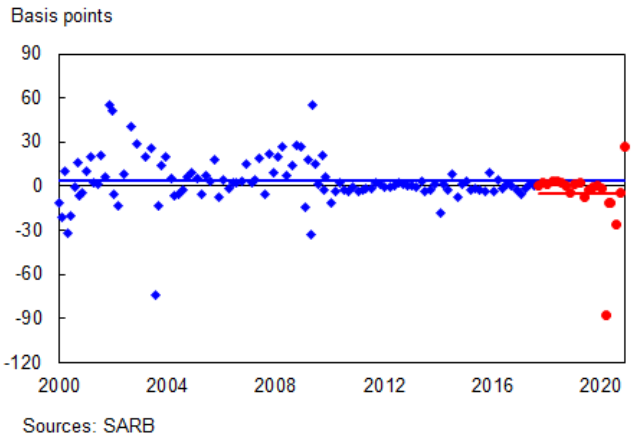
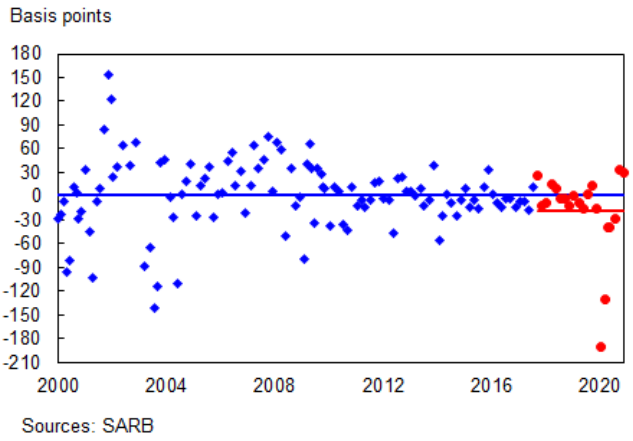


Figure 3: Monetary policy surprises (compared to FRA level)

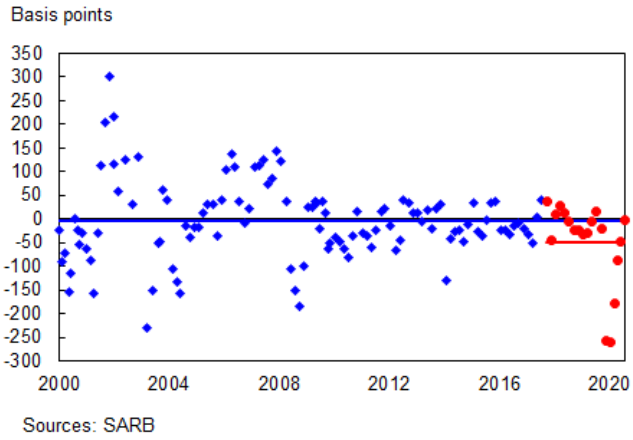
1 month ahead (FRA_{1x4})



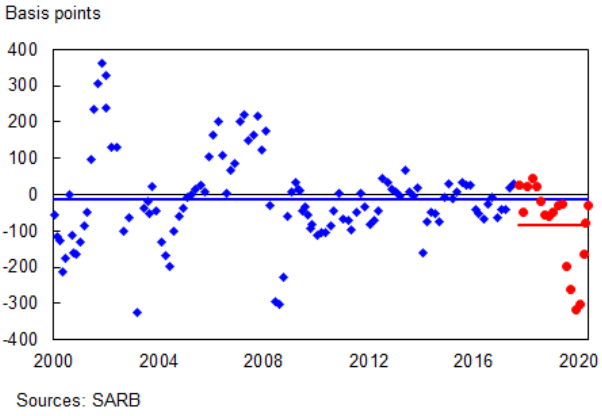
1 quarter ahead (FRA_{3x6})



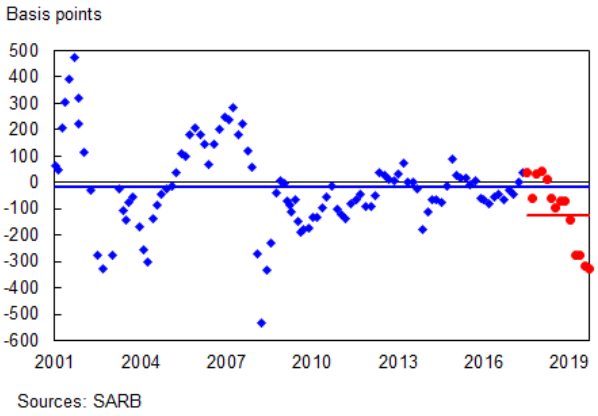
2 quarters ahead (FRA_{6x9})



3 quarters ahead (FRA_{9x12})



4 quarters ahead (FRA_{12x15})



The FRA 1x4 is currently pricing in a 31 percent probability of a rate hike in March 2021. This is quite surprising given that the QPM forecast (at the last MPC meeting in January 2021) projected two increases of 25 basis points in the second and third quarters of 2021. One explanation is that there has been liquidity-related divergence in the JIBAR from other rates affecting the precision of the SARB approach to measuring market expectations of repo changes.

3 Does publication of interest rate paths provide guidance?

Following Natvik et al. (2020), we assess whether publication of the SARB interest rate path has provided guidance by running the following test:

$$|MFE_t| = c + \beta I_t + \varepsilon_t$$

where I is a dummy for the period during which the track for the repo has been published. This tests whether there has been a systematic change in the mean market forecast errors since the publication of repo projections.

The econometric results in Table 1 confirm the intuition of the earlier charts that communication of the SARB's future policy path has improved markets' response to policy decisions. Based on the SARB's definition of surprises, policy decisions tended to be associated with positive market forecast error responses before the publication of the policy path, which could reflect the fact that inflation was trending down over this period. Since the publication of IRPs, there has been an improvement in the responses of market forecast errors, with the coefficients turning negative for all horizons, even though not yet statistically significant. The largest monetary policy surprises have been at longer horizons, consistent with the findings of Natvik et al. (2020) for other countries.

Our forward-looking FRA-based approach tests whether publication of repo projections has brought market forecasts closer to realized interest rates. After the publication of the repo path, we find that forecast errors did fall for horizons up to 2 quarters ahead, but not statistically significantly. Again, forecast errors are larger at longer horizons where there is more forecast uncertainty. Given the short sample over which the policy rate path has been published, these results are tentative, as confirmed by the lack of statistical significance.

Table 1: Market forecast error responses to monetary policy announcements

Forecast errors based on SARB definition					
Horizon	1 month	1 quarter	2 quarter	3 quarter	4 quarter
Before IRP	**21.17**	**37.22**	**62.88**	**91.42**	**120.56**
	(2.26)	(3.98)	(5.75)	(7.98)	(10.03)
Change after IRP	-0.40	-2.08	-4.68	-2.67	-6.19
	(5.60)	(9.97)	(15.12)	(21.45)	(28.13)
Observations	134	133	131	130	118
Average FE (Bp)	21	37	62	91	121
Forecast errors based on FRAs					
Horizon	1 month	1 quarter	2 quarter	3 quarter	4 quarter
Before IRP	**10.23**	**31.61**	**61.76**	**88.75**	**118.79**
	(1.31)	(3.20)	(5.59)	(8.06)	(10.64)
Change after IRP	-0.53	-1.36	-3.31	8.67	20.35
	(3.33)	(8.08)	(14.74)	(21.75)	(29.84)
Observations	134	131	130	128	118
Average FE (Bp)	10	31	61	90	121

Note: Standard errors in parentheses. Bolded text indicates statistical significance at 10 percent.

4 Conclusion

Since September 2017, the SARB has published a projection of the policy rate alongside its Monetary Policy statements. Since publication of the SARB's implied policy path, monetary policy announcements have been associated with smaller market forecast errors. Overall, we find communication of the SARB's projected policy path has improved the markets' response to policy decisions. Although the size of monetary policy surprises has declined pre-Covid, policy guidance through the publication of the policy path plays a relatively limited role in guiding market pricing. We therefore argue there is still room for improvement in the SARB's monetary policy communication to guide forward-looking expectations of policy. Over parts of 2020, for example, market expectations of the repo tended to be focused on current economic conditions, not pricing-in the SARB's repo path guidance. Enhancing the clarity of the communication around the conditionalities associated with the SARB's projections of its future policy path could help the market better price in SARB's policy guidance. For example, emphasising that policy path projections are conditional on the economic outlook and providing clar-

ity about how the SARB would react to shocks could help to anchor longer run expectations closer to the repo path projection by reducing the uncertainty around the likely reaction of SARB projections to shocks and data outturns.

To more accurately measure the market implied expectations of the policy rate over the projection horizon, future work should extract forward interest rates from the term structure at future MPC dates and estimate and remove their embedded term premia.[5] Future work should also formally investigate whether the SARB projections of the repo affect market expectations of future policy rates, particularly using intraday data to more accurately capture monetary policy surprises (as in Brubakk et al. 2021). Lastly, further research into the drivers of the wedge between the repo and market pricing would also be useful.

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Brubakk, L., S. ter Ellen, and H. Xu (2021). Central bank communication through interest rate projections. *Journal of Banking and Finance 124*.

Natvik, G. J., D. Rime, and O. Syrstad (2020). Does publication of interest rate paths provide guidance? *Journal of International Money and Finance 103*(C).

[5] This could also be extended to indexed debt instruments to estimate market implied inflation expectations over the projection period (as the difference between real and nominal forward rates) as a measure of the credibility of monetary policy.

OBEN 2101* – March 2021

A Truck-o-meter for South Africa

Byron Botha, Samkelo Duma, and Daan Steenkamp

Abstract

We produce automated daily and monthly indicators based on South African National Roads Agency traffic flow data from almost 9000 monitoring sites. Traffic volume data is available almost immediately, making such data useful for real-time assessment of economic activity. During the Covid-19 crisis, traffic flows declined dramatically, with trucking flows falling over 50 percent and light passenger flows down almost 80 percent during the initial lockdown. Although traffic flows returned to pre-crisis levels by the end of 2020, the introduction of the adjusted level three lockdown saw renewed weakness in traffic flows. We construct an index of transport activity as a coincident indicator of economic activity, and argue that it provides a useful signal of current economic activity. We argue that the recent level of trucking flows has been consistent with the January MPC GDP forecast for 2020Q4, but suggest some downside to the 2021Q1 nowcast.

1 Introduction[1]

We use hourly South African National Roads Agency (SANRAL) traffic flow data from almost 9000 monitoring sites to construct automated daily and monthly indicators of traffic activity. Traffic volume data is available almost immediately, making such data useful for real-time assessment of economic activity.[2] We construct a monthly index of trucking activity to act as a coincident indicator of economic activity. We argue that recent levels of trucking traffic have been consistent with the January MPC GDP nowcast, but are more pessimistic about growth in 2021Q1 than the SARB official nowcast.

2 Creation of daily traffic flow indicators

The SANRAL data we use provides hourly traffic flow data across four categories: light passenger vehicles, short-, medium-, and long-heavy trucks and distinguishes between three types of public roads: National Roads, Provincial (i.e. specific to different provinces) and Municipal (i.e local council level), with data for some monitoring sites starting in January 1994.[3] We focus on route aggregations for the N1, N2, N3 national roads, and aggregations for all other 'N' roads, all 'R' roads, all 'M' roads and other roads (labelled 'Rest'). We aggregate hourly flows from hourly to daily frequency, summing the number of vehicles for each category of vehicle per day at station-level before averaging across all sites per route (to account for the addition of new measurement stations to the dataset over time). We create route-level aggregations for each route for five vehicle categories (passenger vehicle, light trucks, medium trucks, large trucks and total trucks). To construct monthly series, daily (unseasonally adjusted) data for each category is averaged at station-level before being aggregated to route level and being seasonally adjusted. A large number of stations on Municipal and Provincial routes stopped reporting data during the Covid crisis, so we eliminate stations without at least 90 percent observation coverage from January 2000 from our construction of monthly indicators.[4]

[1] Thanks to the South African National Roads Agency SOC Limited for making data available, Henk Botha for help with dataset construction and Daniel Ollech for advice on seasonal adjustment.

[2] The only other 'Truckometer' we are aware of for other economies is that of ANZ (2012) for New Zealand, who produce light and heavy trucking indices based on traffic flow figures.

[3] We filter out stations outside of South Africa's borders and discard observations that have invalid time intervals.

[4] We exclude the 'Rest' category given the large proportion of non-reporting sites in this group.

2.1 Seasonal adjustment

We use the approach of Ollech (2018) for daily seasonal adjustment, and Sax and Eddelbuettel's (2018) implementation of X-13ARIMA-SEATS for monthly seasonal adjustment.[5]

For daily data, the algorithm decomposes the seasonal component into sub-components including intra-weekly, intra-monthly, intra-annual seasonal factors and a moving holiday effect. We use the default window sizes recommended by Ollech (2018) for trend-cycle decomposition and estimating seasonal factors (ie. the Loess parameter for day of the week/month/year effect estimation). In order to assist in estimating the moving holiday effect, we provide as an external regressor the dates of all observed South African public holidays. For outlier identification, we allow for additive outliers, level shifts, and transient changes, with Ollech's (2018) default critical values.

For monthly aggregates, we use the X-11 procedure to estimate seasonal adjustments, along with trading day and Easter (8) regressors to calculate calendar-related effects.[6] For outlier detection, we select all the outlier types offered by X-13ARIMA-SEATS.

To ensure that all series have been appropriately seasonally adjusted, we confirm that each series is free of residual seasonality using an F-test.

The Covid crisis is a particularly difficult period over which to estimate seasonal effects as it represents a structural break (which is clearly visible in Figure 8 in the Appendix). In this study, we hold back the data post-Covid-crisis when estimating our daily seasonal model and apply the forecasted seasonal factors to seasonally adjust the Covid period data. We present the non-seasonally adjusted data, seasonally adjusted data using the forecasted seasonal factors, forecasted seasonally adjusted data, and forecasted trend in the results (Figure 12 Appendix). We would recommend further refinement of the seasonal adjustment procedures used as more data becomes available.[7]

3 Traffic flow indicators

The purpose of this note is to create daily and monthly traffic flow indicators that can be used for like-for-like comparisons of traffic flows at different points in time and assessment of the impacts of each Covid-related lockdown. The raw daily traffic flows are very noisy and have many aberrations (e.g. missing data points or outliers, Figure 9). After cleaning (Figure 10) and seasonal adjustment clearer comparisons of daily data outturns over time are possible (Figure 11). Figure 1, for example, shows how total traffic flows evolved for each of the last three years relative to their January levels.[8] After the hard lockdown that applied from 27 March 2020, traffic flows fell by almost 80 percent year-on-year for country-wide light passenger traffic in April 2020 (Figure 1). Total truck flows fell over 50 percent in April 2020 (Figure 2). Despite the imposition of adjusted level three regulations at the end of December 2020, traffic flows have continued to improve, recovering to their pre-Covid levels by the end of 2020. There was renewed weakness in traffic flows following the introduction of the adjusted level three lockdown towards the end of 2020 (escalated from level 1). The intense volatility around the end-of-year holidays appear to have to do with poor seasonal adjustment of the daily data around that period. For this reason, we focus on monthly and quarterly frequency data for the rest of the analysis. Better daily seasonal adjustment would need to be a focus of further work as more data becomes available.

[5] The approach of Ollech (2018) provides a STL-based ('Seasonal and Trend decomposition using Loess') routine that can be used in conjunction with a RegARIMA model to identify calendar effects and seasonal outliers. Implemented using the *dsa* and *seasonal* packages in R, respectively.

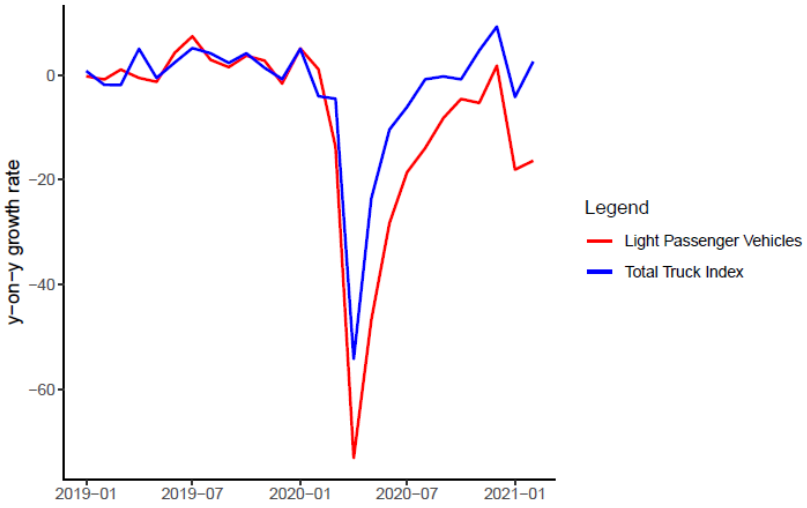
[6] Implemented using the *seas* packages in R.

[7] While our daily seasonal adjustment procedure based the adjustment on pre-Covid data, our monthly adjustment uses full sample data for estimating seasonal factors. Figure 13 in the Appendix suggests that this differing treatment does not make a material difference to the Truck-o-meter obtained: aggregating our seasonally adjusted daily data to monthly frequency produces a similar measure to aggregating unadjusted data and then seasonally adjusting at monthly frequency.

[8] Note that the dramatic drop in traffic volumes represents a fall to a trough in April 2020 of only 2 percent of January 2020 flows (on a seasonally adjusted basis). The actual number is actually 465: the average number of trucks passing ANY monitoring site was 465 on that day, which is far away from zero by a large margin.

Figure 1: Total trucking flows (all categories and routes)

Figure 2: Traffic flows during the Covid crisis



4 The truck-o-meter as a coincident indicator of activity

To construct our 'Truck-o-meter', we sum daily data for each of the three categories of trucks for 77 routes and select monitoring stations that have over 90 percent complete data and have a correlation with GDP of over 0.5. This narrows down the number of considered routes to 16 (N1-4,N6-9,N11-12,N14,N17,R60,R101,R103, R300). After summation of the daily route data across the three categories and conversion to monthly frequency by averaging across the days in the month, the series is seasonally adjusted.

Figure 3 presents the Truck-o-meter in indexed form, while Figure 4 compares our Truck-o-meter to aggregate trucking flows. Trucking flows showed a more dramatic decline during the Covid-crisis than the Truck-o-meter, which reflects the exclusion of traffic routes only weakly correlated to GDP over the full sample.[9]

[9] Understanding divergences between traffic flows between different traffic routes would be an interesting question to investigate in further work.

Figure 3: The Monthly Truck-o-meter (seasonally adjusted)

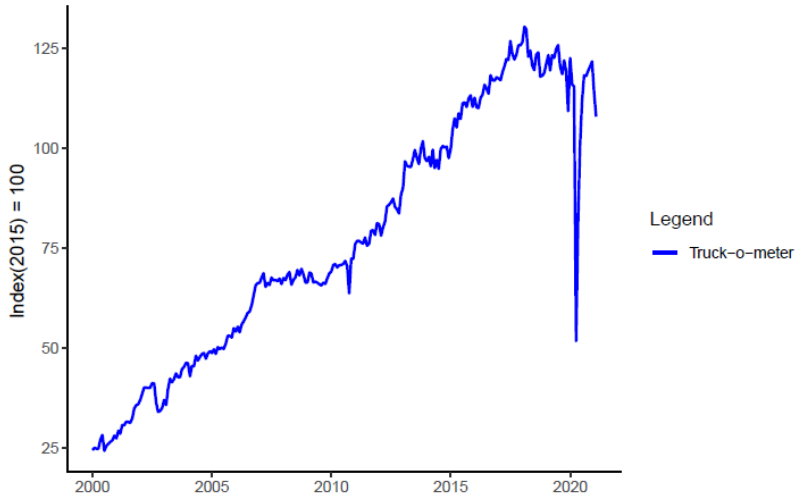


Figure 4: Monthly Truck-o-meter vs Aggregate Trucking flows

There is over a 90 percent correlation between our aggregate traffic flow indicator and GDP in quarterly frequency, as well as with the Reserve Bank's coincident indicator (Figures 5 and 6).

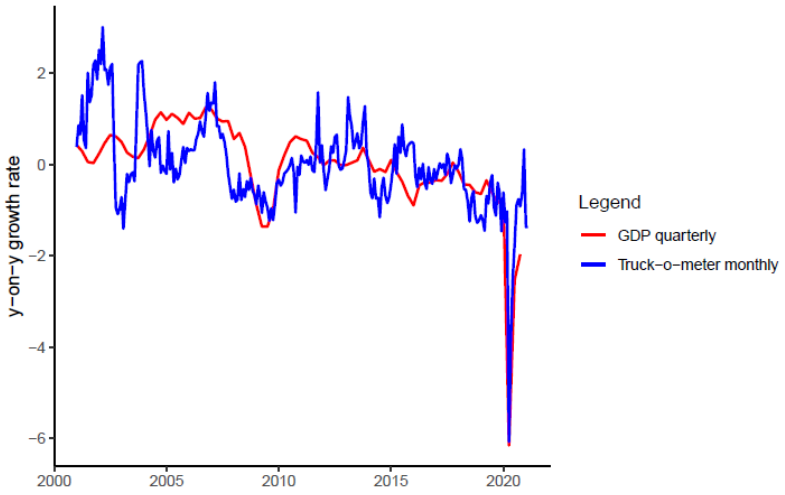
Ahead of the 2020Q4 GDP outturn, a simple model of the Truck-o-meter and GDP suggested that the current level of the index would be consistent with a GDP outturn of -4 percent year-on-year (versus -4.5 percent from the January 2021 MPC forecast and an actual outturn of -4.1, Figure 7). Adding the Truck-o-meter to simple autoregressive model allows the model to capture an additional 20 percent of the variation in South African GDP to be explained. The model suggests there is some upside to the GDP forecast for 2021Q1 relative to the official nowcast, currently predicting a -1 percent year-on-year print relative to the SARB nowcast of -3.9 percent. This is just an illustrative exercise, but suggests that adding the Truck-o-meter to one of the Reserve Bank's nowcasting models might improve their predictive accuracy - a contention worth testing in follow up work.

We have designed the Truck-o-meter to be most useful as a coinciding indicator for GDP. But Figure 14 shows that while the truck-o-meter has a high degree of contemporaneous correlation with GDP, there may also been a lead/lag correlation structure to exploit in creating a leading indicator for GDP (see also Figure 15 Appendix).[10] We intend to add our measure to a large number of other

[10] We also show in the Appendix that there is a high correlation between trucking flows and various forms of activity (such as mining, wholesale activity and vehicle sales, Figures 16 to 19).

indicators to assess its ability to enhance GDP nowcasting performance in future research, but could also construct alternative traffic flow indicators to act as leading indicators.

Figure 5: Truck-o-meter (monthly) vs GDP (quarterly)



Note: Scaled to have unit variance and zero mean. Both series have been seasonally adjusted.

Figure 6: Monthly Truck-o-meter vs SARB's Coincident Indicator

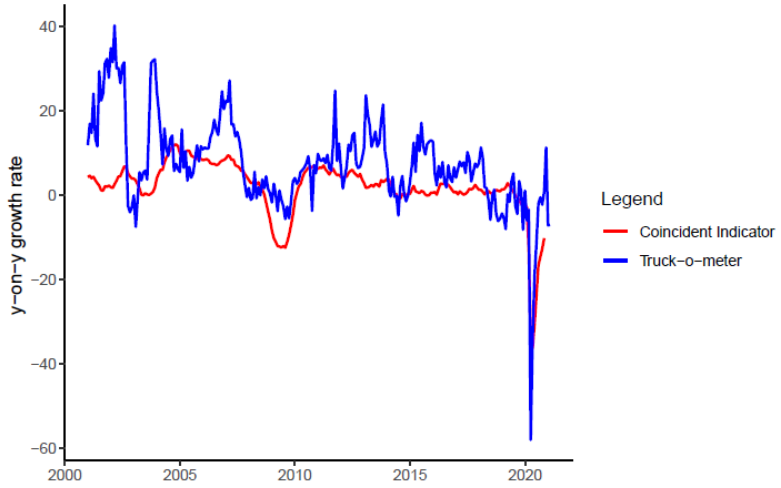
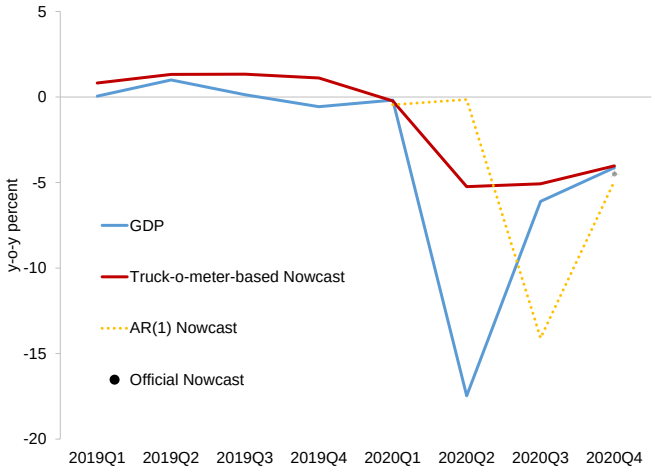


Figure 7: Nowcasting GDP using Truck-o-meter (as at 23 February 2021)



Note: OLS model with constant, AR(1) term and contemporaneous Truck-o-meter. Sample for GDP: 2000Q1 to 2020Q3.

5 Conclusion

We have created automated daily and monthly indicators of traffic flows for major transport routes that can be used for MPC presentations and analytical assessments.

We show that during the Covid-19 crisis, traffic flows declined dramatically, with trucking flows falling over 50 percent and light passenger flows down almost 80 percent during the initial lockdown. Although traffic flows returned to pre-crisis levels by the end of 2020, the introduction of the adjusted level three lockdown saw renewed weakness in traffic flows.

We construct a South African Truck-o-meter that maximizes its correlation with GDP, and argue that it provides a useful signal of current economic activity. We argue that the recent level of trucking flows has been consistent with the January MPC GDP forecast for 2020Q4, but is more pessimistic about growth in 2021Q1 than the SARB official nowcast.

This note provides a first cut of traffic flow data for South Africa. Further refinements to the seasonal adjustment routines, including the creation of additional weekly indicators is recommended. Future research should assess whether the Truck-o-meter is a useful predictor of current GDP or GDP turning points. It would also be interesting to use geolocation matching of stations to those centres of economic activity (eg mines, factories, drydocks, ports or airports) to characterise the nature of regional economic activity.

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Ollech, D. (2018). Seasonal adjustment of daily time series. Deutsche Bundesbank Discussion Paper 41.

Sax, C. and D. Eddelbuettel (2018). Seasonal adjustment by x-13arima-seats in r. *Journal of Statistical Software, Articles 87*(11), 1–17.

A Appendix

Figure 8: Trucking flows (total routes since 2020)

Figure 9: Daily traffic flow example (Long Trucks, before cleaning)

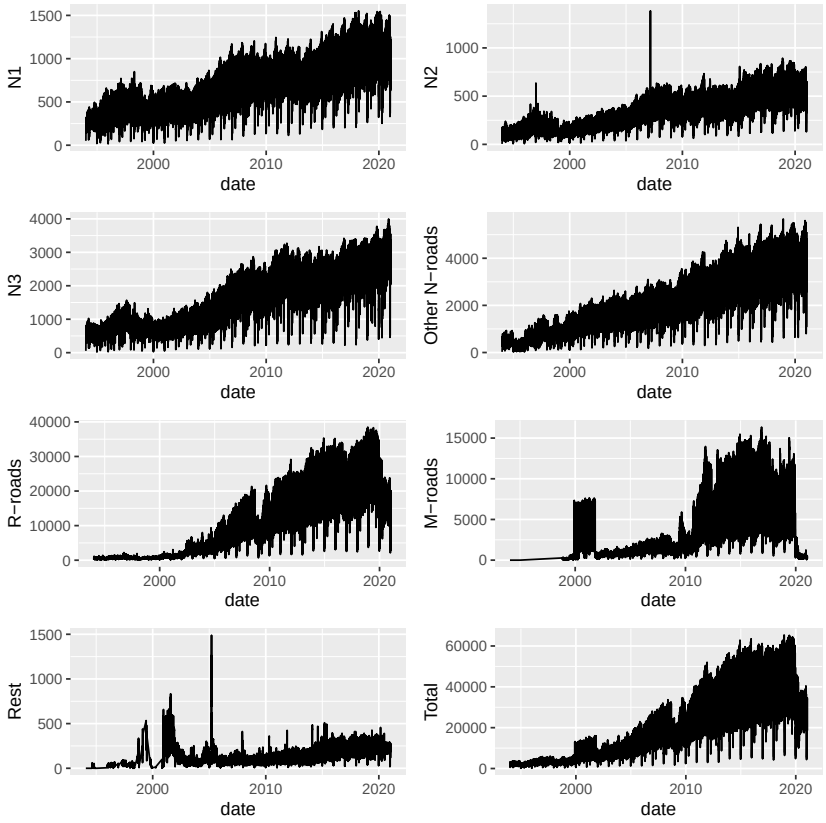


Figure 10: Daily traffic flow example (Long Trucks, after cleaning)

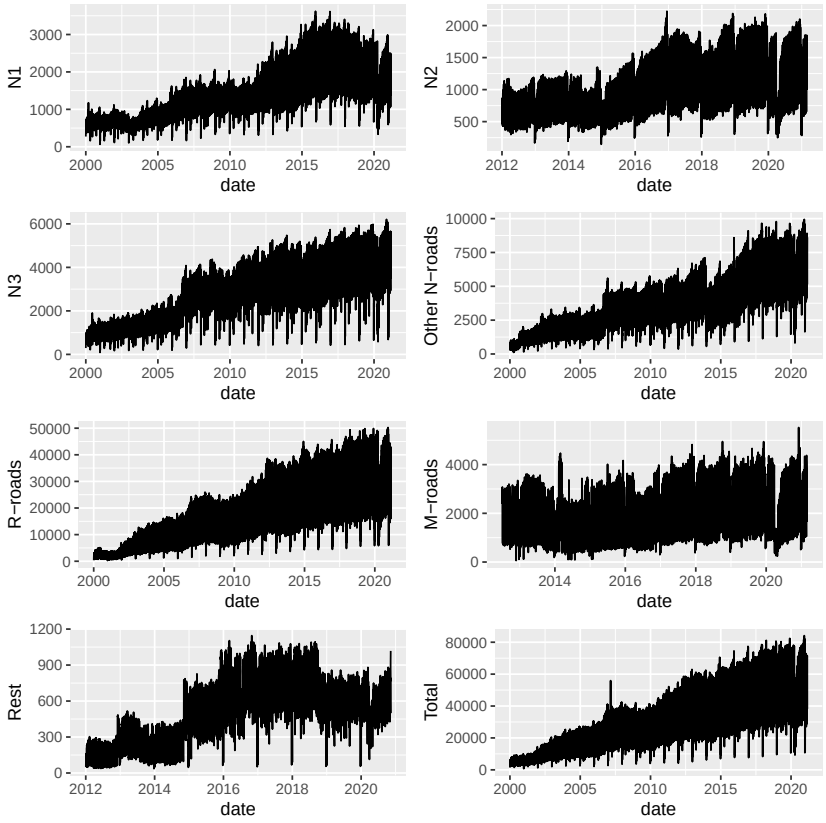


Figure 11: Daily traffic flow example (Long Trucks, after seasonal adjustment)

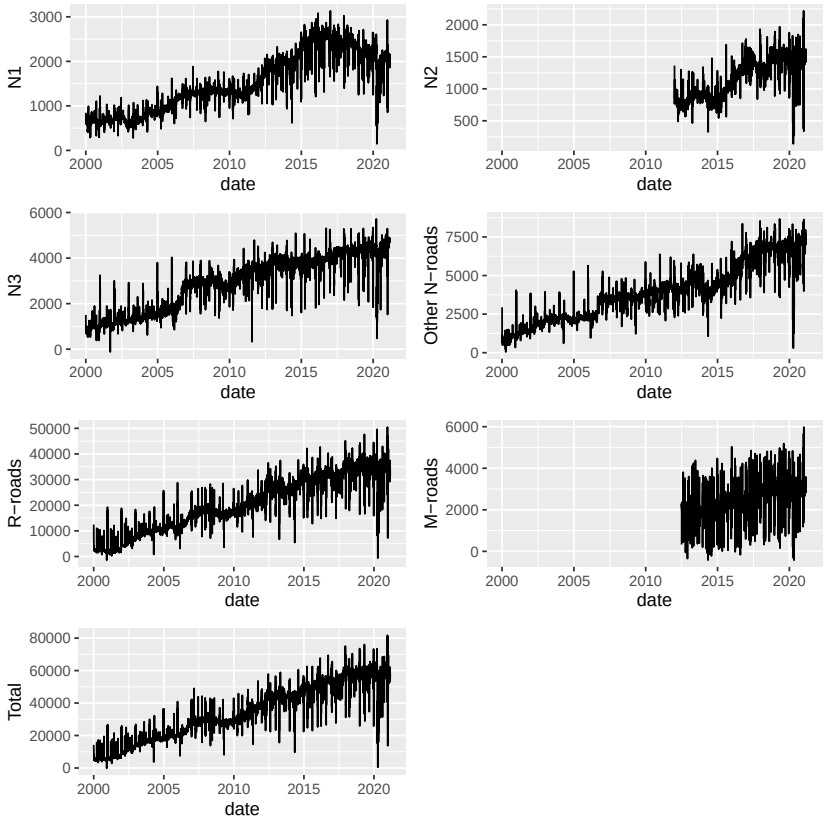


Figure 12: Seasonal adjustment of Total road flows

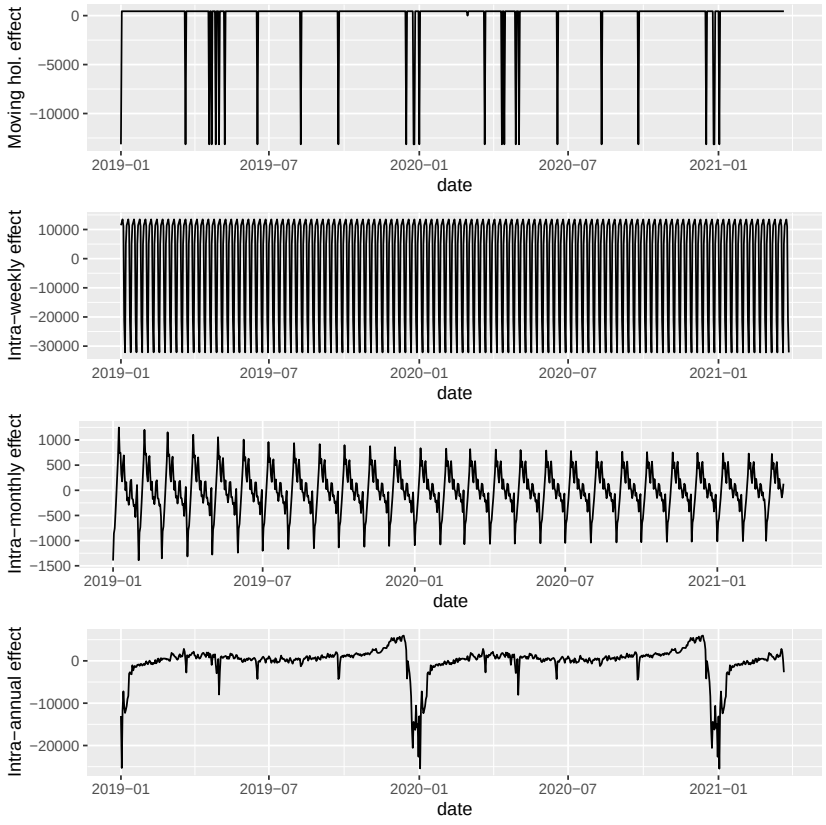


Figure 13: Total Truck Index(Daily Seasonal Adjustment vs Monthly Seasonal Adjustment)

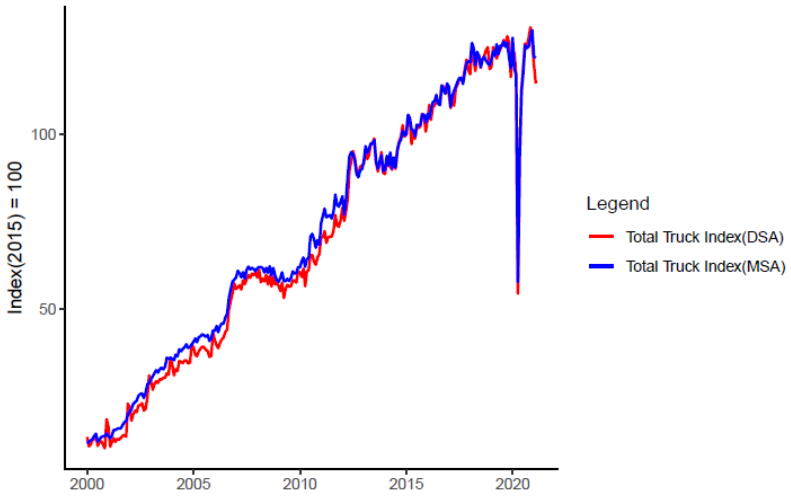


Figure 14: Cross-correlations between Truck-o-meter and GDP (Quarterly, seasonally adjusted)

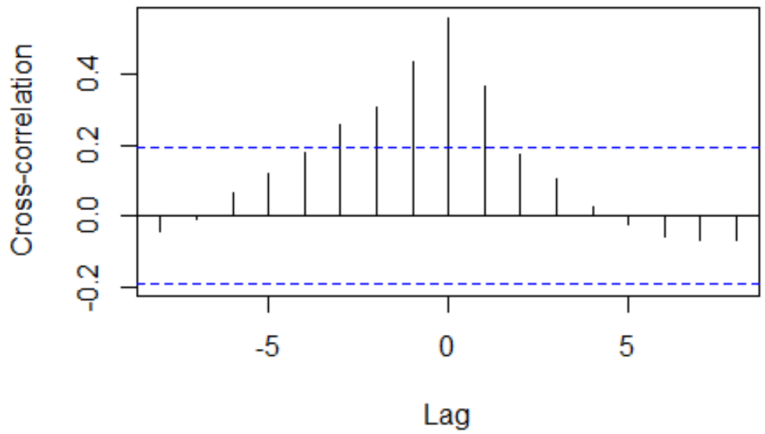


Figure 15: Monthly Truck-o-meter vs SARB's leading indicator

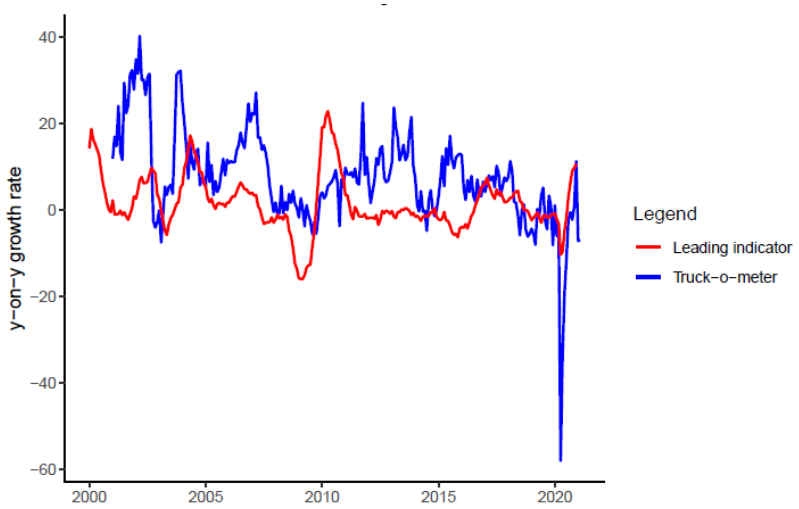


Figure 16: Truck flows vs Mining (Seasonally Adjusted))

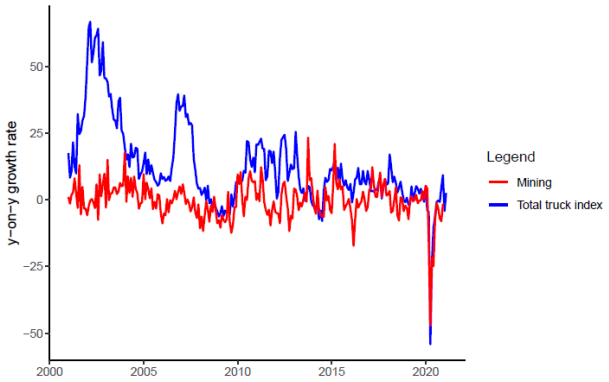


Figure 17: Total Truck flows vs Wholesale trade (Seasonally Adjusted)

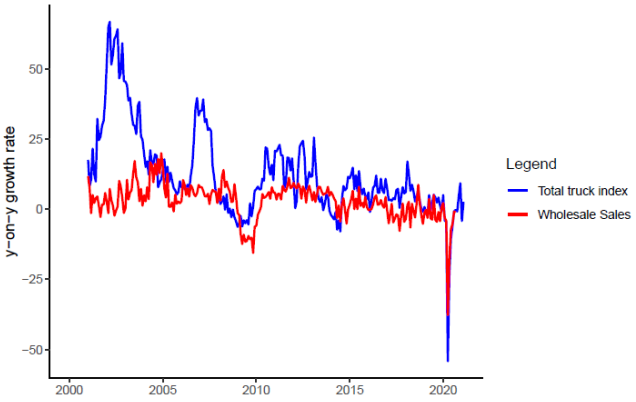


Figure 18: Short Truck flows vs light commercial vehicle sales (Seasonally Adjusted)

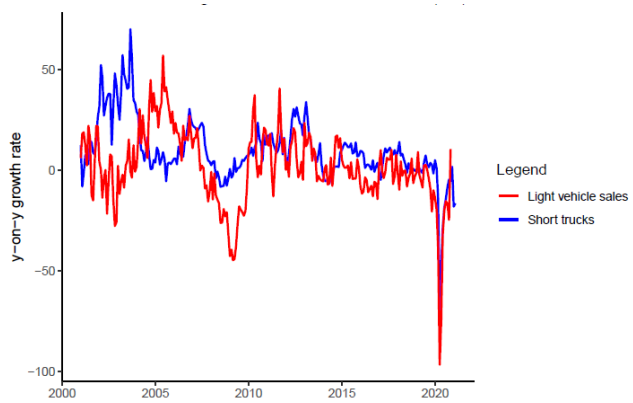
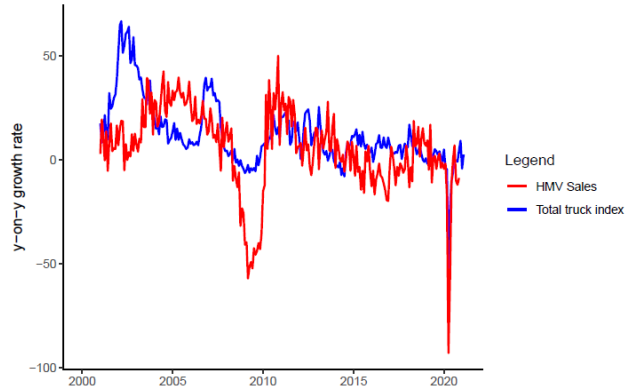


Figure 19: Truck flows vs Heavy, Medium and buses sales (Seasonally Adjusted)



OBEN 2101* – May 2021

Inflation in the time of Covid-19: (II) the liquidity surge

Jean-Francois Mercier

Abstract

Sizable policy stimulus since the start of the Covid-19 crisis has resulted in a sharp acceleration in global money supply. However, this acceleration is uneven, and in many cases not unprecedented. Furthermore, some typical elements of a monetary boom, such as rising demand for new loans or lax bank lending standards, are not present at this stage. Hence, this latest surge in money supply need not result in sustainably higher inflation, and indeed in most major economies money growth has been a poor predictor of inflation in recent decades. However, were fiscal policies to remain expansionary for an extended period and not be matched by a timely normalization of monetary policies, the strong money supply expansion could be sustained and eventually trigger higher inflation.

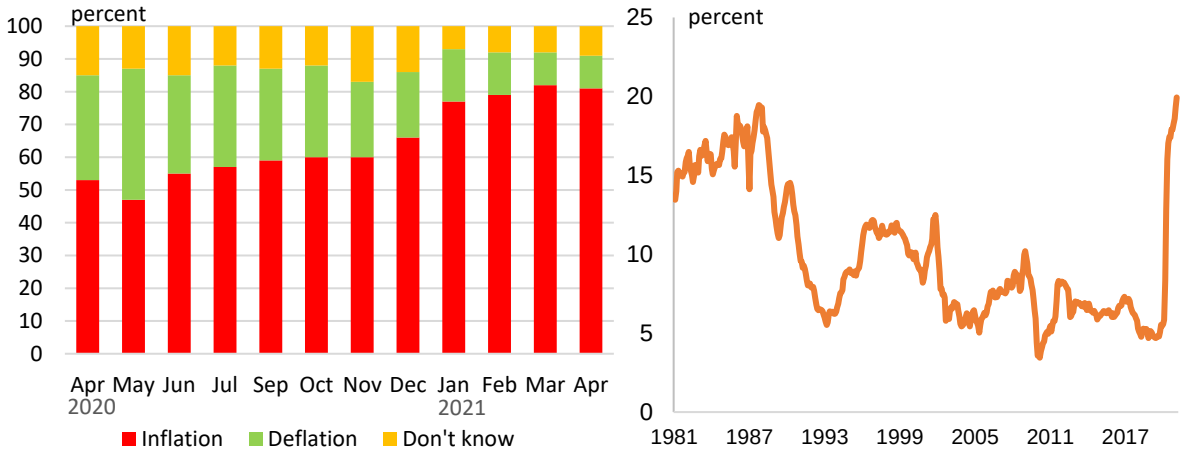
1. Introduction

Governments and central banks have responded to the Covid-19 pandemic with aggressive stimulus across the board. Policy rates have been slashed, many central banks have boosted purchases of bonds (through "Quantitative Easing" programmes), and public deficits have ballooned, reflecting discretionary measures as well as automatic stabilizers. Most economists argue that quick and sizable stimulus was necessary to prevent an even deeper recession and limit permanent economic "scarring". However, some voices are now raising concerns that sizable stimulus – if extended well beyond the closing of output gaps – could sow the seed of future inflation.[1] Market participants seem to share these concerns: A recent Deutsche Bank survey shows rising expectations of inflation in the medium term (Figure 1).

This note, the second in a series looking at whether the Covid-19 crisis should prove inflationary or deflationary over time, focuses on the consequences of policy stimulus, and specifically at how the resulting increase in money supply can feed into inflation. It finds that while the surge in liquidity is undeniable, it is uneven across countries, and furthermore, money supply – especially when not driven by strong and sustained demand for credit – is often a poor guide to future inflation. Ultimately, whether both fiscal and monetary stimulus are phased down in appropriate fashion or not is likely to determine the risk of a sustained spike in inflation.

[1] For example, Larry Summers and Olivier Blanchard have expressed concerns that the latest US fiscal stimulus is "too much" and could, in the former's words, raise inflation to levels unseen in a generation.

Figures 1 and 2: Market participants' opinion on risks of inflation vs deflation in 1-5 years (left) and Y/Y growth in aggregate OECD broad money (right)



2. Some monetary (or monetarist?) arithmetic

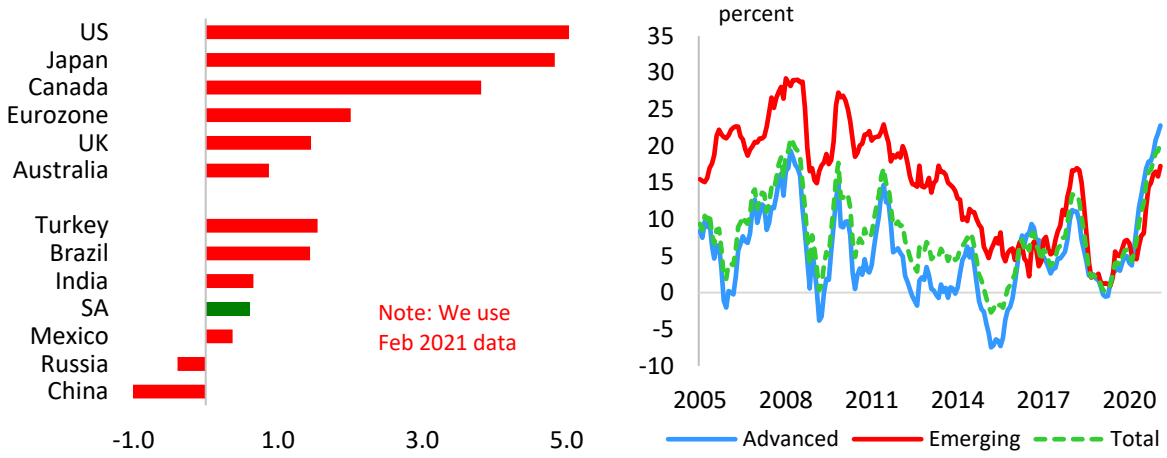
A key consequence of stimulus appears to be a sharp expansion in liquidity, which is reflected in monetary aggregates. For example, the median M1 growth rate for G-20 countries jumped from 7.9% year-on-year in February 2020 to a high of 22.9% in January 2021.[2] This exceeded the peak of 19.9% seen in early 2008, before the Global Financial Crisis – a period in which global inflation accelerated. If we use broader M2 monetary aggregates, the acceleration in the median growth rate is less pronounced, though still strong (14.1% in October, versus 7.9% in February). These findings coincide with the OECD's calculation of a broad money index for the aggregate of its member countries, which jumped to 19.3% year-on-year in January 2021, the highest since 1988 (Figure 2).

If one holds the traditional monetarist view that a sudden surge in money supply is inflationary, then the above-mentioned figures are of concern. However, the reality is more complex. First, while money supply growth has picked up throughout the world, the pace of acceleration varied significantly across countries. If we calculate the z-score of M2 growth for a number of countries, we see a much stronger pickup in US, Canada and Japan than in other countries; within large EMs, only Turkey and Brazil stand above the lot (Figure 3).[3] And splitting our G-20 M2 aggregate between its AE and EM components, we see that current money growth is much less divergent from its longer-run average in EM (Figure 4).

[2] We adjust the M1 series for the US for a jump in May 2020, which reflected the Federal Reserve's decision to include all savings deposits and not just checkable deposits in the narrow money definition.

[3] The z-score refers to the difference between the February reading and the average of the past 15 years, divided by the standard deviation over that period.

Figures 3 and 4: Z-score of M2 growth in selected AEs and EMs (left) and split of aggregate G-20 M2 growth by major regions (right)

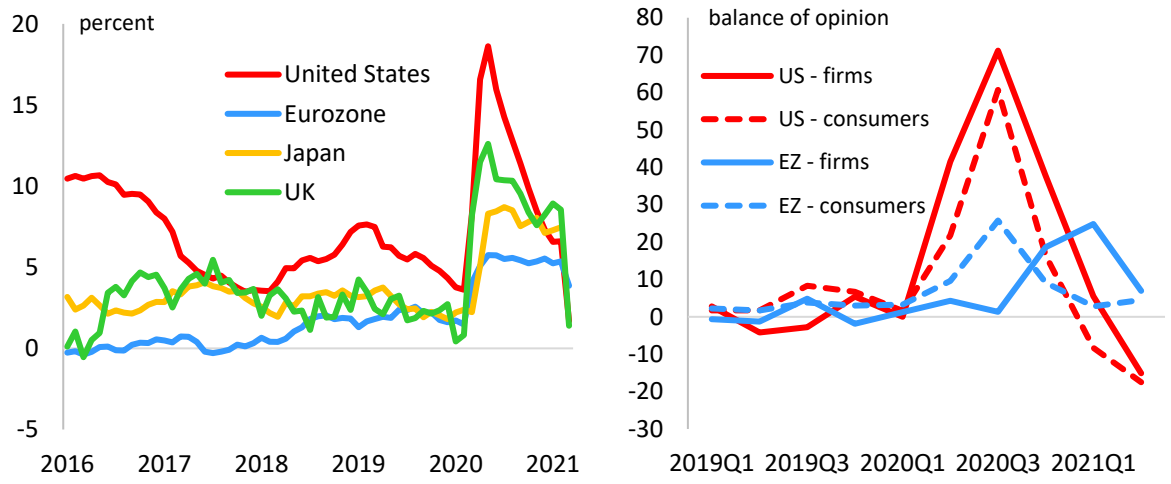


3. What drove the money acceleration?

The current surge in liquidity is unusual insofar as not all characteristics of a traditional monetary expansion are met. Admittedly, there has been a broad-based easing of monetary policy, through both a reduction in rates, central bank asset purchases and targeted lending schemes for specific sectors. However, there has been no sustained, broad-based acceleration in bank lending to the private sector. In most AEs, there was a strong pickup in loans to the corporate sector in Q2 of 2020, as companies sought “bridging finance” to deal with a sharp, lockdown-related decline in cash-flow; however, that acceleration was short-lived and has mostly reversed (Figure 5). At the same time, lending to households has been subdued (or even, in the US contracting, suggesting that consumers are keen to use public cash transfers to pare down their debt). Across major EMs, lending only picked up significantly in Brazil, Turkey and Russia.

Nor is the situation about to change quickly, according to loan officer surveys in major economies. In the US, Eurozone, UK and Japan, banks have not indicated a pickup in demand for loans, with the exception of the housing sector. Also, a sustained loosening of lending standards – traditionally a typical feature of monetary booms – is not present this time. In fact, these same loan officer surveys reported that banks typically tightened their standards in Q2 and Q3 of 2020, sometimes significantly (Figure 6).

Figures 5 and 6: Bank lending to corporations in major AEs (left) and split of aggregate G-20 M2 growth by major regions (right)



Rather, the 2020 surge in liquidity appears to have largely reflected significant fiscal easing, mostly focused on direct cash transfers to households and unemployment benefits/furlough schemes. In many cases, these payments more than made up for job-related income losses. Their timing also affected money supply growth: As the OECD (2020) highlighted, payments happened at the height of the lockdown, when households and businesses were constrained about how much they wanted to spend.[4] Consequently, household savings surged; a large share of these transfers were re-deposited with banks, and did not circulate in the "real" economy. As a consequence, the velocity of money fell markedly, and has yet to pick up. The surge in money growth may also have reflected private agents' willingness to keep a large part of these payments in cash, as protection against income uncertainty.

4. Money supply and inflation – empirical observations

In a February testimony to Congress, Federal Reserve Chair Jerome Powell remarked that "right now, M2 does not really have important implications".[5] But is it a fair assessment? A simple comparison of inflation and M2 growth for advanced economies suggests that money supply has shorter, and more pronounced cycles than inflation: Thus, while the pickups in inflation in the last 30 years (2008, 2011, 2016) were preceded or accompanied by faster money growth, other instances of money acceleration (2001-03, 2018) did not result in inflation. This would suggest that monetary expansion will only be expansionary if other factors of inflation are present, for instance a positive output gap (2008) or a surge in commodity prices (2011).

For many years, academic literature has shown that linkages between money and inflation only really occur in countries with high inflation or hyper-inflation, and that in advanced economies, the power of money as inflation predictor has faded.[6] Indeed, a look at these

[4] "The increase in bank deposits during the COVID-19 crisis: Possible drivers and implications", Box 1.3 in the OECD Economic Outlook, Volume 2020 Issue 2, December 2020.

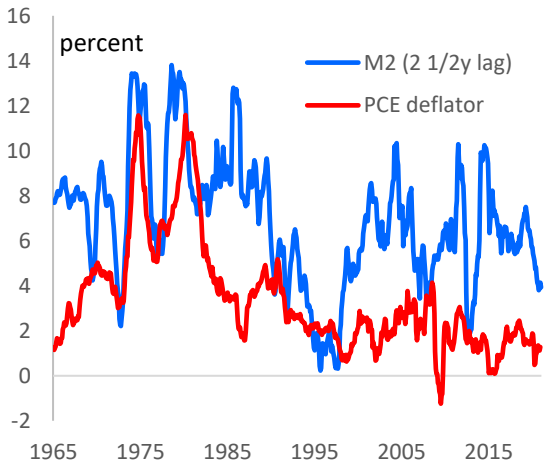
[5] "Powell's Econ 101: Jobs not inflation. And forget about the money supply", Reuters, 23 February 2021.

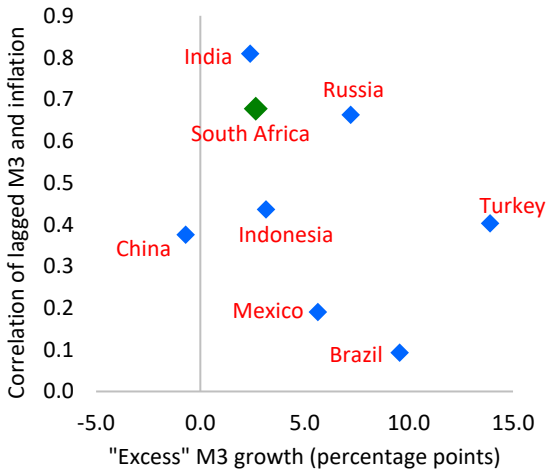
[6] See "Is Inflation Always and Everywhere a Monetary Phenomenon?", Paul de Grauwe and Magdalena Polan, Scandinavian Journal of Economics Vol. 107 No. 2, June 2005; "Money growth and inflation in the Euro Area: A time-frequency view", Antonio Rua, Bank of Portugal Working Paper 22/2011; and "What Does Money Velocity

advanced economies where money supply accelerated the most since Q2 of 2020 shows a weak money/inflation link in recent decades:

- In the **United States**, both narrow and broad money growth have largely decoupled from price gains since the "Volcker Fed" took action to bring down inflation in the early 1980s (Figure 7). While the correlation between PCE inflation and M2 growth (lagged two and a half years) was as high as 71% in 1960-79, it was only 27% in the four decades that followed. This is consistent with evidence of stable inflation expectations through the cycle, and a flatter Phillips curve;
- In **Canada**, some strong positive correlation was also observed between CPI inflation and one year-lagged M2 growth, reaching as high as 86% up to 1995, four years after the Bank of Canada first adopted inflation targeting. However, since that date the correlation has effectively dropped to zero;
- A similar pattern is observed in **Japan**, where M2 growth (with a lag of 20 months) and CPI inflation are strongly correlated up to 1995 – when Japan first experienced deflation – and that correlation falls to zero afterwards.

Figures 7 and 8: US M2 growth and PCE inflation (left) and correlation between inflation and lagged money growth vs "excess" money growth in selected EMs (right)





In emerging countries, where inflation expectations are less anchored – or have only recently been anchored – and where the Phillips curve is generally not as flat, a monetary surge might aggravate inflationary fears. Indeed, some countries show a relatively strong correlation between money supply and inflation; however, these are not necessarily the ones where last year's money acceleration is unusually strong. Figure 8 plots – for eight emerging economies – the maximum correlation between lagged broad money and CPI inflation against "excess" money growth (defined as the latest year-on-year growth in broad money less the 2014-19 average). It would suggest that Turkey, and to a lesser extent Russia, are most at risk from money-driven inflation. India and South Africa have a high correlation to inflation but limited "excess" money growth; Brazil's money growth is unusually high but is uncorrelated with inflation.

Tell Us about Low Inflation in the U.S.?", Yi Wen and Maria Arias, St Louis Fed on the Economy Blog, September 2014.

5. So is it mostly fiscal?

Deutsche Bank economists argued in 2020 that based on experience of the past centuries, the key risk of an upside inflation surprise comes from policy regime change – including a structural change in central bank tolerance for inflation, against a background of economic, social and political changes.[7] In the current environment, they currently see that risk being the highest in the United States, where the Administration is embarking on the largest fiscal stimulus since World War II and the Federal Reserve indicated an implicit shift from a proactive to reactive approach to inflation risks.[8] In a March 2021 report, they quoted Fed research highlighting the possibility of a non-linear Phillips curve, with stronger inflation responses at very low unemployment rates.[9] Their colleagues at Bank of America securities also highlighted the US policy response as raising the risk of a negative inflation surprise in the US, though they do not see those risks extending to other AEs.[10]

Indeed, while the global surge in money supply so far reflects (mostly) temporary factors, and should therefore bear limited inflation risks, the balance of risks could easily tilt should money supply growth remain very high for an extended period. This could be the case if, for example, fiscal policymakers continue to maintain a high degree of stimulus even as the drag from the pandemic fades, boosting pent-up demand, reducing risk aversion and boosting both borrowers' and lenders' appetite for excessive credit creation. And while monetary policymakers have not signalled a tolerance for higher inflation (the Federal Reserve, in particular, rejected calls from some economists for raising the inflation target), a more "reactive" stance may raise the probability of upside inflation surprises. Economic literature indicates neither the consensus nor the Fed anticipated the rise in inflation in the late 1960s, in part because the degree of slack, and the sensitivity of prices to such slack, may have been under-estimated.[11]

Encouragingly, most of the fiscal response to the pandemic (cash transfers, additional unemployment benefits) consisted of either one-off or limited-time transfers. As a result, as these benefits expire, the fiscal stance will automatically tighten: In its April 2021 Fiscal Monitor, the IMF estimates that 54% of AEs and 55% of EMs will witness an improvement in their cyclically-adjusted fiscal balances this year.[12] Non-renewal of generous fiscal transfers should also reduce the incentive for households to spend most of their 2020 fiscal "windfalls", in turn limiting the inflationary risks from runaway consumer demand. However, there are exceptions, including the United States, where the structural budget balance is only expected to decline in 2022. And the US experience shows that an environment of income inequality (exacerbated by the pandemic), ageing and inadequate public infrastructure and a push for

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7 "Could COVID-19 trigger an inflation regime shift? An historical perspective", Focus Europe, Deutsche Bank Research, 15 July 2020.

8 In its March 17 statement, the FOMC expected it would be appropriate to maintain the current target range for Fed funds "until labor market conditions have reached levels consistent with the Committee's assessments of maximum employment and inflation has risen to 2 percent and is on track to moderately exceed 2 percent for some time."

9 See "Goldilocks with Inflation Risk", World Outlook, Deutsche Bank Research, 16 March 2021 and "Non-linear Phillips curves with inflation-regime switching", Jeremy Nalewaik, FEDS Working Paper 2016-078.

10 "Another kind of American exceptionalism", BofA Global Economic Weekly, 5 February 2021.

11 See for instance "Commentary on 'Origins of the Great Inflation'", Christina D. Romer, Federal Reserve Bank of St. Louis Review 87, March/April 2005.

12 For both regions as a whole, the cyclically-adjusted budget balance is expected to improve in 2021.

new public investments (in particular to combat climate change), the political consensus can shift towards larger deficit-funded public spending than was the norm in recent decades.

7. Conclusion

While the Covid-19 pandemic has resulted in unusually large global money supply growth, the acceleration in monetary aggregates remains uneven across countries, and recent history shows that in AEs and also in several EMs, the growth rate in the money supply is a poor predictor of future inflation. The flattening of the Phillips curve, the focus of central banks on anchoring inflation expectations, and the mix of market liquidity and financial innovation – which can exacerbate shifts in money velocity – probably all contributed to the decoupling between money growth and inflation.

As long as the surge in money supply reflects one-off fiscal transfers rather than strong private-sector borrowing appetite and lax lending standards, it need not result in higher inflation than central banks are prepared to tolerate. Nevertheless, if political pressure results in ongoing loose fiscal policies even after output gaps have closed, and if central banks refrain from pre-emptive tightening in the belief that inflation will remain unresponsive to both real economic and money demand shocks (as in recent decades), then strong money growth could ultimately result in sustained higher inflation.

OBEN 2101* – June 2021

Drivers of medium term growth

Josina Solomons, Kerschyl Singh and Jean-Francois Mercier

Abstract

Global long-run potential growth has been on a declining trend in recent years. Covid-19 and the measures undertaken to contain it may have exacerbated this trend. Emerging markets have not been immune to productivity slowdowns, and growth prospects seem particularly challenging over the medium to long term. Five-year ahead growth prospects in emerging market countries are forecast to decline, from roughly 7% in 2008, to 4.4% currently. Long-term drivers of EM productivity have also been declining and could drop even further over the coming decade. Over the last five years, labour productivity growth slowed in emerging market economies to 3.5%, from 4.1% during the period 2000-2009. Lower emerging market productivity could translate into weaker exchange rates and higher inflation over the medium term.

1. Introduction

The Covid-19 pandemic and the measures undertaken to contain it have resulted in the worst global recession on record. Even as the world economy recovers, there remain concerns that the damage from these Covid-related restrictions to the global economy could be long lasting. In this note, we will assess how the pandemic has affected global growth prospects, with particular focus on countries' ability to generate economic growth over the medium to longer term. We will specifically explore drivers of emerging market productivity growth and the likely impact on monetary policy.

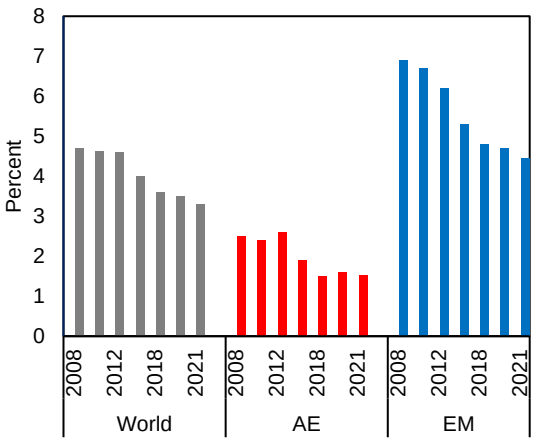
Our analysis finds that global potential growth has been on a declining trend since the global financial crisis. Covid-19 and the containment thereof may have exacerbated this trend. Emerging market (EM) growth prospects seem particularly challenging over the medium to longer term. Prospects for lower EM productivity growth risk translating into weaker exchange rates and higher inflation over the medium term.

2. The impact of the pandemic on global growth prospects

Covid-19 hit the global economy at a time when long-term global growth prospects were already falling. The last decade saw a steady decline that intensified following the 2008-2009 global financial crisis. A simple way to measure medium-term growth prospects is to look at the evolution of the five-year ahead forecasts produced by the International Monetary Fund (IMF).

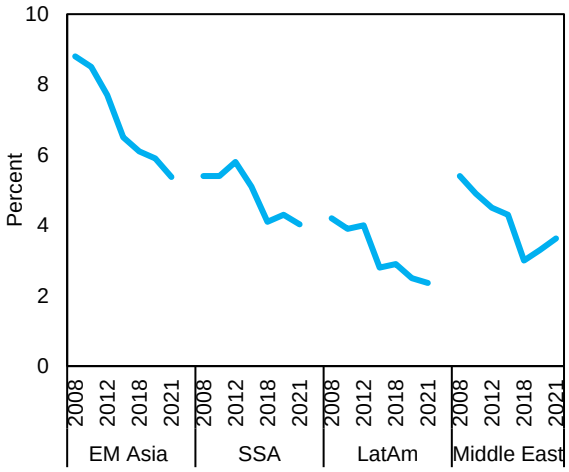
For the world as a whole, the IMF's medium-term growth prospects fell from around 4.7% in 2008 to 3.3% in 2021.[1] Advanced economy growth prospects fell 1 percentage point, from around 2.5% in 2008 to 1.5% currently. But, growth in EM countries is forecast to decline by 2.5 percentage points, from nearly 7% in 2008 to 4.4% currently. While most EM regions experienced declining growth prospects, downward revisions have been particularly large across EM Asia (Figure 2).

Figure 1: Five-year ahead real GDP forecasts



Source: IMF

Figure 2: EM 5-year growth forecasts



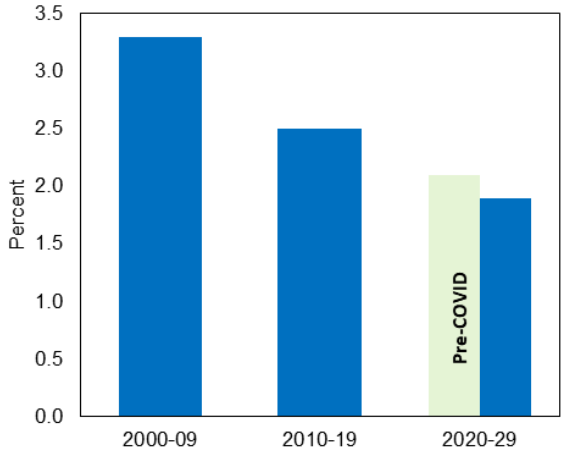
Source: IMF

There is also rising concern that the pandemic will exacerbate the slowdown in global potential growth. According to the World Bank (WB), the decade leading up to pandemic was marked by structural weaknesses that weighed on global potential growth[2]. The WB estimates that global potential output growth declined from around 3.3% during the 2000s to around 2.5% during 2010 to 2019, and expects a further decline to 2.1% for the decade 2020 to 2029 (Figure 3). The WB now projects that the pandemic will erase a further 0.2 percentage points off annual global potential growth over the coming decade, taking it to 1.9%. For EMs it is an additional 0.6 percentage points lower (Figure 4).

1 IMF's World Economic Outlook for April 2021.

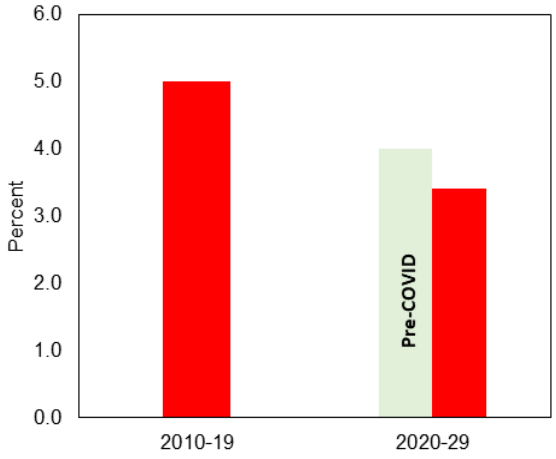
2 World Bank, Global Economic Prospects, January 2021.

Figure 3: Global potential growth estimates



Source: World Bank

Figure 4: EM potential growth estimates



Source: Worldbank

3. Productivity growth

The major contributor to declining potential growth over the last decade has been a trend decline in productivity growth[3]. By 2018, labour productivity growth had slowed in both advanced and emerging market economies to 0.7% and 3.5%[4], respectively, from 1.0% and 4.1% during the period 2000-2009[5] (Figure 5). While there has been a synchronised drop in global productivity growth, declines appear to have been particularly large across EMs.[6]

As the literature suggests, differences in productivity are key to the income gaps between richer and poorer economies.[7] Although EMs have been playing catch-up over the last few decades, EMs still have a long way to go. Furthermore, progress is uneven – there are still wide income gaps across our sample of EM countries – and in some cases, this has stalled or reversed. Perhaps unsurprisingly, the peak in EM productivity growth after the GFC coincided with the peak in income per capita in most emerging markets (Figure 6). In addition, the pandemic has erased most of the gains in per capita incomes from recent years. The IMF predicts that per capita incomes in some EMs will only return to pre-pandemic levels in about five years' time.

3 Productivity is generally pro-cyclical. This means that during recessions productivity usually drops, while productivity is positive when economic growth is positive. To assess productivity growth over the short term can be misleading. It is more useful to look at multi-year longer-term productivity growth.

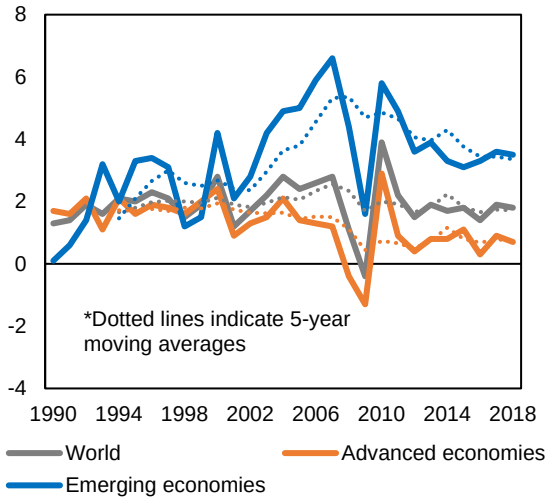
4 These are calculated as 5-year rolling averages.

5 In our analysis, labour productivity is defined as output per worker.

6 This was in contrast to the previous decade, when productivity was generally still accelerating in large EMs.

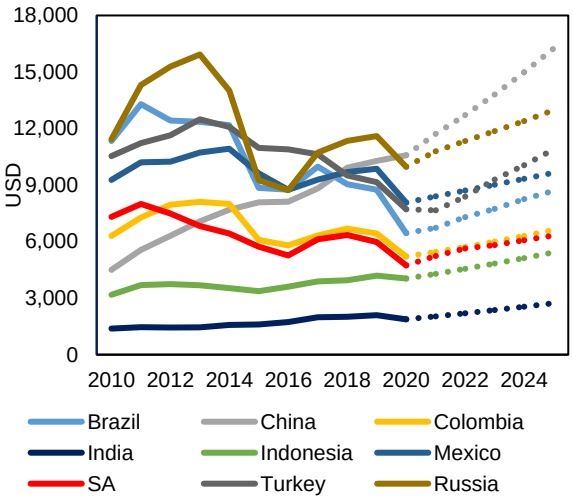
7 Hall, R., and Jones, C., 1999, "*Why Do Some Countries Produce So Much More Output per Worker than Others?*" Quarterly Journal of Economics 114, no. 1: 83–116.

Figure 5: Productivity growth



Source: Penn World Tables, World Bank

Figure 6: Per capita incomes



Source: IMF

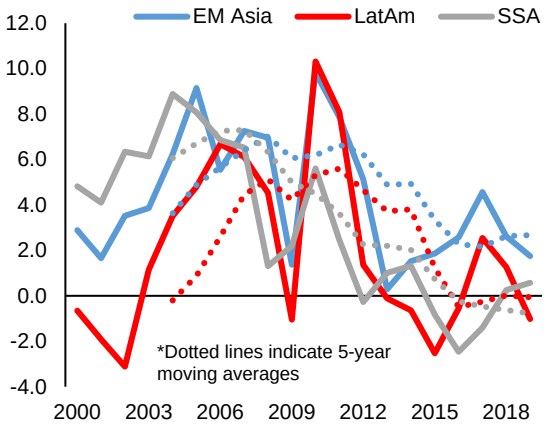
The World Bank estimates the impact of the Covid-19 pandemic on productivity to be much worse than previous epidemics, mainly because of its global reach and the unprecedented social distancing and containment measures put in place to slow the spread of the virus. Whereas previous epidemics such as SARS, Ebola and Zika lowered productivity (in affected countries) by around 4 per cent three years after the initial shock, the Covid-19 pandemic is estimated to have a significantly worse impact on productivity of up to 9 per cent over a period of three years.

4. What explains the differences across EM productivity?

When looking at the productivity performance across a number of EM regions, we find a fairly similar pattern emerging, with productivity increasing sharply during the 2000s, up to the GFC, and declining thereafter (Figure 7). In a recent study by the World Bank, the authors decomposed EM productivity growth into three components: Capital deepening, human capital and total factor productivity[8] (Figure 8). During the EM productivity boom period of 2003 and 2008, both capital deepening as well as total factor productivity were major contributors to productivity growth. Subsequently, during the downtrend, both factors have contributed to the slowdown. Interestingly though, the contributions from human capital have been fairly stable over both decades.

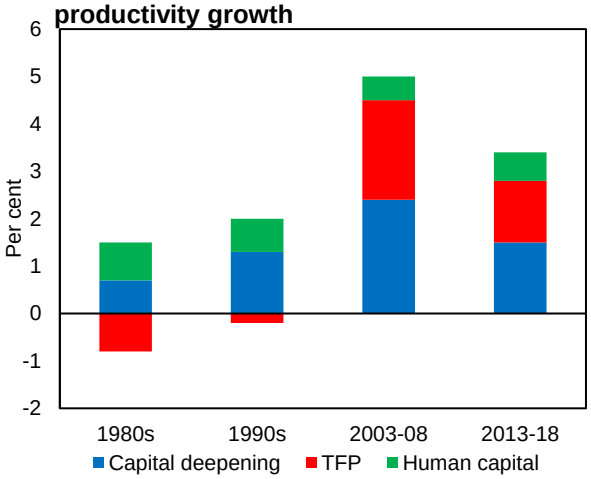
[8] Dieppe, A., June 2020, "*Chapter 1: Global productivity trends*", World Bank Global productivity book.

Figure 7: Productivity across EM regions



Source: World Penn tables

Figure 8: Contributions to productivity growth

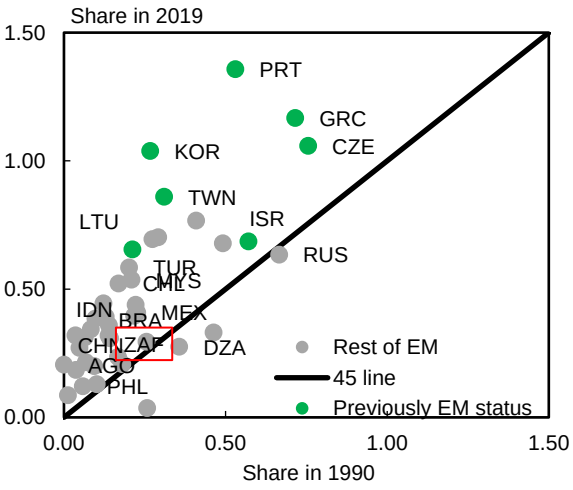


Source: World Bank

We now assess the gap between emerging market productivity and that of advanced economies. In particular, we compare productivity levels relative to the US in both 1990 and 2019 for three categories: physical and human capital as well as total factor productivity. Successful economies – that graduated from emerging to advanced economy status -- are highlighted in green. These include South Korea, where income per capita more than doubled from around 32% of US levels to 67%.

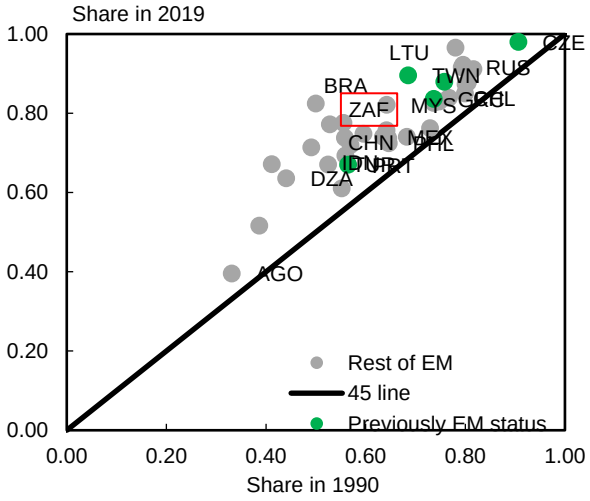
Since 1990, most countries – but especially the successful ones – have seen convergence in relative levels of physical capital (Figure 9). The average stock of capital per capita rose from 19% of the United States' in 1990 to 36% in 2019. In 37 economies, the share increased; it declined in only four. Convergence has been more muted with respect to human capital, though initial 1990 levels were not that low to start with (Figure 10). With respect to TFP, the performance has been more disappointing: Thus, most EMs have accumulated more productive capacities in past decades, but this has not always translated into more efficient use of factors of production (Figure 11).

Figure 9: Physical/capital stock per capita relative to US



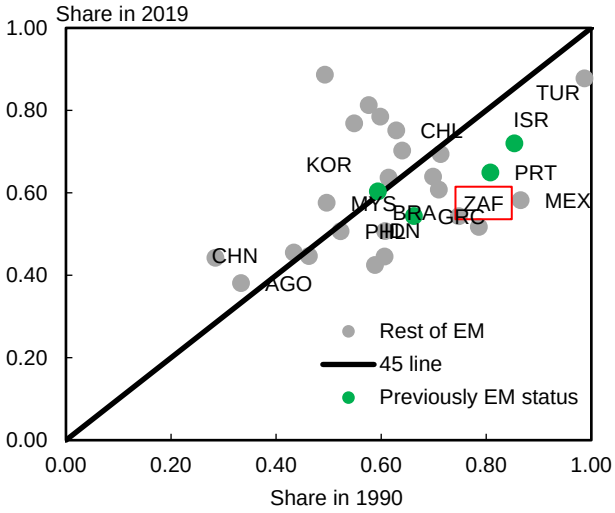
Source: Penn World Tables

Figure 10: Human capital relative to US



Source: Penn World Tables

Figure 11: Total factor productivity relative to US



Source: Penn World Tables

Relative to other EMs, South Africa appears to lag behind in the measure of total factor productivity and is fairly muted in physical capital accumulation. For EMs as a whole, it would appear that factors such as capital deepening, human capital, innovation and health have partially improved towards advanced economy standards, whereas factors such as trade complexity and FDI still require some improvement.

Table 1: Recent developments in EM productivity

	Driver	Are EMs approaching AEs?	How does SA compare?
Sources	Capital deepening Human capital Innovation Health		
Supporting environment	Institutions Macroeconomic stability		
Market development	Trade complexity FDI		

Yes	Partially	Stalled	No

Source: World Bank Group, own estimations

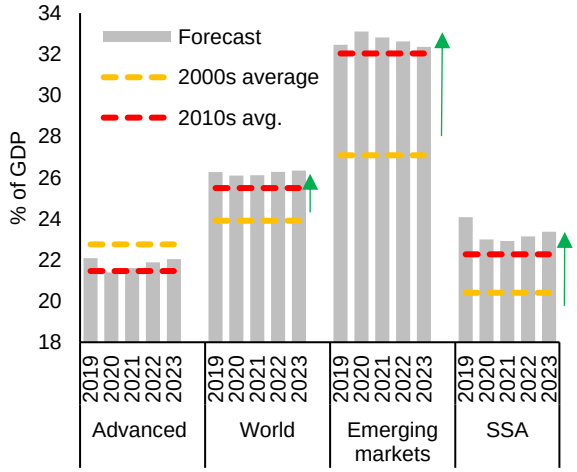
5. Divers of EM productivity: Capital deepening

We now turn our attention to the different drivers of EM productivity growth and assess whether the pandemic's containment measures worsened future prospects of these factors. Capital deepening has been a major contributor of weaker EM productivity growth in recent years. While investment in advanced economies has been on a declining trend relative to GDP for more than a decade, EM investment rose sharply during the 2000s and early 2010s. However, it has also started to slow in recent years, mostly reflecting declining capital accumulation in China, which implemented a rebalancing strategy from investment to consumption. Consequently, investment growth in EMs fell to 2.5% in 2019, from a peak of

10.8% in 2010. Total EM investment collapsed in 2020 and is expected to remain fairly muted over the medium term. Some investments have also been postponed or even cancelled due to heightened uncertainty over the Covid-19 pandemic.

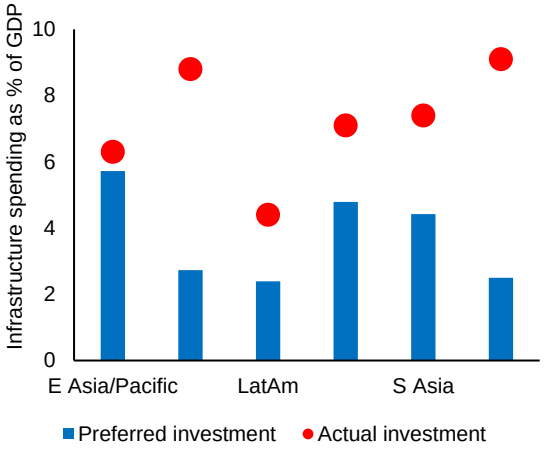
Furthermore, current investment levels may fall short of future needs, especially in infrastructure. A study conducted by the World Bank compares actual (current) infrastructure spending to an estimate of preferred spending needs for 2015–30. It shows that all EM regions are currently spending at sub-optimal levels. The region with the largest infrastructure deficit relative to future needs appears to be SSA.

Figure 12: Investment share of the economy



Source: IMF

Figure 13: Infrastructure gaps



Source: Rozenberg, 2019

6. Human capital

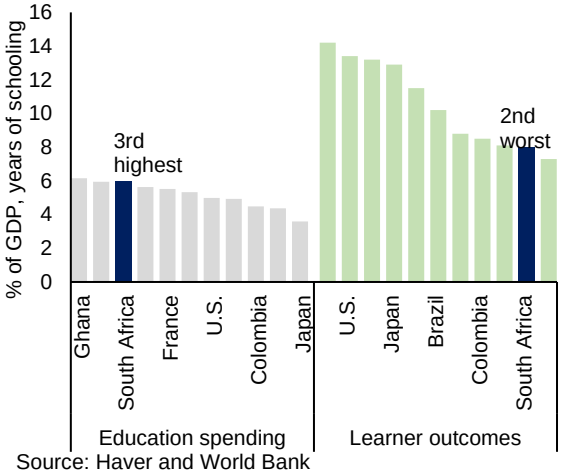
Another key component of productivity is human capital. Education remains a critical driver of productivity growth. Better educated, well-trained, and experienced workers tend to be more productive[9]. Over the last 60 years there has been major improvements in human capital investment through primary and secondary education. Average years of schooling in EMs increased substantially, from 3.5 to 8.6 years. However, a number of EMs and low income countries have spent a significant amount on education, but it has not necessarily translated into better learner outcomes (as measured by average years at school)[10].

Major progress has also been made in education across EMs, but the gap with advanced economies is still wide. While the gap between EMs and AEs in the provision of secondary education have narrowed steadily, that for tertiary education has widened over the last 60 years as tertiary education expanded faster in AEs (Figure 15).

9 Fox J., Smeets V., 2011, "*Does input quality drive measured differences in firm productivity*?", International Economic Review, issue 4, pages 961-989.

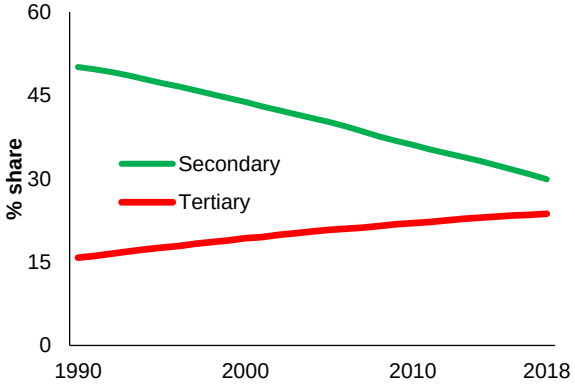
10 Average years of schooling is not necessarily a guarantee of a successful education system. For instance, the PIRLS literacy and TIMMS numeracy studies show widespread performances across countries amid students in the same grade.

Figure 14: Education: Spending vs Outcomes



Source: Haver and World Bank

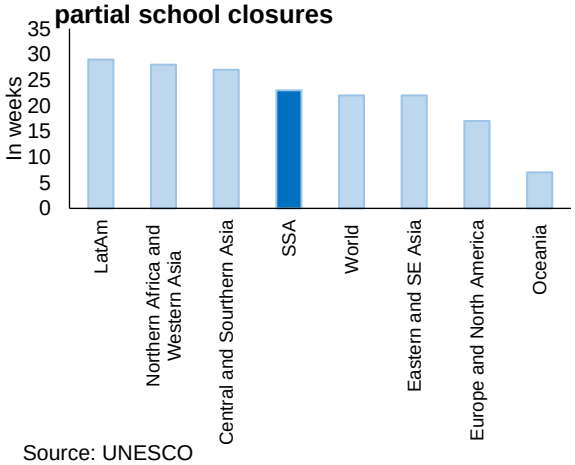
Figure 15: Differences in education shares between AE and EMs



The samples include 26 advanced economies and 82 EMs
Source: Wittgenstein Center for Demography and Global Human Capital; World Bank.

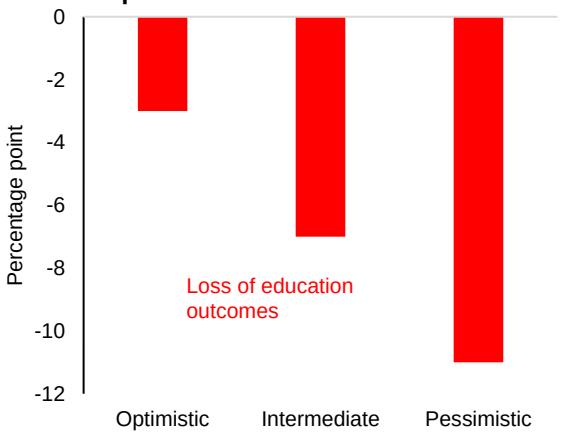
The measures to curb the pandemic are also expected to have weakened progress in human capital development. School closures probably reduced the learning-adjusted years of education across EM regions by roughly a third of a full year[11]. During the pandemic, regions with generally lower productivity, have also experienced longer school closures (Figure 16). For instance, in Sub-Saharan Africa schools were closed for around 23 weeks at the height of the pandemic. This is likely to translate into a seven percentage point decline in learner outcomes. There are also views that deskilling due to prolonged unemployment, could likely lower future earnings and dent human capital. [12]

Figure 16: Duration of complete and partial school closures



Source: UNESCO

Figure 17 : Potential Covid-19 impact on outcomes



11 World Bank, Global Economic Prospects, January 2021.

12 This World Bank 2020 study translates the impact on education outcomes based on three scenarios (Optimistic, Intermediate and Pessimistic) of school closures. For instance, in SSA schools were closed for around 23 weeks, which makes the region fall into the WB's intermediate scenario, which translates into a 7 percentage point decline in learner outcomes.

7. Innovation

Total factor productivity (TFP) typically includes all the gains in productivity that are not accounted for by either capital deepening or improved labour quality. It more or less captures productivity gains from innovation, and a country's ability to make use of advanced technologies. The literature tends to find a positive relationship between productivity and innovation[13].

Measures of innovation are typically lower in EMs than in advanced economies. Unesco publishes a survey on innovation trends across countries. The latest one was conducted in 2018. The survey looks at three types of innovations that manufacturing firms typically implement, namely: product, process and marketing innovators. Product innovation refers to a good or service that is new or improved in either technical specifications or software enhancement. Process or marketing innovators, on the other hand, refer to changes in techniques, design or packaging of a good. Hence, product innovation which generally requires technological advances, appears to be the least prominent type of innovation in most EM economies. Meanwhile AEs mostly make use of high-tech innovations.

Figure 18: Product innovators

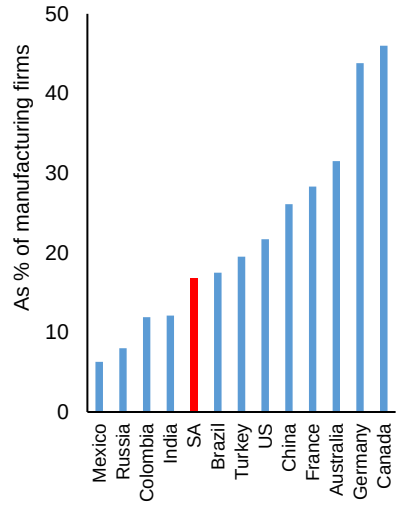


Figure 19: Process innovators

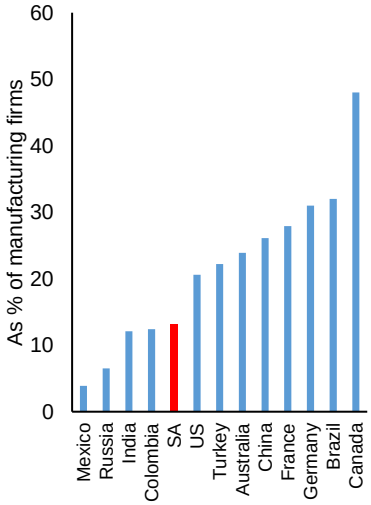
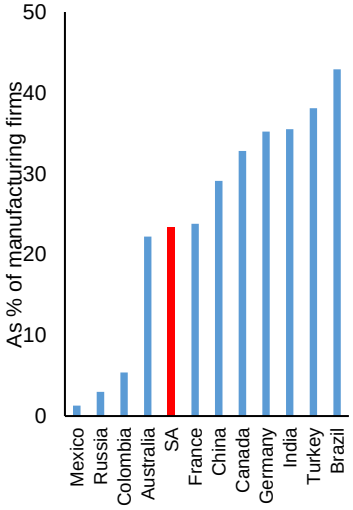


Figure 20: Marketing innovators

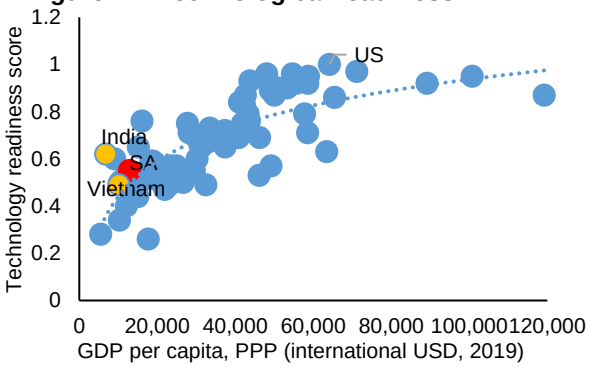


Source: Unesco

Technological innovation is generally expected to boost labour productivity and output. UNCTAD recently published a survey that determines a country's technological readiness for advanced technologies such as artificial intelligence and robotics. The study developed a readiness index, which looks at five different areas of technological readiness. The higher the score, the more ready a country is to make use of advanced technologies. High income countries tend to be more technologically ready, while low income countries lag behind (Figure 21) albeit with significant outliers like Vietnam and India.

[13] Hall, B. H., J. Mairesse, and P. Mohnen. 2010. "Measuring the Returns to R&D." In Handbook of the Economics of Innovation.

Figure 21: Technological readiness



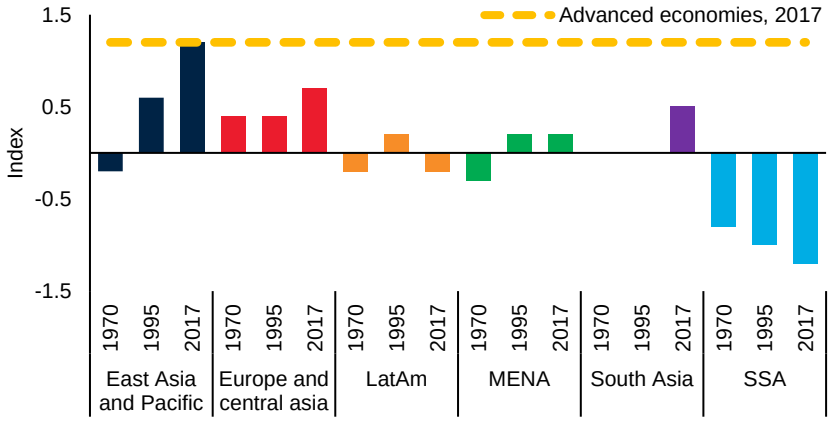
The pandemic is expected to have had significant negative effects on innovation and technological advances as it delayed or even cancelled investments in new technologies. The disruption of global value chains may have also impeded the creation of new technologies, including by weakening property rights, reducing research and development investment and increasing costs of doing business[14]. Meanwhile, the containment measures that were adopted to limit the spread of the virus sharply reduced trade and to some extent limited the transmission of innovation. However, to some degree the pandemic could encourage investment in new and more technologically advanced capital, such as robotics and other digital technologies such as artificial intelligence.

8. Economic complexity

Another identified potential driver of productivity growth is a country's economic complexity. Hidalgo and Hausmann (2009) calculated an economic complexity index that increases with the complexity of a country's exports. Complexity reflects diversification and production capabilities, and may be linked with higher productivity or greater scope for future growth[15]. EMs generally remain behind advanced economies in the complexity of their exports, but with significant regional variation. Complexity in the East Asia Pacific region is now close to advanced economy levels, while other regions remain significantly behind. Complexity in the Sub-Saharan Africa region has been declining since the 1970s and has moved further into negative territory over time (Figure 19).

14 World Bank Group, "*How do epidemics affect productivity*?", June 2020.
15 Jarreau J., Poncet S., 2012, "*Export sophistication and economic growth: Evidence from China*", Journal of Development Economics, issue 2, pages 281-292.

Figure 22: Economic complexity by region



Source: Hidalgo and Hausmann (2009) "The building blocks of economic complexity"

Disruptions to global supply chains from the COVID-19 pandemic is likely to have slowed investment in export-intensive sectors. These factors may have further impeded technological progress in EMs and particularly low income countries such as SSA.

9. Impact on monetary policy

Based on our findings, it would appear as though EM productivity could remain fairly muted over the coming decade, with persistent divergences across regions and countries. What then could this environment of expected low productivity growth mean for monetary policy in EMs over the coming years? In this section, we assess the likely impact of low productivity on real effective exchange rates, inflation and real policy rates for a group of emerging markets.

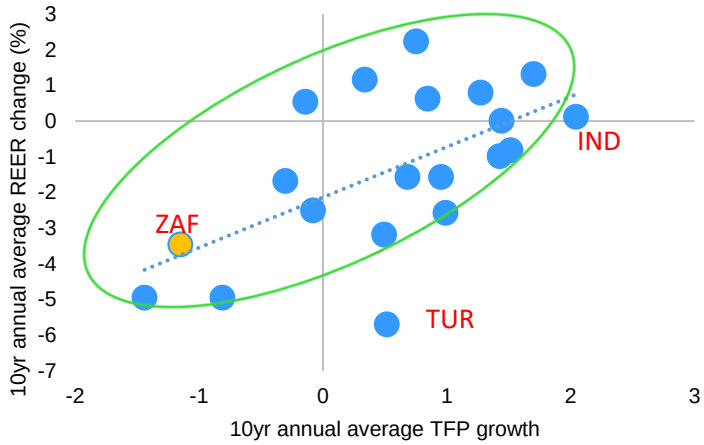
10. Productivity and exchange rate

Loko and Tukladhar (2005) argue that higher productivity growth will translate into an appreciation of the real exchange rate[16]. Here we look at a group of emerging market countries[17], and the data seem to confirm a positive correlation between medium-term productivity and a country's trend REER. Countries with high productivity growth appear to have improved currency performance. Turkey appears the key outlier – displaying trend REER depreciation despite positive TFP growth – though policy instability and financial vulnerabilities probably largely explain this discrepancy.

16 Loko B., Tukladhar A., 2005, " *Labour productivity and real exchange rate*" IMF Working Paper series No.05/113.

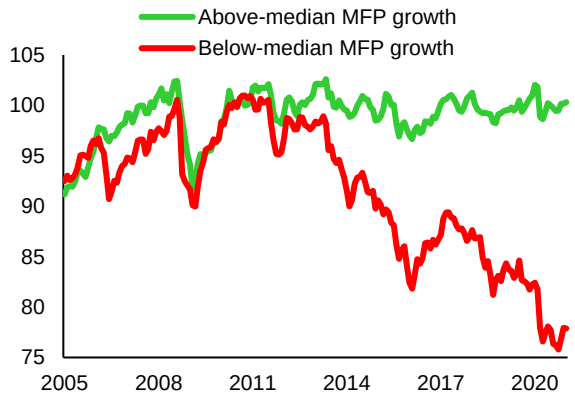
17 Sample of emerging market countries include: Argentina, Brazil, Chile, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey.

Figure 23: Positive correlation REER-TFP growth



Moreover, in comparing productivity growth with REER performance over time, we selected two subgroups from our EM sample, those countries where TFP growth was below or above the sample median, respectively. We then calculated the average REER for each sub-group, and our calculations show a clear under-performance of the "below median" group. Hence, countries with weaker productivity growth, typically have weaker exchange rates.

Figure 24: Average REER trends in high and low-MFP growth countries



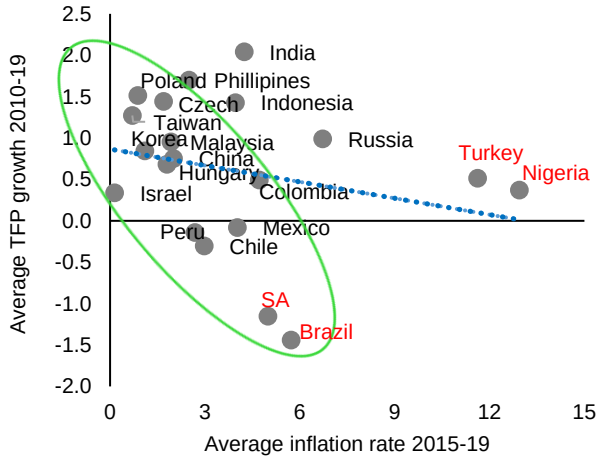
11. Productivity and inflation

Generally, one might expect an inverse relationship between inflation and productivity, because lower labour productivity would raise business costs for a while, as firms face higher unit labour costs. Firms in turn raise prices to offset the squeeze on their profits. Whereas in the long run workers accept lower wage growth to compensate for lower productivity growth, in the short to medium term however, there is upward pressure on inflation.[18]

[18] The poorer performance of real exchange rates would also add to inflationary pressure in lower-productivity countries.

In trying to assess whether the relationship holds for EMs, we compare the change in average inflation from 2005-09 to 2015-2019 with productivity growth for a group of EMs. On balance the relationship looks negative as one would expect, insofar as countries with higher average TFP growth have lower and/or faster-declining inflation. The relationship is even stronger if one excludes the likes of Turkey and Nigeria, which enjoy positive TFP growth, but for other reasons, poor inflation performance.

Figure 25: TFP growth and inflation



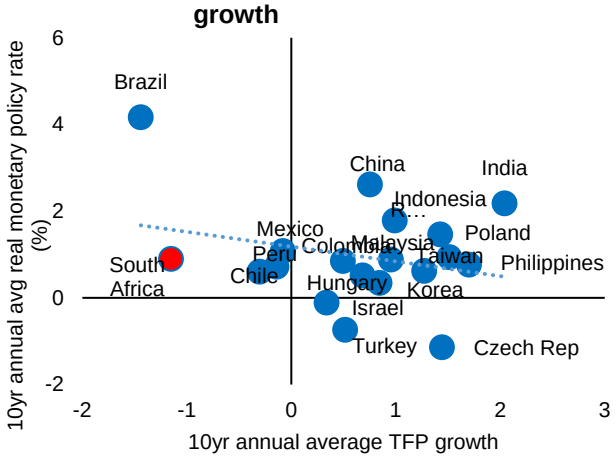
12. Productivity and real policy rates

The literature suggests that a positive relationship exists between productivity and real interest rates[19]. In our sample of EM countries however, there appears to be no clear correlation between the two, which is no surprise. On the one hand, high productivity growth normally means a dynamic, fast-growing economy, which would coincide with a higher neutral real rate (NRIR).[20] But at the same time, a dynamic economy generally means better credit ratings, which tend to depress the risk premium on a country's assets, so in a world of open capital flows this would lower the NRIR. We therefore see no strong argument for a relationship between the two, with unique country characteristics likely to prevail, such that for some countries the risk premium would matter more, whereas for others (for example, relatively closed economies with low debt and external surpluses) it might not even matter.

19 The positive relationship between productivity growth and real interest rates can be found in the Ramsey (1928) model of saving and investment. The intuition for the Ramsey model is as follows. When productivity growth is low, households suspect that their future income may be lower than their present income. Thus, households save more today in order to supplement low incomes in the future, smoothing out consumption. This high level of desired savings provides more funds to firms for investment. Because firms normally invest in their most profitable projects first, these additional funds allow firms to invest in less profitable projects, which lowers the interest rate that can be paid. Hence, low productivity growth leads to low interest rates.

20 This argument was first laid out by Wicksell in *Interest and Prices* (1898).

Figure 26: Real policy rate vs. TFP growth



Source: Haver and Penn World Tables

13. Conclusion

Emerging market productivity growth has been on a trend decline in recent years. The pandemic probably exacerbated this downtrend and EM growth could thus slow further over the medium to long term. The pandemic and resulting containment measures are expected to negatively impact productivity over the coming years, as lower investment, reduced progress in human development and declining investment in technological advancement could potentially weigh on EM productivity growth. Intra-EM performance is likely to vary significantly, but some countries with low productivity growth could experience weaker exchange rates and higher inflation over the medium term.