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AFRICAN DEVELOPMENT BANK GROUP

How are the US Financial Shocks Transmitted into South Africa? Structural VAR Evidence

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Office of the Chief Economist

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Abstract

We investigate the impact of unanticipated United States (US) bond yield increases, federal funds rate tightening, and monetary stimulus shocks on the South African economy using structural VAR models. Firstly, the US monetary stimulus shock leads to weak consumer price inflation, rand-dollar appreciation, real stock price revaluation, bond yield declines, decline in monetary aggregates and real interest rates in South Africa. Despite the weak trade channel evidence, other findings are consistent with predictions of a small open economy Mundell-Fleming model. Secondly, an unanticipated positive US medium-term bond yield shock leads to rand-dollar depreciation and rising bond yields as predicted by the portfolio balance exchange rate model. This same shock leads to significant real stock price declines, which is consistent with portfolio re-allocation driven by change in US bonds yields. Thirdly, we find that unanticipated US federal funds rate tightening leads to significant increases in South African bond yields, rand-dollar depreciation and delayed consumer price inflation.

Keywords: Monetary policy, international transmission, macroeconomic interdependence, structural vector autoregressions.

JEL classification: C32, E43, E44, E50, F41, F42

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1. Introduction

This paper investigates the transmission of unanticipated US bond yield increases, monetary stimulus and the federal funds rate tightening shocks into South Africa using small open economy structural VAR models. This investigation will inform policy-makers about channels impacted by external developments, which may make policies designed and targeted at dealing with domestic macroeconomic issues, ineffective.

The assessment of spillover effects from developed economies to small open economies has become a major issue among policy-makers. This has been heightened by the financial crisis, the euro area sovereign debt crisis and the non-conventional policy responses in the latter periods. Theoretical models show that policy decisions in large economies spillover into smaller open economies through various channels. For instance, portfolio balance models expose the strong interaction between the exchange rate, foreign interest rate, output and monetary stimulus. The portfolio balance model goes a step further to include the bond market to capture risk perceptions. Furthermore, the basic Mundell–Fleming-Dornbush (MFD) model suggests that monetary stimulus in a large economy through the expenditure-switching effects on exchange rate tends to increase domestic income through the improvement in the trade balance. However, the transmission of these effects will be negative to a small open economy, characterized by a fall in income due to declining net exports and the appreciated currency leads to lower transactions demand for money and lower interest rates.

We state the motivations for studying the spillover of US shocks into South Africa i.e. push-effects originating from the US. There has been increasing integration in trade between US and South Africa (SA) possibly strengthened by amongst other initiatives, the African Growth and Opportunity Act (AGOA) that was signed into law at the end of 2000. The International Monetary Fund's IFS direction of trade statistics shows the value of exports from SA to the US has increased from US$162 million in 1998Q4 to US$332.98 million in 2007Q4. In addition, the weight of US trade constitutes a significant portion in the calculation of the SA trade weighted exchange rate.

The significant ties are also evident through financial flows given that the US conventional and non-conventional monetary stimulus in recent years led to significant capital flows into emerging markets including SA equity and bond markets and have affected asset prices, exchange rates and interest rates. These financial ties have also increased the impact of bouts of risk tolerance and aversion, and magnified their impact on asset prices and bond yields.

To date, VAR evidence lends credible support to the US's ability to influence emerging market economies. Although, Mackowiak (2007) concluded that US monetary policy shocks were not important for emerging markets relative to other kinds of external shocks, they found that US monetary policy shock affects short-term interest rates and exchange rates in emerging markets without a delay and is more pronounced. In addition, Canova (2005) found that the interest rate channel is a crucial amplifier of US monetary disturbances, whereas, the trade channel played a negligible role. Studies on SA, such as Kabundi and Loots (2010) used a dynamic factor model to test the channels of transmission of positive demand and supply shocks from Germany to SA. Our study differs from these authors by using a SVAR, which incorporates some assumptions of Mundell-Fleming and portfolio balance approach to the determination of the exchange rate in assessing the effects of US shocks on SA.

Our results show that, firstly, the US monetary stimulus shock leads to low inflation, rand-dollar appreciation, revaluation in stock prices, depressed bond yields, decline in monetary aggregates and real interest rates in SA. Despite a weaker trade channel result, all other findings are consistent with predictions the Mundell-Fleming model of a small open-economy. Secondly, an unexpected increase in US medium-term bond yields leads to depreciation in the rand-dollar exchange rate and a rise in bond yields, in line with the portfolio balance approach. In addition, a significant stock price decline occurs after two quarters and supports the idea of portfolio re-allocation or rebalancing driven by a change in the return from bonds.

We also find that a positive US medium-term bond shock leads to a significant j-curve effect on the trade balance. Thirdly, we find that the unexpected US federal funds rate tightening leads to a significant increase in SA bond yields, depreciation in the rand-US dollar exchange rate and delayed response in consumer price inflation. These findings suggest that the SA economy is

highly responsive to external shocks, and these can neutralise the effectiveness, to some extent, of policies designed to deal with domestic macroeconomic issues.

The remainder of the paper is organized as follows. Section 2 provides a review of empirical evidence, section 3 describes the SVAR methodology. Section 4 provides the data while section 5 discusses the results, and lastly, section 6 concludes.

2. Literature review

The effects of US shocks on various economies have been assessed through various channels. Mackowiak (2007) found sizeable spill-over effects of US monetary policy shocks on non-G7 countries that accorded well with the idea that emerging markets are more vulnerable to external shocks than large and developed economies. Canova (2005) studied how US shocks are transmitted into eight Latin American countries. He found that a US monetary policy shock affects Latin American interest rate very quickly and in a significant manner. In addition, evidence indicated that external shocks were an important source of macroeconomic fluctuations in Latin America. US monetary policy shocks were more important for Latin America relative to US supply and demand shocks.

Holman and Neuman (2002) found strong evidence that US monetary shocks affected real activity in both the US and Canada. The Canadian monetary disturbances affected both countries' real economic activity and many of these effects were similar in magnitude to the effects of US monetary shocks. Lastrapes and Koray (1990) examined the international transmission of aggregate shocks under alternative exchange rate regimes for the US and UK, France and Germany. They found that the transmission of monetary shocks depends critically on the specific country. Selover and Round (1996) focused strictly on output shocks and found significant transmission from Japan to Australia. Schmidt-Grohe (1998) found that the transmission of international business cycles through world-interest-rate and terms-of-trade variations could not explain the cyclical response of the Canadian economy to innovations in US output.

Burdekin (1989) examined the impact of US monetary policy, budget deficits and inflation on France, Italy, UK and West Germany. The empirical results revealed interplay between domestic monetary and fiscal policy augmented by a significant impact of the US variables across all four countries in the sample. Kuszczak and Murray (1986) focused on the transmission of output, price and interest rate shocks on US and Canadian monetary variables and emphasized the importance of US variables in explaining the forecast error variance in Canadian variables.

Kim (2001) found a smaller positive transmission effect on foreign output and found that foreign aggregate demand increased in response to an expansionary US monetary policy. Schmidt (2006) showed that asymmetric price setting explained the stylized fact that US monetary policy has positive international effects on both non G-7 output and aggregate demand. Grilli and Roubini (1995) suggested that the non-US G-7 monetary policies strongly follow the US monetary policy.

3. VAR methodology

This paper adopts a small open economy structural VAR model in Li et. al (2010) to analyze the impact of US shocks on the SA economy. This model incorporates some assumptions of a Mundell-Fleming model and portfolio balance approach to the exchange rate. We use two components of aggregate demand and two wealth measures. The aggregate demand components are consumption and the trade-balance as a percentage of gross domestic product (SA_Trade balance), whereas, the wealth measures are the real all-share stock price (Alsi) or bond yields.

The model has seven variables namely, component of aggregate output (SA_Y), consumer price index (CPI_SA), Money (SA_M3), real interest rate (SA_R) defined as difference between the money market rate and inflation rate, the rand-dollar exchange rate (R/$), wealth (Wealth) and the US variables (US_VAR). Most of these variables are standard in the Mundell-Fleming type models for open economies. The baseline model with short-run restrictions based on the approach in Li et al (2010) is given by equation [1].

$$[1] \quad \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & g_{17} \\ g_{21} & 1 & 0 & 0 & 0 & -g_{26} & g_{27} \\ -g_{31} & -1 & 1 & g_{34} & 0 & 0 & 0 \\ 0 & 0 & g_{43} & 1 & 0 & -g_{46} & 0 \\ g_{51} & g_{52} & g_{53} & g_{54} & 1 & g_{56} & g_{57} \\ g_{61} & g_{62} & g_{63} & g_{64} & 0 & 1 & g_{67} \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} u_{SA\_Y} \\ u_{SA\_CPI} \\ u_{M3} \\ u_{SA\_R} \\ u_{Wealth} \\ u_{R/\$} \\ u_{US\_VAR} \end{bmatrix} = \begin{bmatrix} e_{AS} \\ e_{AD} \\ e_{MA} \\ e_{MMR} \\ e_{Port} \\ e_{TRADE} \\ e_{VAR} \end{bmatrix}$$

NB US_VAR represents US interest rate, M1 and long term bond yields included separately in the model.

We characterize monetary policy by a feedback rule which is a linear function relating the policy rate to information available to the central bank. The conditioning variables for the policy rate feedback include contemporaneous values of the real money supply, the exchange rate and the lagged values of all variables included in the model. We use M3 as the broad measure of monetary aggregates.

The policy reaction function is given by row 4 in equation [1]. The policy reaction function indicates that monetary policy authorities consider currency depreciation as one the factors driving the inflationary process. We assume monetary policy shocks (MMR) are driven by preferences of monetary policy authorities.2 The identification strategy also reflects the interactions amongst the goods market, money market, stock or bond market and the external sector. In this context, our model specifies the equilibrium conditions.

The aggregate supply (AS) shock in equation [1] includes the effects of exogenous changes in productivity, mark-ups and other supply side factors. Real output is separated into trade-balance balance and consumption. These are included into the model separately and depend on contemporaneous price level, foreign variable and other lagged variables in the model. An aggregate demand (AD) shock in equation [1] comprises of the exogenous impact of fiscal policy

[2] These drivers include shifts in relative weights given to inflation and exogenous variation arising from changes in the private agents inflationary expectations not necessarily linked to economic fundamentals and measurement errors in the real time data available (Li et al 2010).

from the expenditure and revenue shocks and other demand side factors. Therefore, the demand side shock is a factor of the inflation rate and other lagged variables in the model. At equilibrium, the aggregate quantity demanded equals aggregate quantity supplied.3

Firstly, we assume that domestic demand is determined by changes in price levels, foreign interest rates and levels of domestic exchange rates including all other lagged variables in row 2. Secondly, we assume that external demand for South African goods is partly dependent on prevailing exchange rates, i.e., the exchange rates (R/$) depends on all variables in the model except the real stock prices (row 6). The unexpected changes in aggregate demand are transmitted through the unexpected movements in the exchange rates. An unexpected decline in foreign demand for SA goods will lead to an unexpected depreciation of the SA rand exchange rate.

Money demand (MA) shocks denote exogenous changes in the income velocity of money given by the standard quantity theory of money specification. However, the real money balances are determined by real income and the interest rate. Portfolio shocks (PORT) represent an exogenous change in the demand for equities or bonds, or a decline in equity prices or the bond risk premium, which leads to portfolio rebalancing and innovations in the time varying risk premium.

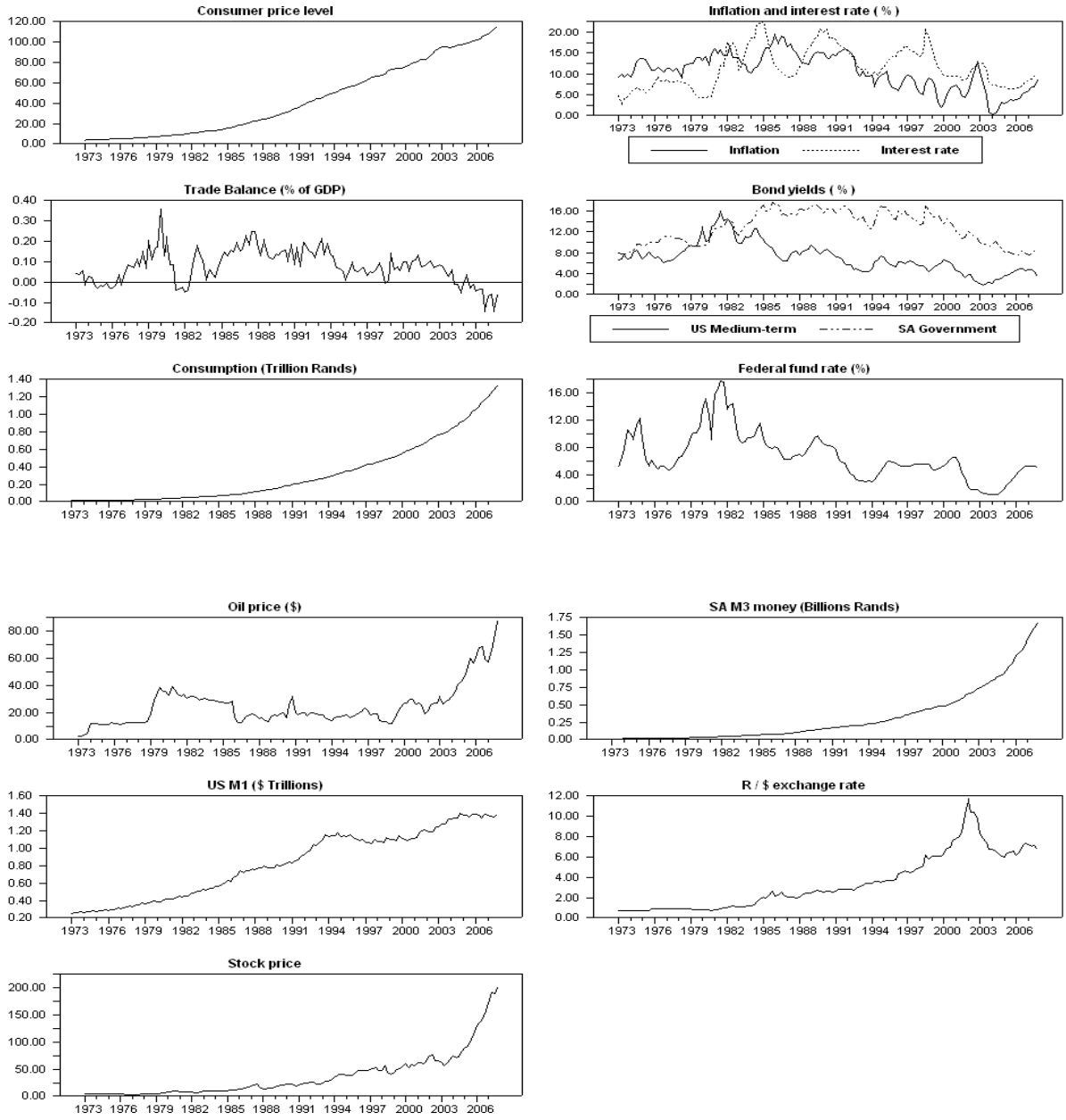
This specification suggests that equities or bonds markets use all available public and private information but react contemporaneously to all variables in the model including portfolio shocks. However, we emphasize that the external sector comprises of three US financial variables. These variables are used interchangeably, one at a time in row 7. These are the US federal funds rate, monetary expansion and a positive bond yields shock.

4. Data

We show movements of all variables over time in Figure 1 beginning in 1973Q1 and ending in 2007Q4. All variables are extracted from the IFS database, except for the SA GDP, which is sourced from South Africa Reserve Bank.

[3] We divide the aggregate demand equation to reflect the domestic demand and external demand (see Li et al 2010).

Figure 1. The plot of all variables



NB. Stock price variable was deflated by the consumer prices index .SA= South Africa, US =United States. The base year for stock price is 2005.

The SA all-share index shows a steeper increase after 2003, M3 broad money supply displays an upward trend. The South African rand-dollar exchange rate depreciated in 2000s compared to

levels observed in the periods between 1971 and 1990. The interest rates displayed variations in different directions throughout the sample, being high in 1980-1985 and significant peaks in 1990 and 1995. The SA consumer prices display a steeper upward trend. For most periods the South African interest rate exceeded the inflation rate. Moreover, the SA long-term bond yields are higher than the US medium-term bonds. The trade balance as percentage of GDP deteriorated after 2005.

5. Results

We estimate various structural VAR models using data over the period 1973Q1 to 2007Q4. Variables are in level form by ordinary least squares (OLS) method for reasons motivated in literature. The OLS method delivers consistent parameter estimates (Li et.al, 2010) and the parameters have super consistency properties when a VAR is estimated in levels than in first difference in the presence of a cointegration relationship (Hamilton 1994).

The estimations done using first differenced variables result in misspecifications due to the omission of the error-correction mechanisms (Li et.al, 2010). The US federal funds rate, money market interest rate, bond yields and bond spreads are expressed in percentages. However, other variables are expressed in logarithms and multiplied by 100 to represent percentage deviations from their trends. The Akaike information Criteria (AIC) was used to choose the optimal lag length for each model. The various models are estimated using two to four lags based on the AIC results. The oil price is an exogenous variable including dummies for Asian crises in 1998-99, debt standstill in 1985-1989, inflation targeting in 2000 and recession in 1991-1992. The impulse responses error bands represent the 16 and 84 percentiles and the median being the impulse responses.

The sections reporting the results are separated according two asset classes, starting with real stock prices and followed by nominal bond and SA-US bond spreads analysis. The analysis in this section is on the impact of three US shocks, namely, positive interest rate, bond yields and monetary expansion, on SA macroeconomic variables.

While many impulse responses are generated, to maintain focus, the paper only reports and discusses the responses to these three shocks only. These dynamic responses to three US shocks are presented together throughout the analysis using three columns denoting each response. At the bottom of each column, there is a specific US shock. We also opt not to use an aggregate output variable but consumption and net exports components in separate estimations. This is because aggregations may obscure the sensitivity of certain components. We further separate the asset price variable into stock prices and bonds based on the likelihood that asset classes may respond in a different way to foreign developments, leading investors to reallocate their portfolios across these asset classes.

For further insights into the bond market we replace bond yields with two versions of term spreads, namely, the difference between SA long-term bonds and SA money market rates, and the SA-US long-term bond spread, which is the difference between long-term term bonds between the two countries.

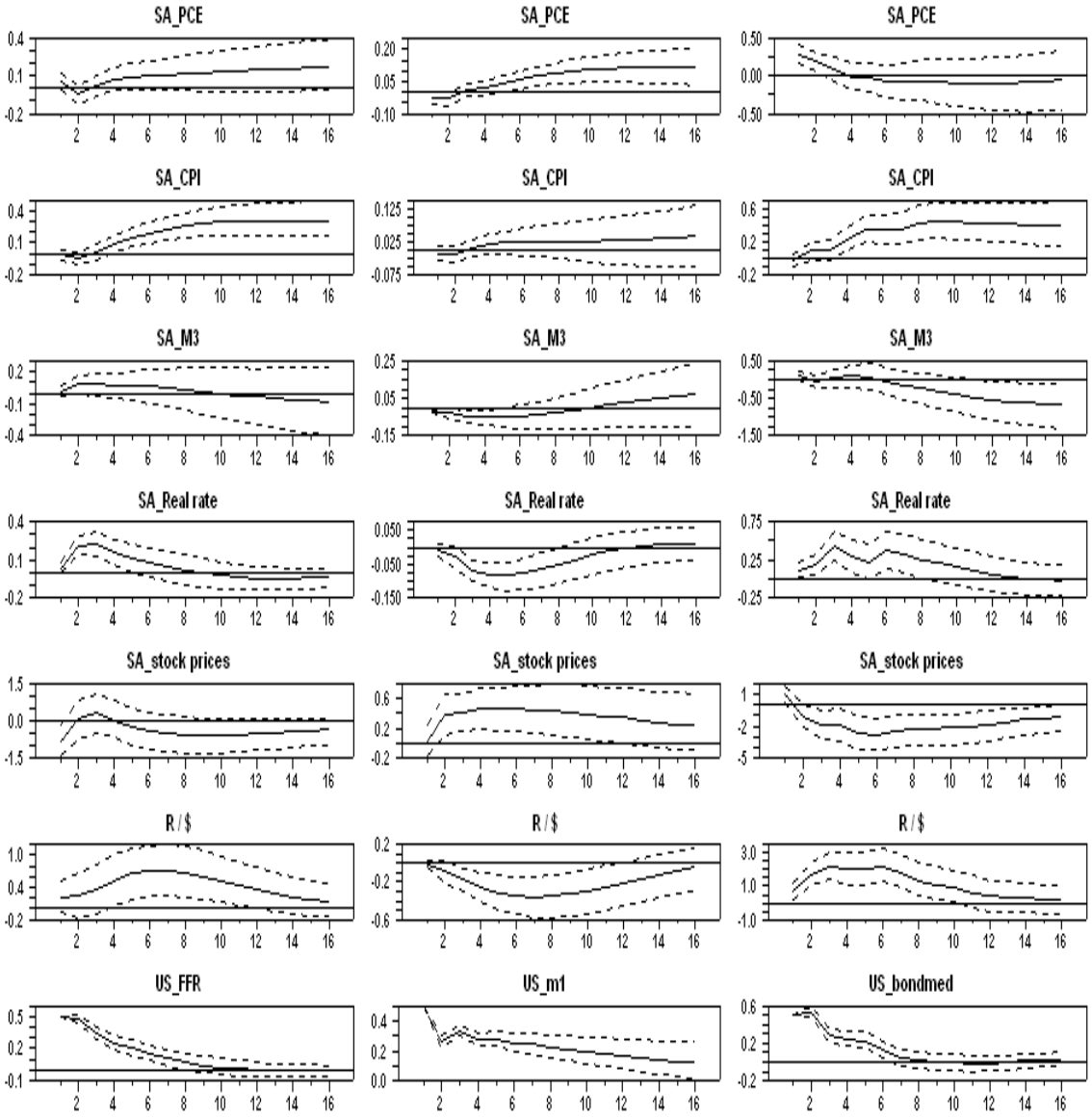
5.1. The transmission channel controlling for stock prices

This section focuses on real stock prices. In Figure 2, the real stock price captures the wealth effects, whereas, consumption (SA_PCE) captures aggregate demand effects transmitted through this channel. Our discussion, starts by focusing specifically on column 1 in Figure 2, which shows the effects of a positive federal funds rate shock.

We find evidence confirming that a positive federal funds rate shock impacts the SA economy through various channels. We find a significant decline in real stock prices upon impact that be could interpreted as a reflection of the sensitivity of stock prices to foreign developments and reduced expected future earnings linked to rising real interest rates. In addition, we find exchange rate depreciation that becomes significant between four and ten quarters. The significant consumer price inflation occurring after a year could be indicative of the nominal rigidities in the goods markets and coincided with beginning of significant exchange rate depreciation.

These findings suggest that developments in US interest rate market are transmitted into SA faster through the exchange rate and asset price channels but gradually, through the goods markets. The insignificant consumption increase confirms the inverse transmission effects of US policy changes.

Figure 2. US shocks on SA stock prices and consumption channel



NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

The second column in Figure 2 shows the effects of a US monetary expansion shock, representing an unexpected policy easing shock. A two country small open economy Mundell–Fleming model predicts contraction in output, interest rate reduction and currency appreciation in a small country, in response to large economy's monetary stimulus.

As such, we find a significant rand dollar exchange rate appreciation between three and thirteen quarters. This currency appreciation (not periods of significance) conforms to the predictions of the Mundell–Fleming model, flexible monetary and the Frankel real interest rate exchange models. In addition, the US monetary stimulus leads to a significant revaluation in real stock prices confirming the importance of the asset price channel in transmitting shocks into SA. The real stock price revaluation could arise from two effects, namely, the financial inflows that increase demand for the SA bonds and equities or a reduction in real interest rates.

The results show that the real interest rate contracts significantly and this is due to a significant fall in nominal interest rates relative to the consumer price inflation, which is relatively muted throughout all horizons. The significant decline in M3 largely points to predictions of Mundell-Fleming model working through the contraction in domestic income due to reduced net exports, given the adverse effects of foreign monetary stimulus. Nevertheless, the liquidity equilibrium condition requires money supply and demand to be equal.4 Hence, a reduction in domestic income lowers money demand, and ultimately, money supply leading to lower interest rate.

The US expansionary monetary policy induces consumption to rise significantly after a year. This attests to positive spillover effects into SA aggregate demand through the consumption channel. The US monetary expansion is inversely transmitted into SA economy depressing the latter country's income and real interest rates as suggested by the Mundell-Fleming model of the small open economy. These two forces operate in opposite ways to determine the response of consumption.

Consumption depends negatively on real interest rates and positively on income, while the later variable is not included in this analysis, we rely on theoretical linkages related to foreign

[4] Since the large economy has the ability to pull down interest, this forces interest rates to drop in smaller country.

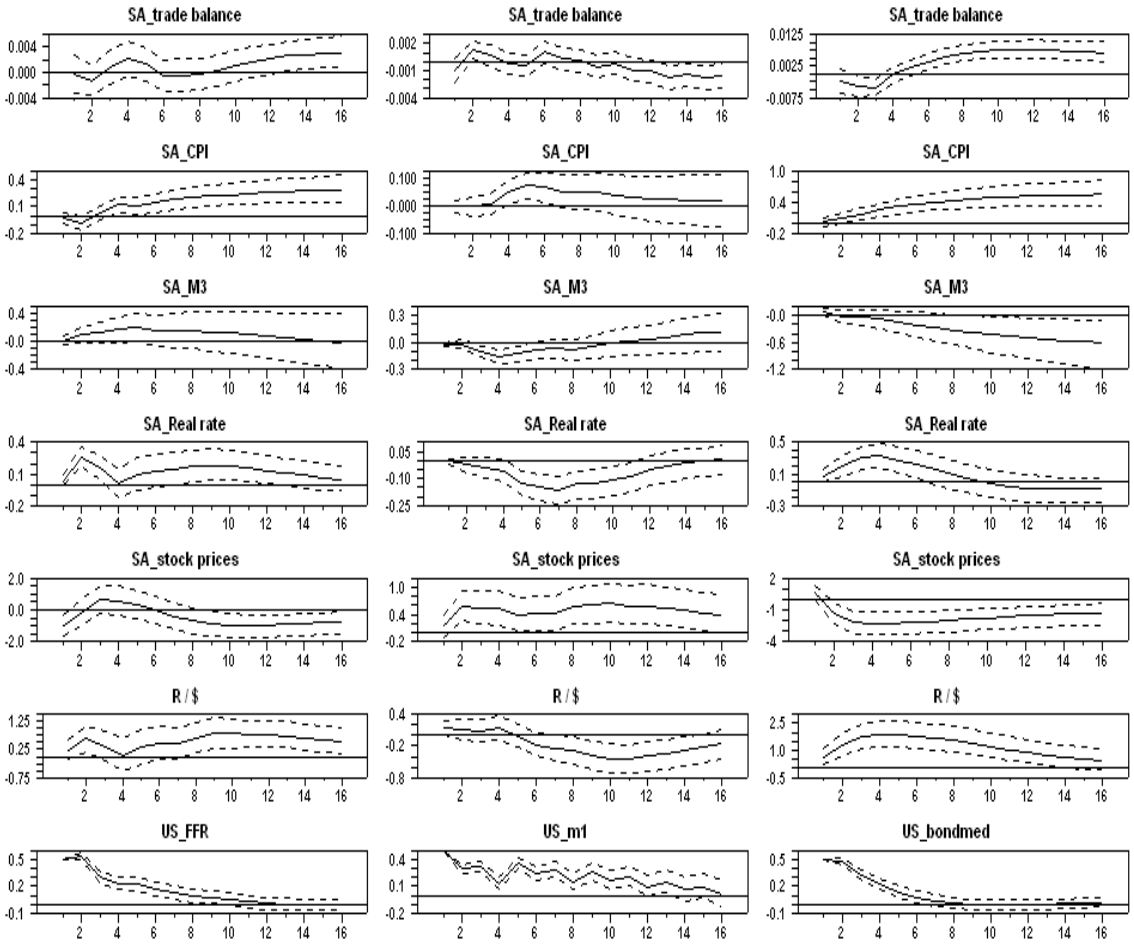
monetary stimulus effects to make inferences. The rising consumption maybe attributed more to the elasticity of the interest rate reduction, than to a reduction in the income level. We therefore, conclude that US monetary expansion reduces the SA demand for liquidity, lowers the real interest rate, leads to a revaluation in real stock prices and the appreciation in the rand dollar exchange rate.

The third column in Figure 2, displays the effects of positive US medium-term bond yields bonds. We included the real stock prices to capture the spillover effects induced from the US bond market into SA equity markets, in line with portfolio re-adjustment approach, given that, for a portfolio investor, a change in returns in one asset class may trigger an asset reallocation. The results show significant real stock price declines occurring after two quarters, supporting the idea of the asset re-allocation driven by a change in returns from bond markets. Assuming no transactions costs and perfect capital mobility, investors would move their funds to earn higher yields from increased US bonds yields.

The results in column 3, in Figure 2, show that the rand dollar exchange rate depreciates significantly due to an unexpected increase in US bond yields. This currency depreciation is consistent with predictions of portfolio balance model of the exchange rate determination. In addition, a muted M3 reaction indicates a diluted role of liquidity channel in transmitting the US bond yields shock into SA. Furthermore, we suggest the delayed and significant increase in consumer price perhaps signals nominal price rigidities.

In Figure 3, we substituted the consumption variable with the trade balance. This follows the Mundell-Fleming model's implications for the small open economy's trade balance movements from a large economy's shocks. We find that most dynamic responses of other variables are similar, even after introducing the trade balance, hence we retain the justifications postulated in the preceding sections. As a result, we focus more on assessing the dynamic responses of the trade balance to three US shocks using dynamic impulses shown in Figure 3.

Figure 3. US shocks on SA stock price and net trade balance channel



NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

The trade balance does not respond significantly to the US expansionary monetary shock, which is surprising given the predictions of Mundell-Fleming model. The Mundell-Fleming small open economy model predicts that a US monetary expansion (i.e as a large economy) should appreciate the SA currency relative to the dollar thereby worsening the SA trade balance. In the context of this model, the US monetary stimulus, has negative effects as SA income falls because of a decline in net exports. The lower transactions demand for money in SA due to a decline in net exports leads to a lower real interest rate.

Net exports improve following a reduction in real interest rates and income, the latter stimulates it through lowering the import component. Given the variables, in the estimated model, we conclude that real interest rate elasticity is the dominant factor exerting upward pressures on trade balance within the year. Furthermore, the muted and later worsening trade balance response reflects the dampening exchange rate appreciation effects after two years. A US bond yields shock (column 3) depreciates the exchange rate and result in J-curve trade balance response.

5.2. Shock transmission after including South African bond yields

This section focuses on the predictions of the portfolio balance approach to the exchange rate determination. The portfolio balance model assumes individuals hold a portfolio of wealth comprising of money/cash, domestic and foreign bonds. In this model, individuals can alter the composition of their portfolios and this affects the exchange rate, interest rate and money demand.

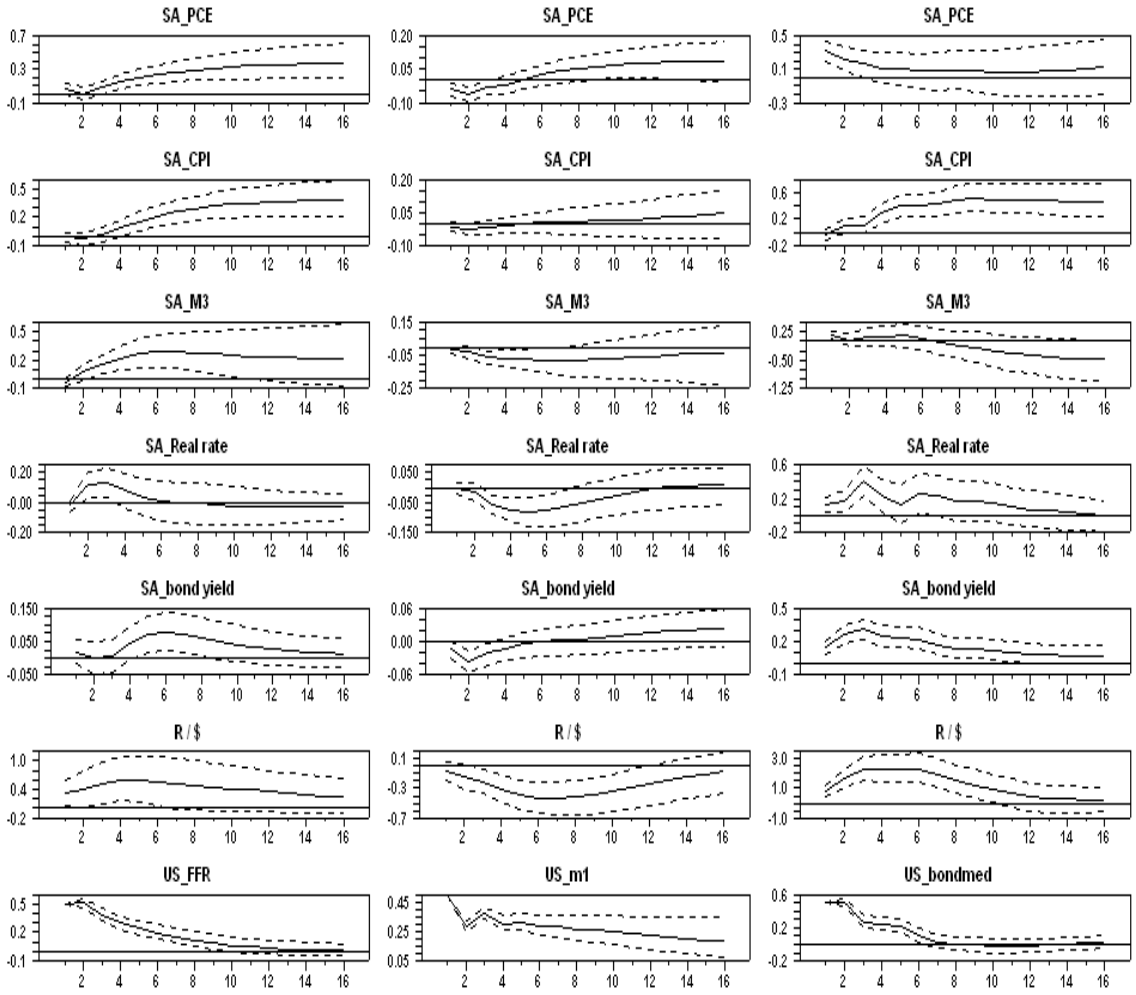
We focus on three predictions using this model. Firstly, the portfolio balance model predicts a domestic exchange rate appreciation from the foreign monetary expansions but a depreciation from rising foreign interest rates and values of foreign bonds. An increase in the value of foreign bonds leads to the appreciation of the rand dollar exchange rate.

Secondly, the portfolio balance model suggests a negative relationship between the demand for domestic money and the foreign interest rate. In this model, a rise in the foreign interest rate induces the domestic citizens to curtail their holdings of domestic money and increasing their holdings of foreign bonds in their portfolios.

Thirdly, the model suggests that the demand for domestic bonds is negatively related to foreign interest rates. In this case, a rise in foreign interest rates makes the domestic participants to hold higher yielding foreign bonds instead of domestic bonds. A decreased demand for domestic bonds drives down the price of domestic bonds and domestic interest rates increase. This indicates a positive correlation between foreign and domestic bond yields. At the same time, the

exchange rate depreciates, as there are increased purchases of foreign currency by domestic citizens to acquire foreign bonds.

Figure 4. US shocks on SA nominal bonds yields and consumption

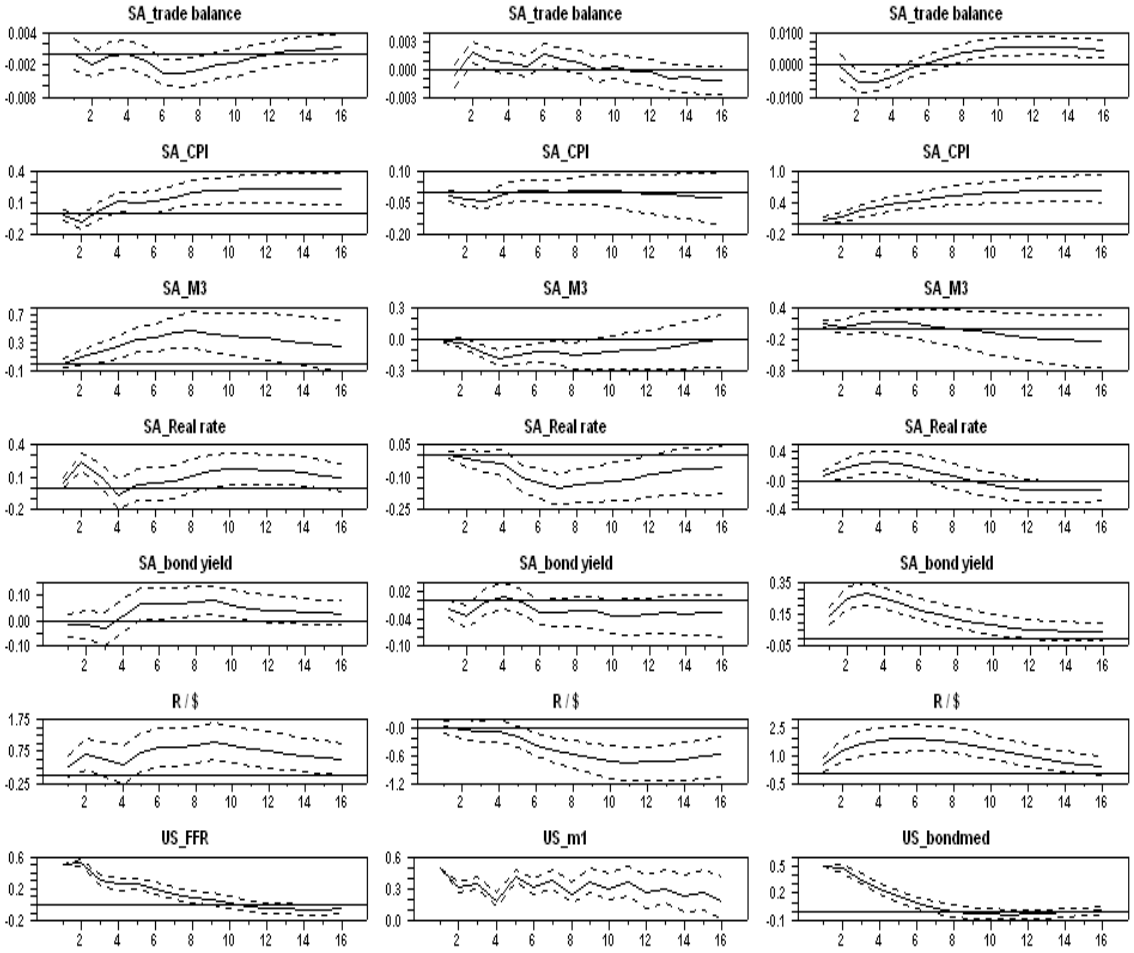


NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

While most impulse responses are similar to those reported in earlier sections, we decided to focus more on the impulse responses of SA nominal bond yields to three US shocks as shown in Figures 4 and 5. An expansionary US monetary shock leads to a significant decline in nominal bond yields upon impact, which is consistent with this theoretical prediction. This reflects the widening yield differential between US and SA, following the monetary stimulus, and this triggers capital flows to be invested in either equities or bonds, or both, in latter country. An

increase in the demand for bonds arising from capital inflows exerts upward pressure on bond prices and depresses bond yields. Moreover, we find a positive correlation between two bond yields. However, the South African bond yields rose by a smaller margin relative to initial response of US bond yields shock.

Figure 5. US shocks on SA nominal bonds yields and trade balance



NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

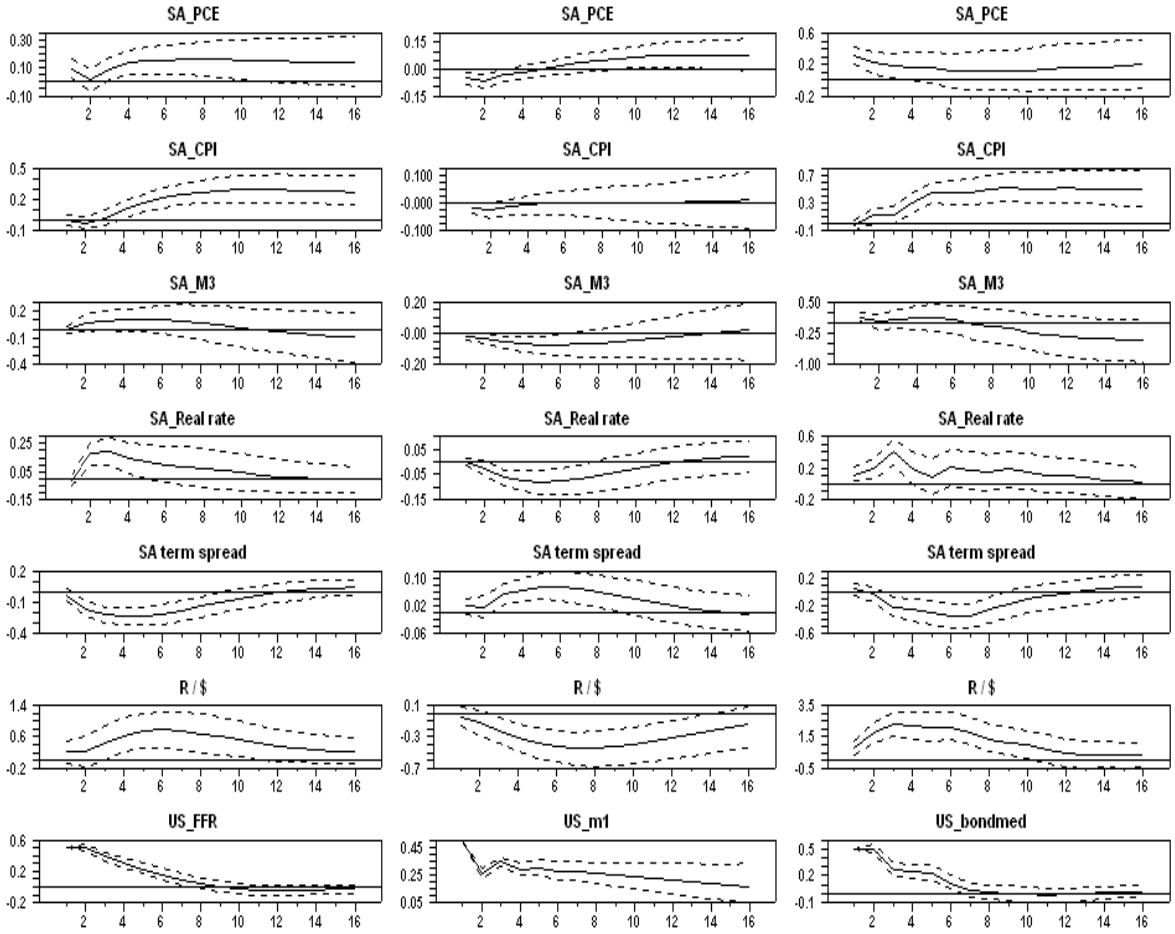
When considering the effects of the trade balance, as shown in results reported in Figure 5, SA nominal bond yields are shown to be positively correlated with US bond yields, suggesting the interconnectedness between the markets. In addition, the SA bond yields show a temporary decline following a US monetary expansion but rise in response to the US monetary policy

tightening. This is reflected in rising risk premium linked to exchange rate depreciation and consumer price inflation.

5.2.1 What happens to the SA term structure of interest rate?

The earlier section found that SA bond yields react to unexpected US monetary stimulus and a positive shock to bond yields. The significant response of bond yields has implications for the SA term structure of the interest rate. As such, we further investigate how the term structure is affected by three unexpected US financial shocks. The objective is to capture the interactions between money markets and bond markets. We define the term structure (SA term spread) as the difference between the long-term bond yields and money market interest rates.

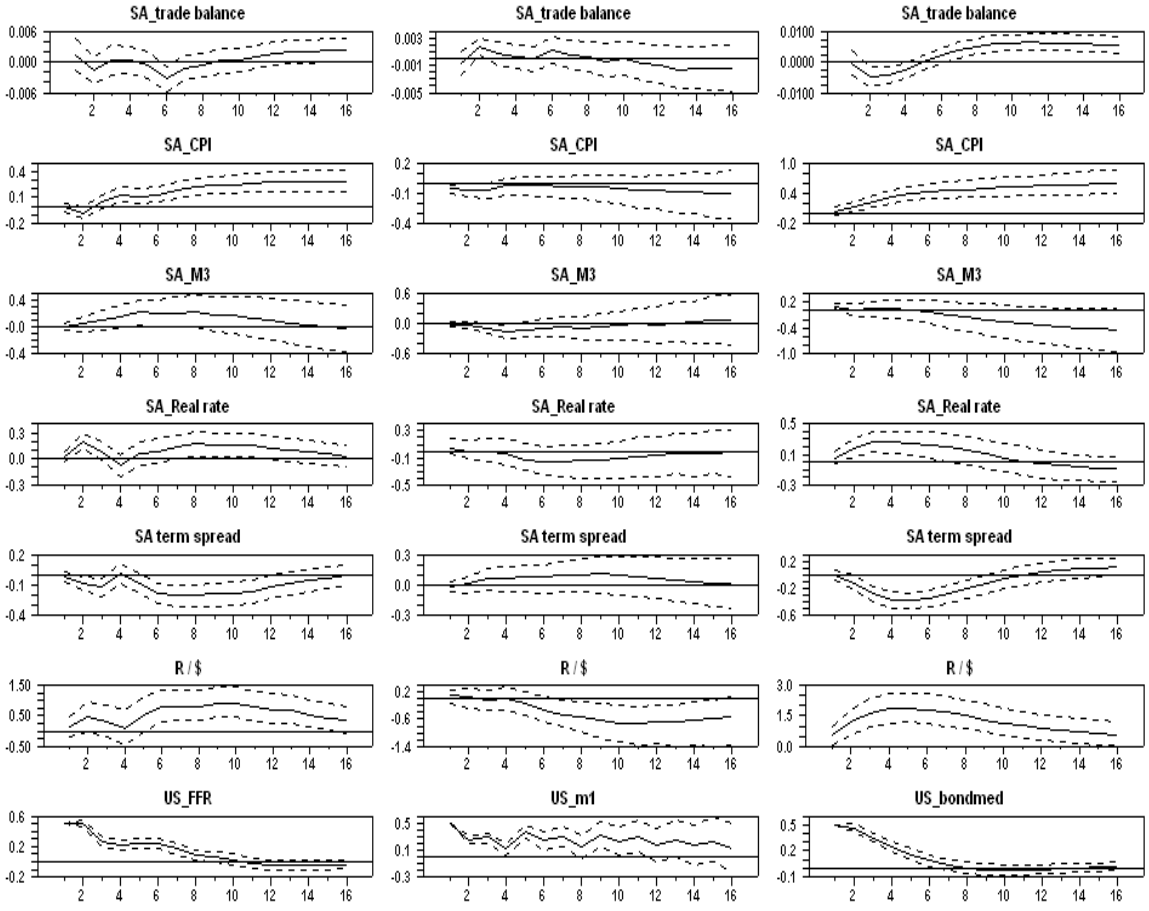
Figure 6. US shocks on SA term spreads and consumption



NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

Figures 6 and 7 show the dynamic responses of all variables to US financial shocks, however, the analysis, focuses on the response of the term-spread variable. We find a significant decline in the SA term-spread to an unexpected tightening in the US monetary policy, as shown in column 1, and medium-term bond yields as shown in column 2. However, the term-spread rises significantly to unexpected US monetary expansionary shock. This arises from a relatively large decrease in nominal money market rates relative to bonds yields. In addition, the lack of significant contemporaneous term-spread reaction suggests that the term-premia period adjusts with a lag. It is worth noting that, results not reported here, defining the term structure as the difference between long-term bond yields and the Treasury Bill rates were similar.

Figure 7. US shocks on SA term spreads and trade balance

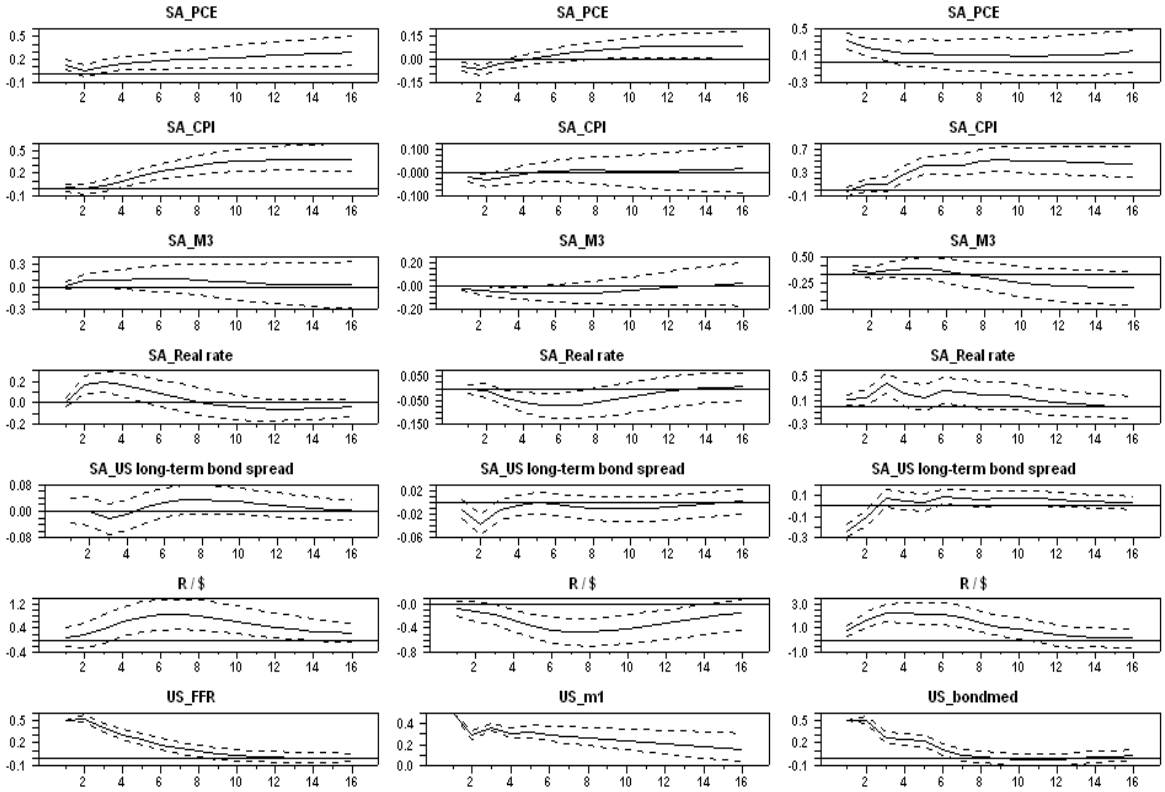


NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

5.2.2 What happens to South Africa US long-term bonds spreads?

We conclude the bond market analysis by examining the long-term bond spread variable defined as the difference between the SA and US long-term bonds. This captures the interactions and dynamics in the portfolios of long-term bonds. Other variables in Figures 8 and 9 still show similar dynamic responses as discussed in earlier sections. In addition, shocks to both, the US expansionary monetary policy and positive US bond yields, in three-quarters of responses leads to a large and significant decline in the SA–US bond spread. This large initial decline in long term SA-US bonds is due to a significant increase in US long term bond yields, and, the latter is strongly correlated with US medium–term bonds yields. Furthermore, this analysis confirms that both US monetary expansion and positive US bond yields shocks are transmitted to the SA economy upon impact through the bond market in three-quarters of the responses.

Figure 8 US shocks on SA and US term-spreads and consumption

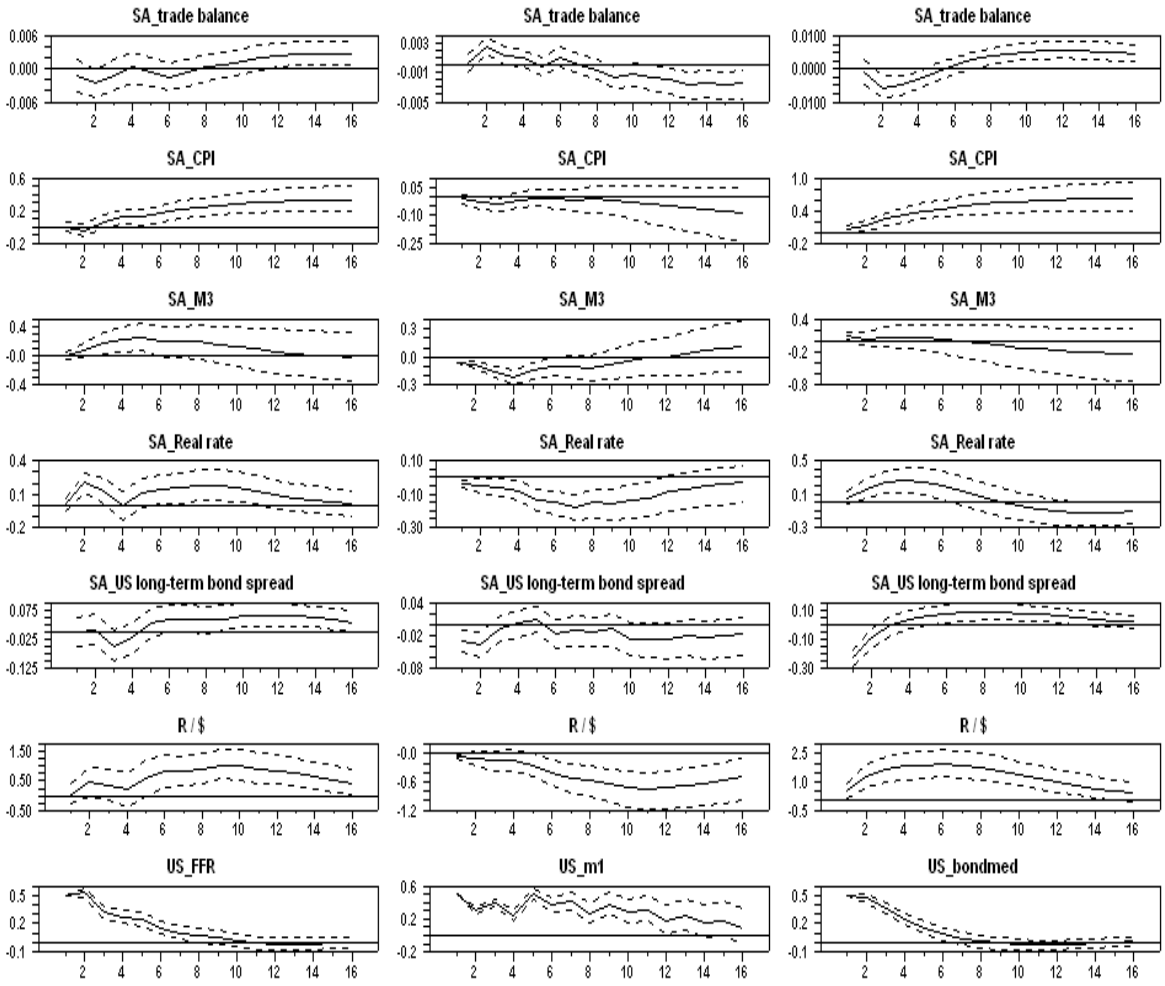


NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

We find similar dynamics in other variables excluding SA–US bond spreads in two cases accounting for the trade balance effects, as shown in Figure 8 and 9. For instance, a contractionary US policy rate shock exterts a delayed but significant upward pressure on the SA–US bond spreads (in Figure 9) in contrast to the same variable response in Figure 8. In Figure 9, following an initial decline on impact, the SA-US long term bond spread tends to rise significantly in response to a positive shock in US bond yields.

However, we suggest that the quick return of SA-US bond spread to pre-shock levels within three quarters may reflect the presence of term premia. While the risk premium is not directly included, it is indirectly included, given that the dynamics of both inflation and the exchange rate variables induce risk premium movements. Hence we find that persistent inflation and prolonged exchange rate depreciation point to increased risk premium in bond yields demanded by investors.

Figure 9. US shocks on SA and US term-spreads and trade balance



NB. The last row denotes the US shocks namely federal fund rate (US_FFR), monetary stimulus (US_M1) and medium term bond yield (US_BONDMED) shocks.

The expansionary US monetary shock induces transitory declines in SA-US bond spreads, followed by the muted response. This points to prolonged stable periods of long term SA-US bond spreads markets. Since inflation rate is muted through all quarters, the bond spreads, hints to possible asymmetrical responses of risk premium between increases and decreases in the exchange rate.

6. Conclusion

We investigated the effects of three US financial shocks on the SA economy using the SVAR approach. We find that an expansionary US monetary shock raises real stock prices, appreciates the exchange rate, lowers money demand, reduces real interest rates and SA bond yields; and exerts limited pressure on consumer price inflation. By and large, this evidence is consistent with the predictions of the Mundell-Flemming model. An unexpected increase in US medium-term bond yields leads to rand-dollar depreciation and bond yields rise as predicted by portfolio balance approach to the determination of the exchange rate.

In addition, the significant decline in real stock prices supports portfolio re-allocation driven by change in return from bonds. We find that a positive US medium-term bond shock leads to a significant j-curve trade balance effect. We also find that an unexpected US policy rate tightening leads to significant increases in SA bond yields, rand dollar depreciation and delayed response in consumer price inflation. Rising bond yields possibly reflect rising risk premium due to the exchange rate depreciation and consumer price inflation induced by the US policy tightening. We also captured the interactions and dynamics in the SA–US long term bond spreads. Both, the US monetary expansion and positive US bond yields shocks lead to a significant decline in the SA-US bond spread.

Overall these findings suggest that the South African economy is highly responsive to external shocks, which may destabilise the economy and limit the effectiveness of policies designed to deal with domestic macroeconomic problems.

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