To zero and beyond? Estimating South Africa's structural trade balance – January 2017

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Abstract

The South African trade balance has improved significantly over the last three years from a 2.1 per cent of GDP deficit in 2013 to an estimated 0 per cent in 2016. According to the model developed in this note, roughly three-quarters of this improvement is cyclical and one quarter structural. If the export and import drivers were at their equilibrium (or structural) levels in 2016, the trade balance would have been -1,3 per cent of GDP – instead of the estimated 0 per cent. The trade balance could therefore deteriorate again should export and import values return to their trend values.

Introduction[1]

South Africa's trade balance has improved substantially over the past three years, from -2,1 per cent of GDP in 2013 to an estimated 0 per cent of GDP in 2016[2]. Should this trend continue, South Africa might be on the way to realising the kinds of trade balances obtained in the early 2000s, around 3½ per cent of GDP, which then closed the current account deficit entirely.

However, the improvements in the trade balance appear to have been largely of a cyclical nature. As these trade account drivers such as global and domestic demand, commodity prices, REER, etc. return to their trend values, our modelling suggests that the trade balance will deteriorate.

More precisely, the estimated model suggests that when the export and import drivers are at their trend (or equilibrium/structural) levels, the structural trade balance would have been -1,3 per cent of GDP in 2016, compared to an actual outcome of 0 per cent (Table 1). Put differently, the actual 2016 trade balance (0 per cent) was above the structural level (-1,3 per cent) due to favourable cyclical factors, as cyclical imports in nominal terms (largely due to cyclically weak oil prices) were more depressed than cyclical exports.

1 The authors are indebted to David Fowkes and Theresa Alton for useful comments and editing suggestions.

2 2016 refers to the average for the first three quarters of the year, unless otherwise indicated.

Table 1: Trade balance (as % of GDP)

Year	Actual	Structural	Cyclical
	A = (S+C)	S	C
2007	-0.9	2.2	-3.0
2008	-0.6	1.4	-2.1
2009	1.1	0.6	0.6
2010	2.2	-0.4	2.6
2011	1.6	-1.1	2.8
2012	-1.1	-1.6	0.4
2013	-2.1	-1.6	-0.4
2014	-1.7	-1.5	-0.2
2015	-0.9	-1.3	0.5
2016	-0.0	-1.3	1.2

Note: Totals may not add up due to rounding

Methodology

In order to distinguish the structural and cyclical components of the trade balance, we employ a three-step methodology.

First, we estimate equations for merchandise export volumes and prices and do the same for merchandise import volumes and prices over the 1996–2016 period. The equations are depicted in Appendix A. From the equations we identify the following drivers:

- Merchandise exports volumes = f(REER, world import volumes, availability of electricity[3])
- Merchandise exports prices = f(Commodity prices, world PPI, Rand/US$, NEER[4])
- Merchandise imports volumes = f(Real GDP, REER, output gap, trend variable)
- Merchandise imports prices = f(Oil price, world PPI, Rand/US$, NEER)

In the *second* step, we identify equilibrium (or structural) values for each of the drivers (such as commodity prices and the output gap). These are obtained by fitting an HP filter through the data[5] – an approach similar to how Macro Models define potential GDP[6] (or structural GDP). Although this method is not unproblematic, it provides for a consistent assessment of all the structural drivers. Another benefit is that an HP filter (mostly) ensures that the average cyclical component over the long run is zero[7]. Although it is easy to criticize this approach, it would be difficult to suggest an alternative method/specification that can be consistently applied across all the structural drivers, still resulting in a cyclical component that has a zero mean over the cycle.

In the *third* step, these values are used to calculate overall structural values for merchandise import and export volumes and prices. For each variable the cyclical component is calculated as the

3 Electricity availability is defined as electricity output divided by GDP (at basic prices) and suggests that when electricity output rises at a faster pace than total GDP, exports would increase and *vice versa*.

4 Commodity and oil prices are converted to rand using the Rand/US$ exchange rate, whilst the world PPI is converted to rand using the NEER.

5 End point problem of HP filter (partly) overcome by extending the out-of-sample series with growth rates recorded over the 2010 to 2015 period.

6 Our HP methodology suggests an output gap of +0,3 per cent and -0,7 per cent for 2015 and 2016 respectively.

difference between actual and structural values. For example, import prices might be said to be cyclically low if oil prices, world PPI and the NEER are below their HP-filter trend.

After completing the three steps it is possible to calculate both the cyclical and structural trade balance, reflecting the difference between the respective nominal merchandise export and import values. Likewise, it is possible to derive the cyclical and structural merchandise terms of trade.

Structural trade balance and terms of trade

The merchandise trade balance improved from -2,1 per cent in 2013 to an estimated 0 per cent in 2016 (Figure B1). Our model shows that a large part of this improvement was cyclical (Figure B2). The structural trade balance improved by 0,4 per cent of GDP, helped in particular by structurally better terms of trade (Figures T1 and T2). Yet this structural balance nonetheless remained negative at -1,3 per cent of GDP. The remainder of the trade account adjustment, to an actual trade balance of 0 per cent, reflected cyclical factors.

Figure B1: Trade balance

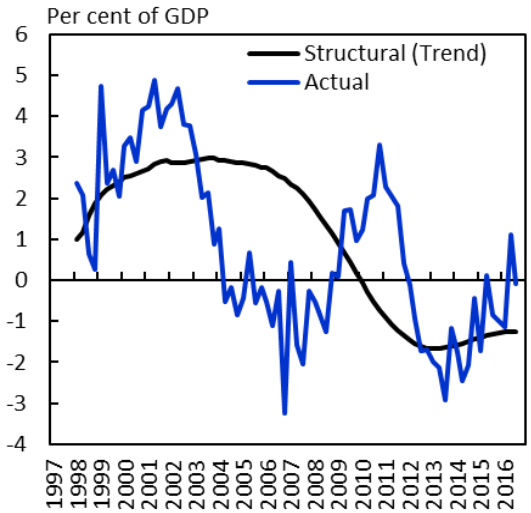


Figure B2: Trade balance

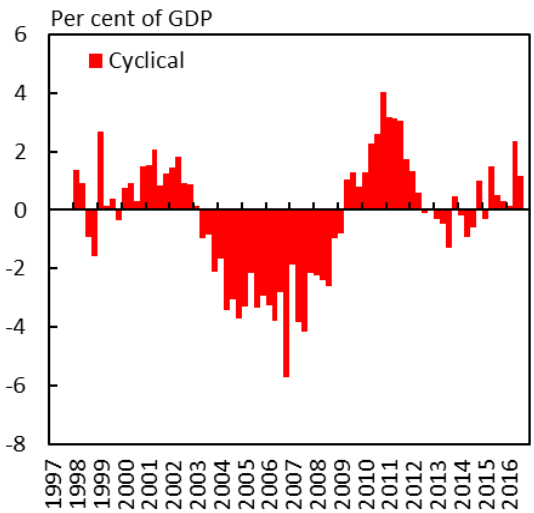


Figure T1: Merchandise terms of trade

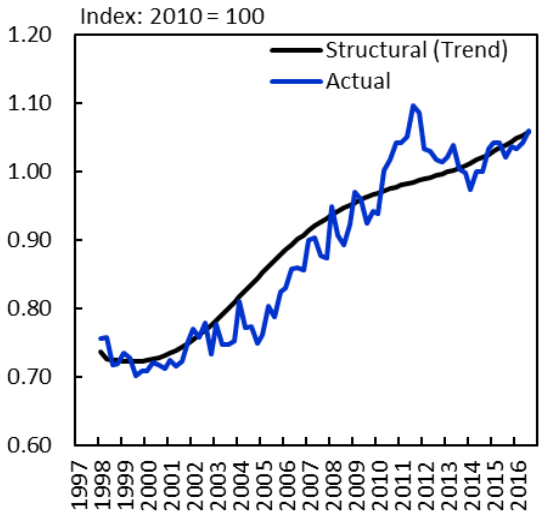
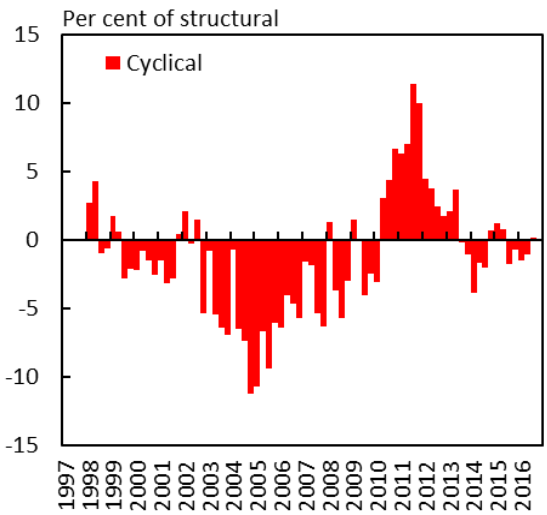


Figure T2: Merchanise terms of trade



In the following two sections we analyse the structural drivers of the trade balance in more detail, by examining the drivers of nominal merchandise exports and imports.

Structural nominal merchandise exports

As indicated earlier, structural nominal merchandise exports are derived from export volumes and prices. In 2016 export volumes were above structural levels, mainly because of a below equilibrium REER. However, export prices were significantly below equilibrium, largely due to US$ commodity prices being cyclically weak. As a result, the overall impact on nominal merchandise exports in 2016 was only marginally negative (Figures E1 and E2).

Figure E1: Nominal merchandise exports

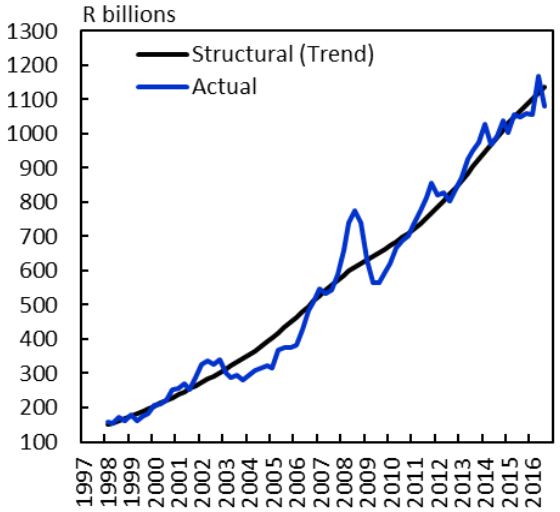
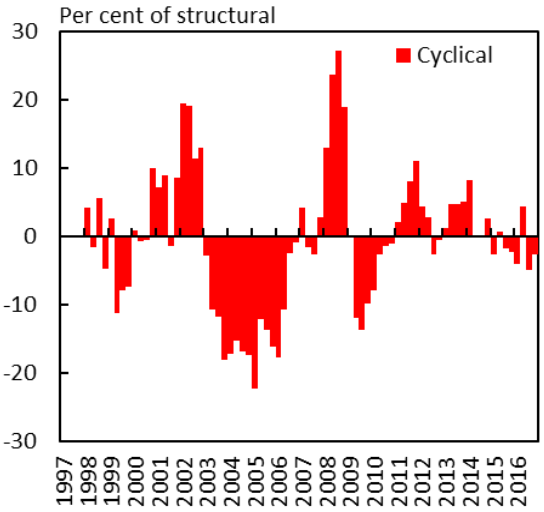


Figure E2: Nominal merchandise exports



Next, we examine the drivers of structural merchandise export volumes and prices in more detail.

Structural merchandise export volumes

The estimated equation for merchandise export volumes (Appendix A, equation 1) suggests that the structural level is a function of the REER, world import volumes and the availability of electricity. Merchandise export volumes were almost 3 per cent above equilibrium levels in 2016 (Appendix E, Figures E(i) and E(ii)), mainly due to a below equilibrium REER (Appendix E, Figures E(iii) and E(iv)).[8] This was partly offset by world import volumes and the electricity availability indicator being slightly below equilibrium levels (Appendix E, Figures E(v) to E(viii)).

Figures E(v) and (vi) indicate that global import volumes (a proxy for South Africa's export demand) appear to have slowed from pre-crisis growth rates to a slower trend rate. But the post-2010 growth rate is probably reflective of the "new normal" trend – as captured by the HP filter. Consequently, based on this "new normal" HP derived trend, global import volumes were only marginally below equilibrium (i.e. HP filter trend) during 2016.

The other interesting driver of merchandise export volumes was the availability of electricity (Figures E(vii) and E(viii)). We were surprised how significant this variable was. This inspires confidence for higher structural export levels going forward because as additional electricity generation plants are put into use, export volumes should rise significantly. However, thus far, electricity output remains subdued.

[8] In the case of the REER, the HP filter has a slightly negative mean over the cycle, whereas for all other variables the mean is zero. This may indicate that the (HP determined) equilibrium value of the REER is slightly overestimated and that the structural value of the rand might be weaker. If that was indeed the case, the cyclical real export component could be even larger.

Structural merchandise export prices

Merchandise export prices were estimated as a function of commodity prices and the global PPI (both indices converted to rand) (see Appendix A, equation 2). The cyclically weak export prices during 2016 (Appendix EP, Figures EP(i) and EP(ii)) were principally a result of commodity prices being below equilibrium, but also to some extent due to the global PPI currently being cyclically suppressed (Appendix EP, Figures EP(iii) to EP(vi)). This was partly offset by the weak rand (contributing to cyclically strong outcomes)(Appendix EP, Figures EP(vii) and EP(viii)).

Structural merchandise imports

As with merchandise exports, imports are derived from volumes and prices. Both factors contributed to below-trend imports in 2016. Import prices were significantly below equilibrium, largely due to US$ oil prices being cyclically weak. Meanwhile, import volumes were slightly below structural levels, mainly because of the cyclically weak REER and the negative output gap. (Figures M1 and M2).

Figure M1: Nominal merchandise imports

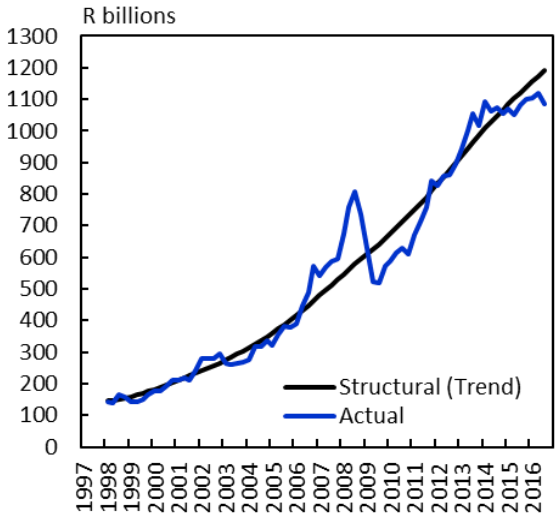
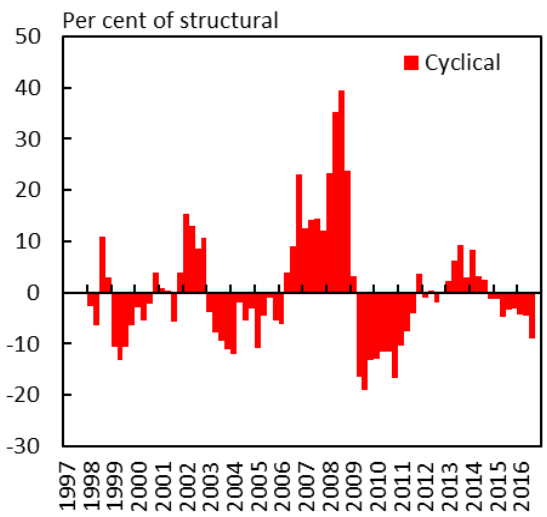


Figure M2: Nominal merchandise imports



We now investigate the drivers of structural merchandise import volumes and prices in more detail.

Structural merchandise import volumes

The estimated equation for merchandise import volumes (Appendix A, equation 3) suggests that the structural level is a function of real GDP[9], the REER, the output gap, and a trend variable.

Merchandise import volumes were slightly (-2,6 per cent) below equilibrium levels in 2016 (Appendix M, Figures M(i) and (ii)). This was largely driven by a below equilibrium REER as well as the negative output gap (Appendix M, Figures M(iii) to (vi)).

Note that our structural and cyclical outcomes for 2016 are based on a potential growth rate of 1,2 per cent and therefore an output gap of -0,7 per cent. Should potential growth be higher and the output gap be more negative, the cyclical import component will be even more negative – resulting in an even larger positive cyclical trade balance than the calculated 1,2 per cent in 2016. The opposite would be true if potential growth is lower, resulting in a smaller cyclical trade balance component.

[9] This is a proxy for domestic demand. We opted for GDP instead of GDE as the former also includes (intermediate) exports.

Structural merchandise import prices

Merchandise import prices were estimated as a function of oil prices and the global PPI (both indices originally in US$ but converted to rand) (See Appendix A, equation 4). The cyclical weakness of import prices during 2016 (Appendix MP, Figures MP(i) and MP(ii)) was principally a result of oil prices being below equilibrium, but also to some extent due to the global PPI currently being cyclically subdued (Appendix MP, Figures MP(iii) to (vi)). This was partly offset by the weak rand (contributing to cyclically strong outcomes)(Appendix MP, Figures MP(vii) and MP(viii)).

The big uncertainty here – and where most criticism might be due – is the structural oil price. The HP filter suggests a "structural" oil price of US$57/barrel in 2016. It would be easy to motivate lower values based on (more recent) structural changes (e.g. shale gas) in the oil market – which would be unknown to the HP filter (probably not even fully accounted for with our guidance of 2010–2016 trends for the out-of-sample period). However, others might argue that structural oil prices might be (slightly) higher. For example, at the time of writing, markets seem to suggest that OPEC could be more successful in sticking to allocated quotas going forward, which may result in structurally higher oil price levels. The advantage of our approach is that we do not take have to take a view, but rather apply our methodology consistently to all variables.

Concluding remarks

The principal takeaway from our study is that the improvement in the trade balance since 2013 has been approximately three-quarters cyclical and one-quarter structural. Had export and import drivers been at their equilibrium (or structural) levels in 2016, the trade balance would have been -1,3 per cent of GDP – instead of the estimated 0 per cent. Although both exports and imports have been below equilibrium levels, our models indicate that during a recovery to structural levels, there will be a sharper rebound in imports than exports. In other words, if our model is a reasonable reflection of reality, and when all the cyclical noise is removed, the South African trade balance will be worse than the current levels, and the deterioration will be import driven.

These findings support the SARB's forecast of a widening current account deficit in 2017. They also suggest structural changes will be necessary if the trade balance is to turn positive. Absent such changes, and given a large and persistent deficit on the services, income and transfers account, it is reasonable to describe South Africa's structural current account deficit as between 3 and 4 per cent of GDP.

Appendix A: Estimated equations

Note: Mnemonics at the end of Appendix A

Equation 1: Merchandise export volumes

Dependent Variable: DLOG(EMERCH1)
Method: Least Squares
Date: 25/01/17 Time: 13:23
Sample (adjusted): 1997Q3 2016Q3
Included observations: 77 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EMERCH1(-1))	-0.818070	0.114816	-7.125027	0.0000
LOG(WLTM1(-1))	0.726482	0.100789	7.207929	0.0000
LOG(EL11(-3))	0.655820	0.125629	5.220285	0.0000
LOG(REER(-1))	-0.203101	0.056819	-3.574524	0.0006
C	-2.014718	1.097457	-1.835806	0.0706
DLOG(WLTM1)	0.393188	0.199716	1.968737	0.0529

R-squared	0.545509	Mean dependent var	0.005453
Adjusted R-squared	0.513502	S.D. dependent var	0.048889
S.E. of regression	0.034100	Akaike info criterion	-3.844347
Sum squared resid	0.082557	Schwarz criterion	-3.661713
Log likelihood	154.0074	Hannan-Quinn criter.	-3.771295
F-statistic	17.04373	Durbin-Watson stat	2.035930
Prob(F-statistic)	0.000000		

Equation 2: Merchandise export prices

Dependent Variable: DLOG(PEMERCH)
Method: Least Squares
Date: 25/01/17 Time: 13:23
Sample (adjusted): 1996Q1 2016Q3
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PEMERCH(-1))	-0.029149	0.012807	-2.275978	0.0256
LOG(PCOMMR(-1))	0.036036	0.015930	2.262129	0.0265
C	-0.270823	0.124147	-2.181471	0.0322
DLOG(PCOMMR)	0.137307	0.040822	3.363553	0.0012
DLOG(1/NEER*WLTPPI...	0.451143	0.052236	8.636627	0.0000

R-squared	0.676636	Mean dependent var	0.021772
Adjusted R-squared	0.660053	S.D. dependent var	0.040007
S.E. of regression	0.023326	Akaike info criterion	-4.620139
Sum squared resid	0.042440	Schwarz criterion	-4.474426
Log likelihood	196.7358	Hannan-Quinn criter.	-4.561599
F-statistic	40.80347	Durbin-Watson stat	2.101439
Prob(F-statistic)	0.000000		

Equation 3: Merchandise import volumes

Dependent Variable: DLOG(MMERCH1)
Method: Least Squares
Date: 25/01/17 Time: 13:23
Sample (adjusted): 1996Q1 2016Q3
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MMERCH1(-1))	-0.418698	0.073824	-5.671609	0.0000
LOG(Y1(-1))	0.385466	0.201750	1.910615	0.0598
LOG(REER(-2))	0.230645	0.045645	5.052970	0.0000
C	-1.766347	2.303439	-0.766830	0.4456
DLOG(Y1)	1.684850	0.707430	2.381648	0.0197
YCU/100	2.094540	0.507001	4.131233	0.0001
@TREND	0.003108	0.001385	2.244454	0.0277

R-squared	0.485669	Mean dependent var	0.011253
Adjusted R-squared	0.445064	S.D. dependent var	0.045210
S.E. of regression	0.033679	Akaike info criterion	-3.863342
Sum squared resid	0.086203	Schwarz criterion	-3.659343
Log likelihood	167.3287	Hannan-Quinn criter.	-3.781387
F-statistic	11.96081	Durbin-Watson stat	2.088550
Prob(F-statistic)	0.000000		

Equation 4: Merchandise import prices

Dependent Variable: DLOG(PMMERCH)
Method: Least Squares
Date: 25/01/17 Time: 13:23
Sample (adjusted): 1996Q1 2016Q3
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PMMERCH(-1))	-0.165499	0.062196	-2.660943	0.0095
LOG(1/NEER*WLTPPI)	0.101700	0.041160	2.470826	0.0158
LOG(POILR(-1))	0.031381	0.013913	2.255616	0.0270
C	-0.207139	0.090880	-2.279269	0.0255
DLOG(POILR)	0.073749	0.016930	4.356224	0.0000
DLOG(POILR(-1))	0.049533	0.018352	2.699083	0.0086
DLOG(1/NEER*WLTPPI)	0.296094	0.056811	5.211887	0.0000
DLOG(1/NEER(-1)*WLTPPI(-1...	0.110908	0.044553	2.489377	0.0150

R-squared	0.751510	Mean dependent var	0.017101
Adjusted R-squared	0.728317	S.D. dependent var	0.037957
S.E. of regression	0.019784	Akaike info criterion	-4.916442
Sum squared resid	0.029356	Schwarz criterion	-4.683301
Log likelihood	212.0323	Hannan-Quinn criter.	-4.822779
F-statistic	32.40324	Durbin-Watson stat	2.251391
Prob(F-statistic)	0.000000		

Mnemonics

Variable	Description
BCATRADE	Trade balance
EL11	Availability of electricity
EMERCH	Nominal merchandise exports
EMERCH1	Real merchandise exports
MMERCH	Nominal merchandise imports
MMERCH1	Real merchandise imports
NEER	Nominal effective exchange rate
PBCATRADE	Trade balance (% of GDP)
PCOMM	Commodity prices (US$)
PCOMMR	Commodity prices (Rand)
PEMERCH	Merchandise export deflator
PMMERCH	Merchandise import deflator
POIL	Oil price (US$)
POILR	Oil price (Rand)
REER	Real effective exchange rate
REXD	Rand per US$
WLTM1	Real global imports (US$)
WLTPPI	World PPI (US$)
Y1	Real GDP
YCU	Output gap

Appendix E: Merchandise export volumes and its drivers[10]

Figure E(i): Merchandise export volumes

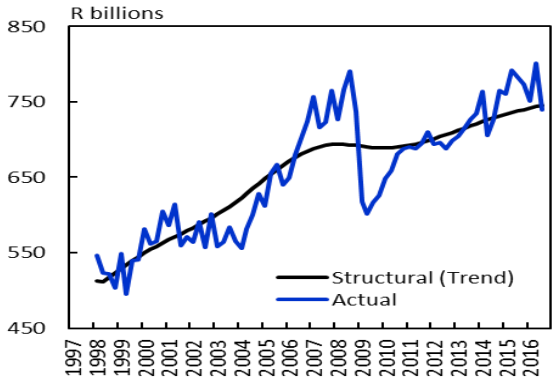


Figure E(ii): Merchandise export volumes

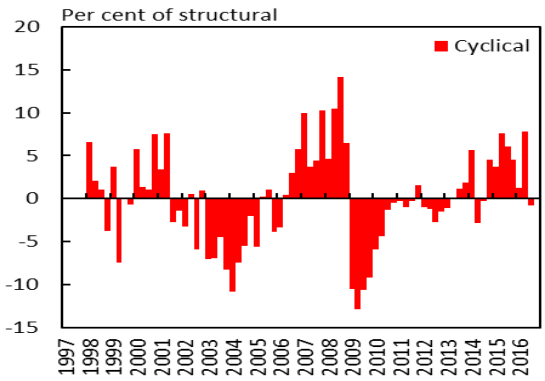


Figure E(iii): REER

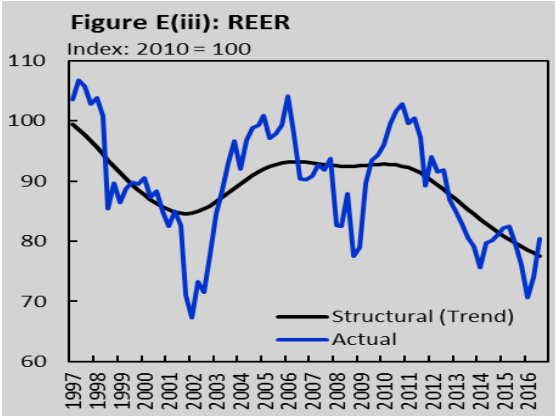


Figure E(iv): REER

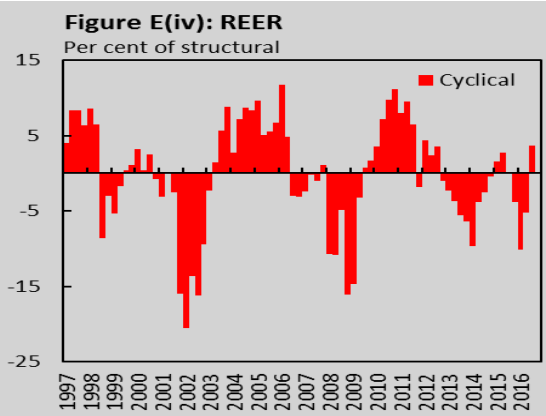


Figure E(v): World import volumes

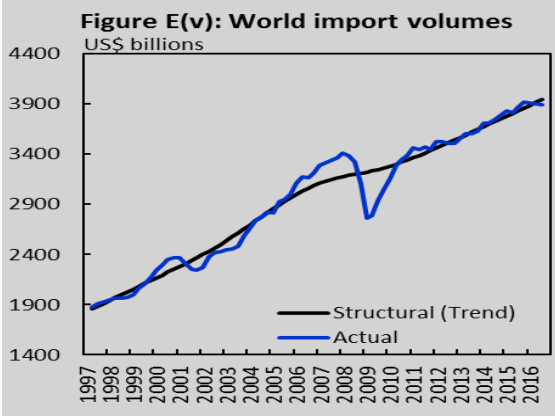


Figure E(vi): World import volumes

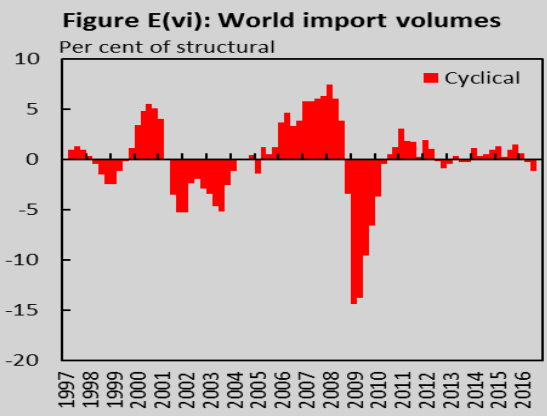


Figure E(vii): Electricity availability

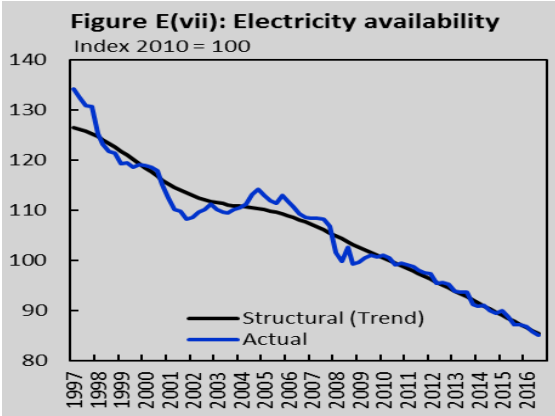
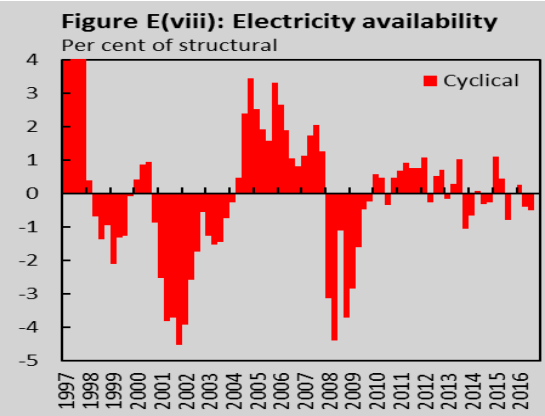


Figure E(viii): Electricity availability



[10] Graphs for structural variables derived from an HP filter approach are depicted with a grey background.

Appendix EP: Merchandise export prices and its drivers

Figure EP(i): Merchandise export deflator

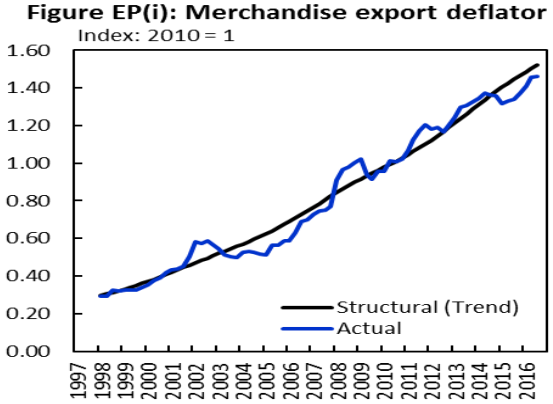


Figure EP(ii): Merchandise export deflator

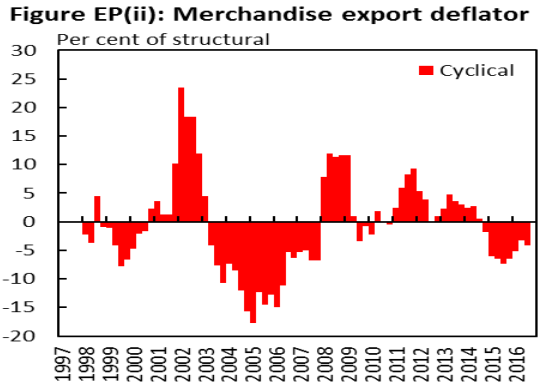


Figure EP(iii): Commodity prices (US$)

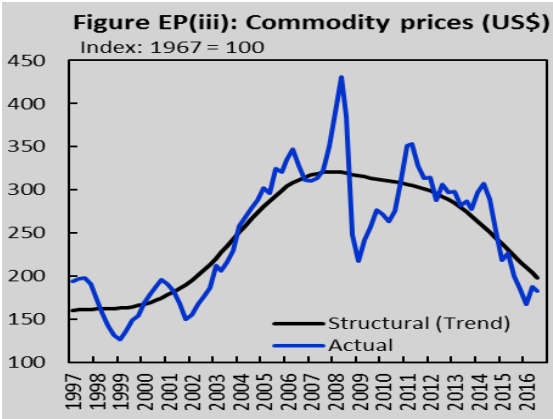


Figure EP(iv): Commodity prices (US$)

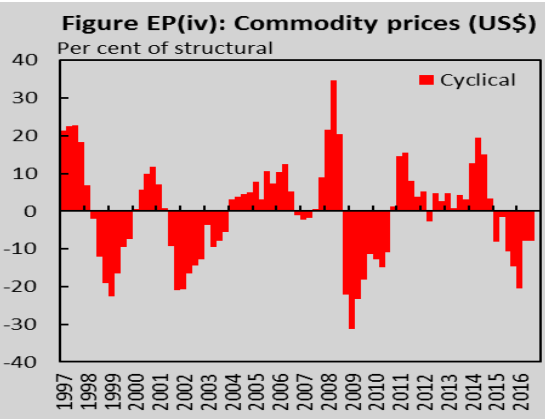


Figure EP(v): World PPI (US$)

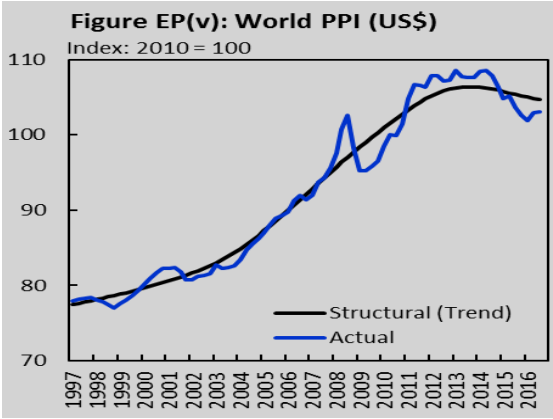


Figure EP(vi): World PPI (US$)

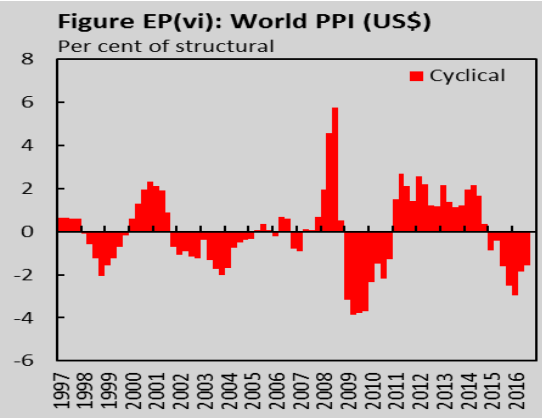


Figure EP(vii): Rand/US$

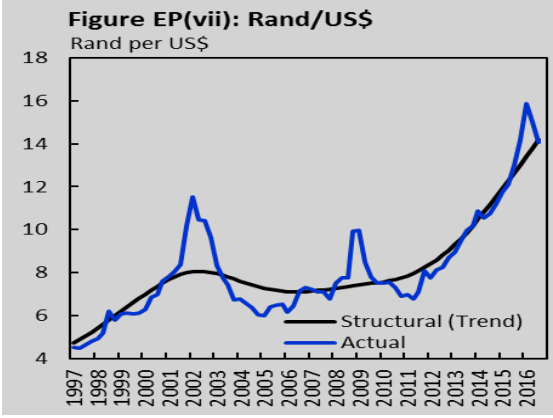
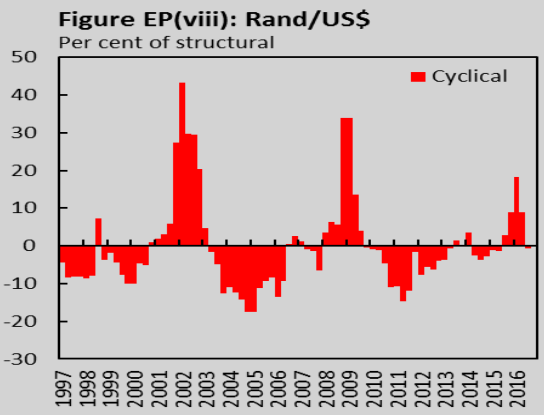


Figure EP(viii): Rand/US$



Appendix M: Merchandise import volumes and its drivers

Figure M(i): Merchandise import volumes

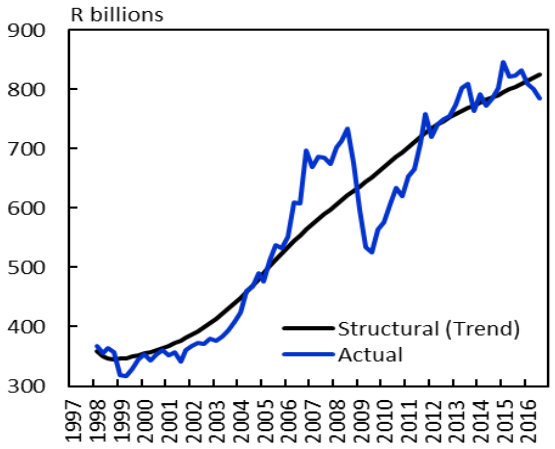


Figure M(ii): Merchandise import volumes

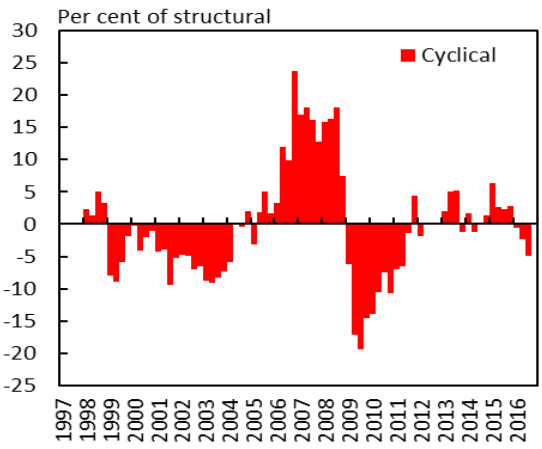


Figure M(iii): REER

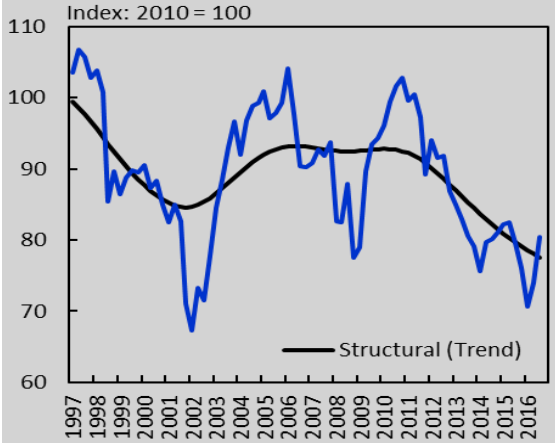


Figure M(iv): REER

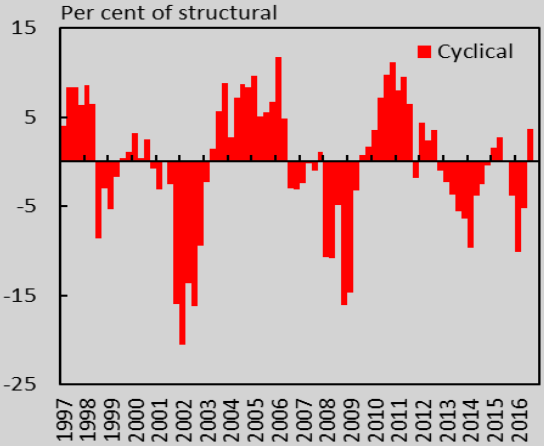


Figure M(v): Real GDP

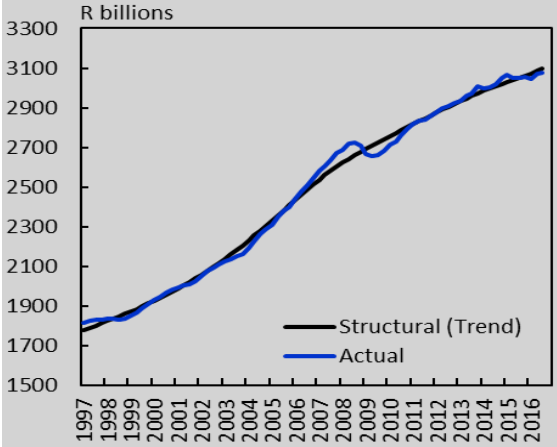
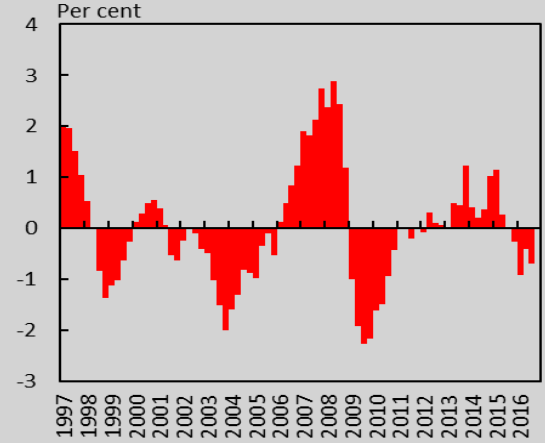


Figure M(vi): Output gap



Appendix MP: Merchandise import prices and its drivers

Figure MP(i): Merchandise import deflator

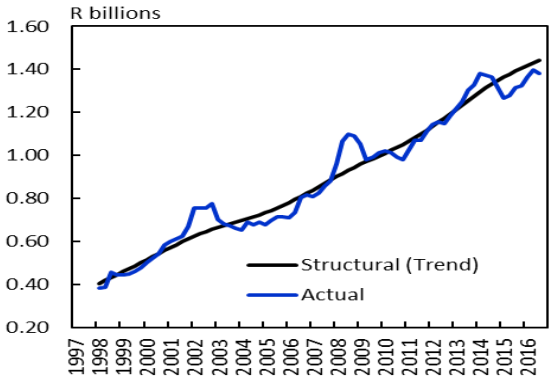


Figure MP(ii): Merchandise import deflator

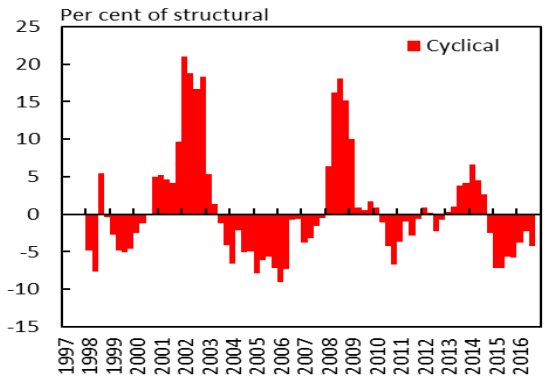


Figure MP(iii): Oil prices

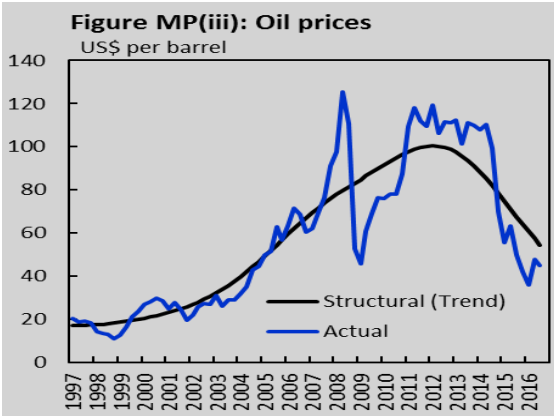


Figure MP(iv): Oil prices

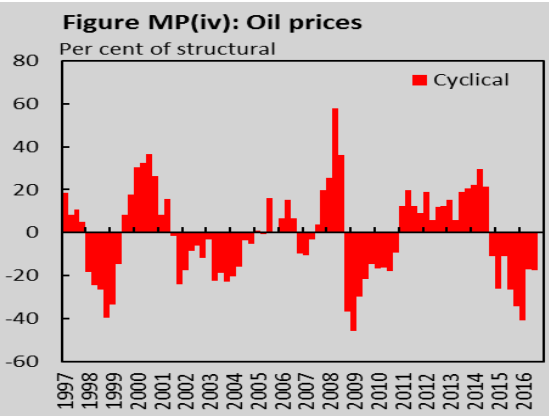


Figure MP(v): World PPI (US$)

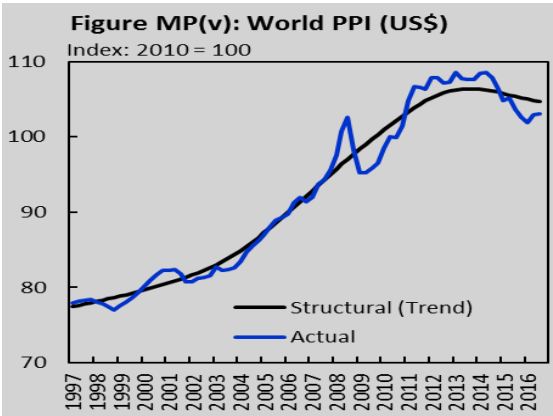


Figure MP(vi): World PPI (US$)

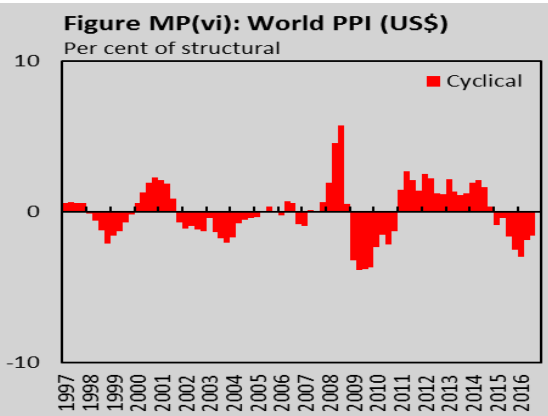


Figure MP(vii): Rand/US$

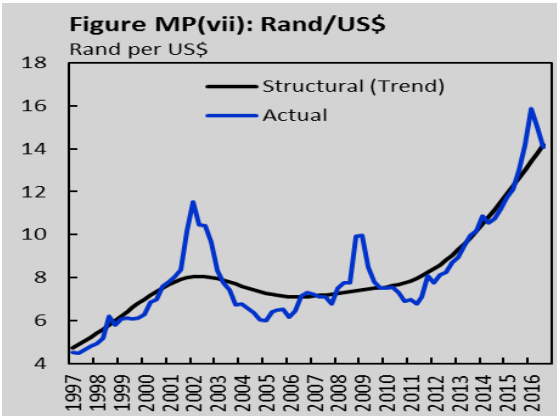


Figure MP(viii): Rand/US$