



**THE IMPACT OF FISCAL DEFICITS ON CAPITAL FLOWS IN AN ‘AT-RISK’
FRAMEWORK ACROSS BOTH RESIDENT AND NON-RESIDENT FLOWS IN
SOUTH AFRICA**

Masters Research

by

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Date: 05 June 2023

Abstract

This paper studies the determinants of capital flows to South Africa by using the ‘at-risk’ framework developed by Adrian et al. (2019) and adapted for capital flow analysis in the seminal paper of Gelos et al. (2022). It extends the work of Goel and Miyajima (2021) on South Africa by including fiscal deficits as an independent variable to analyse the response of resident and non-resident flows to increases in fiscal deficits. The approach uses quantile regression to predict the probability distributions of capital flows to South Africa conditional on domestic economic and financial conditions, and external risk sentiment. Focusing on the tails as opposed to the median of the capital flow probability distributions allows for the examination of extreme cases of capital flows, such as sudden stops and surges. This paper finds a generally strong buffer effect of resident capital flows against non-resident outflows, except in the case of global risk aversion. Domestic fiscal deficits are found to have an impact on both resident and non-resident capital flows, with a specifically strong response of non-resident FDI to domestic fiscal deficits. This highlights the risk of non-resident capital flight in response to increasing fiscal deficits, and the need to properly manage fiscal deficits. This paper has important policy implications as it allows for a better understanding of what causes and subsequently what should help mitigate extreme capital flows.

1. Introduction

Capital flows are a double-edged sword, having the potential to economically benefit and financially destabilize receiving countries (Furceri et al., 2012). They demonstrate increasing levels of financial integration and allow for increased domestic access to financing from abroad, and increased diversification (Prasad et al., 2003). Not only does this immediately benefit the recipients of capital inflows, but the asset diversification via non-resident inflows helps buffer against the domestic impact of financial shocks. The significance of capital flows for emerging markets (EMs) is particularly important as it creates access to much needed investment and funding for economies that may be more dependent on external investment for economic growth than is the case for advanced countries (ACs). South Africa, for example, has a significantly high gross external financing requirement, and a capital account that is largely dependent on capital flows, which creates vulnerabilities in its domestic economy (IMF, 2018).

While capital flows bring benefits, abnormally high inflows (surges) and extreme outflows can create high-risk environments and have destabilising effects on domestic economies. Large capital inflows may create more available credit in an economy and disproportionately increase asset valuations. Additionally, surges can create a disproportionate exposure to foreign currency, making domestic financial systems more vulnerable to foreign shocks. Sudden stops or reversals pose a more obvious risk to the domestic economy through the expatriation of investment, leading to currency depreciation and increased indebtedness. Extreme cases of this can be seen in the Mexican and Asian financial crises of the 1990s.

Capital flows exhibit different dynamics in response to shocks, in this context shocks refer to the unpredictable or random changes in the considered variables. These dynamics depend on both the type of shock and the type of capital flow. In this regard there are both upsides and risks when it comes to capital flows. This is exacerbated by the higher levels of capital flow volatility experienced in EMs when compared to ACs. Capital flows in general consist of both inflows and outflows, and in normal times are benign. However, there are also instances of extreme inflows (surges) and extreme outflows (reversals) that often happen in response to some form of economic shock and can have an ultimately destabilising economic effect.

The potential of capital flows to bring great benefit but also pose a destabilising effect on EM economies highlights the importance of understanding the dynamics and nuances of capital flows. By developing a deeper understanding of how capital flows respond to both global and domestic financial conditions, policy makers can develop macroprudential policy and capital flow management measures to facilitate capital flows in a way that is sustainable. The International Monetary Fund (IMF) has acknowledged this, introducing its Institutional View (IMF, 2012) that supports countries seeking to implement capital flow management and macroprudential measures to mitigate risks to financial stability.

Recent examples of the interaction between capital flows and global shocks can be seen through the response of capital outflows to the financial conditions caused by the COVID-19 pandemic, capital outflows after the global financial crisis (GFC) and around the time of the subsequent ‘taper tantrum’ of 2013. These shock responses were especially significant among EMs (OECD, 2020). This highlights the fact that capital flows in EMs are specifically susceptible to financial shocks, and that financial shocks can be exacerbated by capital outflows.

While the existing literature looks at many contributing factors to capital flows response, none look at the inclusion of fiscal factors in an ‘at risk’ framework (Miyajima & Goel, 2021; Gelos et al., 2022). The extension of this topic to include fiscal deficits was suggested by both Miyajima and Goel (2021) and Gelos et al. (2022) and will form part of the extension of the literature in this paper.

Fiscal conditions are a key element of the resilience of an economy and work hand-in-hand with monetary policy and institutional strength, as well as having a significant interaction with external risk sentiment. Fiscal deficits and current account deficits are inherently connected through the impact of fiscal spending on a country’s exchange rate and thus the incidence of foreign investment, this can lead to a scenario where there is both a fiscal deficit and current account deficit simultaneously. This is known as the ‘Twin Deficits Hypothesis’ and has been shown to exist even post Global Financial Crisis (Bluedorn & Leigh, 2011). This link validates the inclusion of fiscal deficit when looking at capital flows and shows the significance of fiscal policy and fiscal conditions on the current account of a country.

This paper therefore builds on the ‘at-risk’ analysis of Miyajima and Goel (2021) by including fiscal deficits as a “shock” variable to deduce consider the probability of an extreme capital flow response in South Africa. Specifically, it will investigate whether higher fiscal deficits and their interaction with global risk aversion impact on capital flows in an ‘at-risk’ framework across both resident and non-resident flows in the South African case.

The research report is structured as follows. Section 2 provides a review of the literature on capital flow dynamics, types, and capital flows in EMs. Section 3 introduces the data and methodology. The results are provided in Section 4 and are then analysed against existing literature in Section 5. Section 6 concludes.

2. Literature review

Capital flows to EMs are known to be highly volatile and understanding the dynamics of these flows is fundamental in creating macroprudential policy and capital control measures that help prevent economic crises. It is on this basis that significant research has been done into capital flows in EMs. To provide context for this paper we will first examine the literature relating to components of capital flows and the response dynamics of capital flows. This will be followed by literature looking specifically at capital flows to EMs and then moving to a discussion on the literature relating to South Africa and the ‘at-risk’ framework.

Capital flows are intrinsically linked to other economic outcomes such as crises, a fact that is not only true of large capital outflows but is also shown to be a consequence of large capital inflows. Furceri et al. (2012) analysed the link between large capital inflows, banking and currency crises and sudden stops and found that the probability of financial crises, including banking currency and balance of payments crises all increase when there are large debt-driven capital inflows. Additionally, it was found that large portfolio and FDI inflows have little impact on the probability of economic crises. Understanding that capital inflows and outflows can both have detrimental economic impacts, highlights the importance of understanding capital flow dynamics. Additionally, noting the different impacts that are brought about by different types of capital flows, informs the need for disaggregation of flow types in capital flow analysis.

Koepke (2019) summarizes the basis for distinction between capital flows into six main groups: residency of investor, component, type of investor, data frequency, official vs. private sector and currency. The first two categorizations are most important for this paper. The literature on capital flows in its first phase focused on net flows, conflating domestic and foreign capital flows, before moving to a second phase that distinguished between the behaviour of foreign investors and domestic residents (generally termed ‘gross’ flows). This more recent literature points out that first, resident flows in EMs have grown in recent times and are significant for capital flow determination. Second, the focus on non-resident flows is based on a number of important factors, such as their disproportionately large impact on EMs, and ability to create high levels of instability. Non-resident flows, particularly portfolio flows, have the largest significance when analysing financial stability.

Unlike Koepke (2019), Forbes and Warnick (2012) classify gross capital flows in relation to surges, stops, flights and retrenchment to better understand the overall dynamics of capital flows, as opposed to singular extreme events. They make an important contribution to the literature by using gross capital flows as opposed to net flows, meaning that capital flows are disaggregated into resident and non-resident flows.¹ They note that net and gross capital flows had historically exhibited similar dynamics, but with growing levels of resident capital flows, this had changed (Forbes & Warnick, 2012). Understanding capital flows at a gross level not only provides a deeper understanding of capital flow dynamics, but also has implications for policymakers, as the response of capital flows to shocks is significantly influenced by where they originate from.

Turning to the response of specific capital flows to economic shocks, Forbes and Warnick (2012) analyse the relationship between global risk and capital flows. Variability across responses highlights the significance of looking at both resident and non-resident flows independently as well as breaking down capital flows into components.

Claessen and Ghosh (2013) analysed the interaction between capital flow volatility and systemic risk in EMs, breaking up capital flows into global conditions (push factors) and domestic characteristics (pull factors). Eichengreen et al. (2018) also investigated capital flows responses to push and pull factors, in EM flows specifically and found that push factors are the biggest drivers of portfolio flows, while pull factors are the main drivers of FDI, and bank-intermediated flows are driven by both push and pull factors.

Global risk aversion is also discussed by Koepke (2019), who concludes that banking and portfolio flows are greatly impacted by global risk aversion. This analysis draws on references to the GFC. It is elaborated that the VIX is the most common for investor risk aversion and has been used consistently

¹ Koepke and Paetzold (2020, 14-16) point out that the terms ‘net’ and ‘gross’ capital flows are ambiguous in the literature, and result in misconceptions. Gross capital inflows are net purchases of domestic assets by foreign residents and gross outflows are net purchases of foreign assets by domestic residents. As Avdjiev et al. (2022, Online Appendix) put it, “what is commonly called “gross flows” in the literature is actually more accurately described as “net inflows” and “net outflows” ... Thus, although these measures are often called “gross”, they can be positive or negative.”

throughout the literature. This paired with the analysis of country risk indicators which, in the literature, are less robust in their impact on portfolio flows when compared to banking flows. There is evidence that debt to GDP ratio does affect general capital flows, but an interesting relationship has been found, namely that the impact that improved creditworthiness has on capital flows can be drowned out by reduced financing needs. Essentially improved creditworthiness leads to a reduction in foreign portfolio flows (Koepke, 2019). In this vein it is assumed that higher fiscal deficits should in fact increase capital flows due to the need for external financing.

Eichengreen and Gupta (2013) analysed EM responses to the announcement of security purchase tapering by the Fed. Both macroeconomic fundamentals, including fiscal deficits, and financial market conditions were considered. It was found that financial market factors played a more important part in buffering EM economies against the negative impact of the tapering talk, and that high capital inflows received in the years prior to the tapering talk made outflows as a response of the tapering talk more likely.

The research done by Eichengreen and Gupta was later extended by focusing specifically on the effect of the tapering talk in India (Basu et al., 2014). In this context it was found that the weakened macroeconomic conditions in India, made the economy more vulnerable to negative consequences as a response to the tapering talk. Basu et al. (2014) highlighted Indian fiscal deficit as playing a large part in this vulnerability, explaining that the increased fiscal deficit in India at the time, which increased the vulnerability of the country to capital outflows by narrowing the policy space. It was noted that the increasing fiscal deficit was largely as a response to the GFC as opposed to increased investment by the government highlighting that the reasons behind fiscal deficits may also be an important consideration when analysing their impact on macroeconomic and fiscal vulnerabilities.

Calvo et al. (2003) studied a similar response in Argentina, where low levels of fiscal sustainability resulted in government inability to offset underlying vulnerabilities by narrowing the policy space inhibiting public sector intervention. This highlights the importance of fiscal sustainability in being able to respond to economic shocks, such as capital outflows, which have the potential to, without appropriate fiscal policy response, cause economic crises. This finding links to the significance and interaction between fiscal conditions and capital flows which will be discussed in this paper.

Building on the concept of economic vulnerability, fiscal sustainability, and their interaction with capital outflows, Unver et al. (2015) examined determinants of economic fragility in the context of the “Fragile Five” countries by looking at fiscal sustainability over the long term and sovereign ratings across Brazil, India, Indonesia, South Africa, and Turkey. Fiscal sustainability is a key component in assessing the economic fragility of a country and while government debt was considered a contributing factor to fiscal sustainability, it showed no statistically significant effect for South Africa.

Financial fragility indicates the vulnerability of an economy or financial system to financial crisis, this fragility can be subverted by strong financial and macroeconomic systems. One of the ways in which an economy can buffer against crises with fiscal sustainability, which allows for increased ability for public sector intervention in response to crises. South Africa has been shown to have historically high levels of fiscal sustainability (Burger et al., 2011; Calitz et al, 2014; Mackiewicz, 2021).

Mackiewicz (2021), used a fiscal reaction function to provide the most recent analysis of South African fiscal sustainability. It was found that, despite South Africa meeting the fiscal sustainability conditions, growing public debt may, if not addressed, offset this sustainability. This provides insight into not only levels of financial stability in South Africa, but also sheds light on the potentially destabilizing effects of fiscal deficits.

There is little research on the direct impact of fiscal deficits on capital flows and any research done was pre-GFC. It was shown that there was “bidirectional causality” between capital inflows and fiscal deficits, where public borrowing caused rising interest rates which then created the possibility for greater return on investment (Bahmani-Oskooee & Payesteh, 1994). It is also known that larger fiscal

deficits and other local vulnerabilities can exacerbate the detrimental effects of large capital outflows in EMs (Garcia Lopez & Stracca, 2021).

Looking at the dynamics of capital flows in the context of emerging markets we find that EMs experience higher levels of economic vulnerabilities for a number of reasons including that capital flows are often larger relative to the size of their economies, economies are less diversified (and potentially more dependent on capital inflows) making them more vulnerable to shocks, and they often have weaker institutions and less resilient financial structures. These factors mean that all capital flow shocks, both surges and reversals, are exacerbated (Claessen & Ghosh, 2013). It has been shown that large capital outflows are the biggest forces behind recessions and create the largest losses in EMs, when compared with both currency and debt crises (Claessen & Ghosh, 2013).

EMs are often characterised by large foreign bank presence, high levels of dollarization, weak institutions and constrained policy making ability (Claessen & Ghosh, 2013). While many of these generalised EM characteristics are not applicable as South Africa has strong institutional frameworks and an advanced financial system, it remains important to understand the overarching kinds of vulnerabilities that can expose a market to extreme capital flows.

Eichengreen et al. (2018) investigated different capital flows in emerging markets with respect to their volatility. The basis for this research was to test the conventional wisdom around the high levels of volatility in capital flows among EMs in modern times. In their research Eichengreen et al. found that capital flows in EMs are still volatile, but FDI inflows are less so than other capital inflows. As far as outflows go, they noted increased levels of FDI outflows from EMs, along with increased volatility of these FDI outflows.

There is extensive literature on capital flows in South Africa; Rangasamy (2014) for example provides a detailed look into capital flows for the period 1961Q1-2011Q4. In addition to providing a detailed summary of the financial context of South Africa with respect to capital flows, this paper also identifies capital flow episodes (initially on a net basis) and outlines important characteristics of these capital flow episodes.

Capital flows in South Africa increased significantly after the end of apartheid in 1994 and from the capital account liberalisation that happened in 1995. This is a stark contrast to the capital controls and financial sanctions that were imposed pre-democracy. Rangasamy (2014) finds South African resident and non-resident capital flows respond asymmetrically to financial crises. Additionally, looking at specific types of capital flows, it was found that FDI reversals are comparably sensitive to portfolio and other flows during normal times, despite FDI flows being seen as more stable.

Over the observed timeline certain characteristics of South African capital flows were exposed. First there is a strong positive correlation between non-resident inflows and resident outflows and vice versa. Second, while foreigners made up the majority of capital inflows post-democracy, this trend has changed, and SARB reserve accumulation has contributed to the positive levels of capital inflows. Finally, it was shown that resident flows played an important role in mitigating non-resident capital flight during the GFC (Rangasamy, 2014). This paper also emphasises the importance of considering gross over net capital flows which is in line with other literature (Forbes & Warnock, 2012; Koepke, 2019).

Gumata and Ndou (2019) provide an analysis of the response of the South African economy to different types of capital flows as well as interrelationships between capital flows and economic determinants like exchange rates and GDP growth responses. This provides a view of South Africa-specific financial and economic responses. The main findings as they relate to analysing capital flows at-risk are first, domestic investors do not consistently act as a stabilising force in response to shocks. Second, surges, sudden stops and global risk shocks are all shown to magnify the effect of other shocks on the economy.

Third, capital flow sudden stops cause credit growth to slow down while VIX also slows down credit growth. Conversely capital flow surges have a positive relationship with credit growth.

Adding some additional context to capital flows dynamics in South Africa, Gossel and Biekpe (2012) looked at the short- and long-run impact of push and pull factors on FDI, portfolio and other capital flows. This highlights an important consideration when it comes to capital flow analysis, that being that capital flows respond differently to certain drivers over different time periods. Gossel and Biekpe also grouped capital flow drivers into 'push' and 'pull' factors, and found that portfolio flows are mainly driven by 'push' factors in the short-run, and both 'push' and 'pull' in the long run. FDI on the other hand is driven by 'push' factors in the short-run and 'pull' factors in the long-run. They find therefore that short-run shock responses of capital flows are not necessarily indicative of their long-term drivers.

In an important contribution to the literature on the determinants of South African capital flows, Kavli and Viegi (2017) estimate the time varying relationship between portfolio inflows and the VIX and sovereign spread. They find that the VIX and sovereign spreads have different effects on cross-border flows over time. Specifically for this paper, it is important to note that they found VIX to only be a driver of portfolio flows during a shortly after a financial crisis. Again emphasising that shock responses do not give the full picture of capital flows dynamics.

Another researched area of South African capital flows is analysing their interaction with global spill overs and business cycles as a result of globalisation. Gossel and Biekpe (2012) looked at the cyclical relationship between business cycles and capital flows and Kabundi et al. (2020) looked at the co-movement between South African financial variables in response to both global financial crises and US monetary policy. Both papers found a level of procyclicality of South African financial conditions, the spill over effect is not always strong. Kabundi et al. (2020) found that South African financial cycles have a countercyclical relationship with VIX and Gossel and Biekpe (2012) looked at capital flows specifically and found a lack of procyclicality from portfolio flows and slight procyclicality from FDI flows. This aligns with expectations of portfolio flow volatility and FDI stability.

Traditional methods of analysing capital flow responses come with a number of limitations, most notably the inability to analyse average capital flows, surges and sudden stops together, as well as needing to create a benchmark for what constitutes a surge or sudden stop. These problems are addressed by using the 'at-risk' framework when analysing capital flows. This methodological approach allowed for the ability to predict the future probability distribution of capital flows to allow for differentiation between the median probability and the tails of the distribution and how they impact capital flows, as well as being able to isolate out short-term and medium-term effects.

Gelos et al (2022) is the seminal paper analysing capital flows 'at-risk', although this type of analysis has been made popular recently in the context of growth by Adrian et al (2016, 2019). Building on the idea that an understanding of capital flows in EMs is significant in creating more resilient institutions and tailored policy choices, Gelos et al. (2022), implemented a cross-country, quantile regression framework, integrating the Adrian et al. Growth-at-Risk (GaR) methodology. The intention behind this was to analyse how policy frameworks and decisions can be used to mitigate the effects of capital flow volatility. Gelos et al. (2021) use a quantile regression framework for the following reasons, first there are non-linearities across capital flow episodes specifically between strong and weak flow regimes, second policy makers are more interested in the instance of extreme capital flow episodes than they are average capital flows and lastly domestic and global factors that impact capital flows exhibit a certain level of time variance.

It is highlighted that from a policy perspective analysing the tails of the probability distribution is often more relevant than looking at the median probability. It is in this context that the capital flows 'at-risk' framework is introduced. Capital flows 'at-risk' allows for the volume of capital flows at different probabilities to be estimated. (Gelos et al., 2022). This piece of research has specific significance in

the context of post-COVID literature and assessing the dynamics of capital flows in response to global shocks. It also considers the time-varying component of shocks, and disaggregates capital flows in resident and non-resident flows, which holds significance (this is shown in Koepke, 2019).

In the face of adverse global shocks, capital controls are sometimes counterproductive, while foreign exchange and macroprudential responses help dampen downside risks. An important finding is that good institutional frameworks only aid in speeding up the post-shock recovery and do not mitigate extreme capital flows post global shock. There are mixed findings for countries with deeper financial markets as, while deeper markets curb large outflows of capital, there is greater investor mobility facilitating higher levels of capital flows when compared to shallow markets. This effect can be summarized by the conclusion that open capital accounts experience increased capital inflows, but in the same vein can lead to outflows at the same rate, in response to shocks (Gelos et al., 2022).

In a European Central Bank working paper, Eguren-Martin et al. (2021) also assessed capital flows ‘at-risk’. Specifically focusing on the dynamics of push and pull factors as well as going into detail around which types of policy responses have capital flow stabilising effects. This paper looks at flows from an AC perspective but assesses how push and pull factors impact flows to EMs. Eguren-Martin et al. also highlights two key aspects that enforce the value of using an ‘at-risk’ framework to assess capital flows. First for going ‘beyond the mean’ and assessing how both ‘push’ and ‘pull’ factors impact capital flows across the entire distribution, allowing for specific focus on weak and strong flow periods. The second benefit they highlight is not needing to create abstract metrics to define extreme mapping, as by plotting the flows on a probability distribution, extreme flows can be inferred from tail percentiles.

The significant, heterogeneous impact of push and pull type shocks on non-resident capital flows was a key finding of this paper. It was found that the left tail of the distribution, signaling the probability of large capital outflows, reacts most strongly to both pull and push type factors (Eguren-Martin et al., 2021). Global financial conditions were seen to significantly slow down both portfolio and banking inflows, while having no significant effect on FDI. Local financial conditions had very little impact on FDI and portfolio flows, while banking flows showed a stronger response to tightening local financial conditions increasing the probability of large capital outflows, which creates the risk of a sudden-stop (Eguren-Martin et al., 2021).

As examined earlier, South Africa provides a unique context under which to analyse capital flows, having many EM characteristics as well as an advanced financial sector. Miyajima and Goel (2021) use the ‘at-risk’ framework to differentiate between extreme and typical capital flows in South Africa, as a response to shocks. Looking at capital flows in South Africa by breaking them up not only by type of flow, but also into resident and non-resident flows, provides a holistic view of how different types of capital flows respond to different shocks. Most notably it was shown that resident flows and non-resident flows are inversely correlated allowing for non-resident outflows to be buffered by resident flows.

As noted, capital flows can be broken up into different components, with each having unique dynamics and characteristics. These general categories are portfolio flows, both debt and equity, FDI, and other investment flows. Flows can also be broken up into sectors such as corporate, banking and sovereign. Miyajima and Goel (2021) employed these categories in their analysis looking at capital flow by sector for non-resident flows and by type for resident flows. They then looked at the impact of higher global risk aversion, higher domestic growth, and tighter domestic financial conditions, to discern how each “shock” impacted each different category of capital flows.

It was found that higher global risk aversion has a negative impact on non-resident portfolio flows, with debt flows being more greatly affected than equity flows. Global risk aversion also has the greatest impact on non-resident flows. Higher domestic growth positively affects all flows including corporate sector non-resident flows, while tighter domestic financial conditions can have a variety of effects depending on the type of flow (Miyajima & Goel, 2021). This shows the variability of capital flows to different shocks, showing from a policy perspective that there is no one-size-fits-all answer. Despite

this, an understanding of the dynamics and risks of capital flows is integral in creating a shock-resilient economy, specifically in instances where countries experience high levels of capital flows relative to a country's GDP.

In their paper, Goel and Miyajima (2021) conclude by discussing potential extensions on their work. In order to build on their framework, the potential areas for extension include exploration into the inverse buffering relationship that exists between resident and non-resident flows; comparing South Africa to other EMs and examining country specific factors; and further investigation into the role of fiscal deficits. Looking at fiscal deficits, it is suggested that this be explored in relation to its interaction with VIX to look specifically at how global risk aversion responds to levels of fiscal deficits.

The existing literature does not currently examine fiscal deficits or their interactions with capital flows, specifically in relation to surges and sudden stops. Including fiscal deficits as a variable and examining its interaction with capital flows in an 'at-risk' framework will add to the literature by providing this analysis with a more focused risk-aversion dimension. By noting the importance of fiscal sustainability in preventing economic crises, looking at the fiscal deficit will help understand to what extent fiscal deficits impact capital flows. This can assist in developing more informed macroprudential policy and capital control measures.

3. Methodology and data

3.1 Quantile regression in an 'at-risk' framework

In line with the methodology in Goel and Miyajima (2021) and Gelos et al. (2022), this paper will use quantile regression to estimate the expected future distribution of capital flows. This approach builds on the work of Adrian et al. (2016, 2019), whose Growth-at-Risk (GaR) framework provides the foundation for the various 'at-risk' approaches.

Using this framework, Gelos et al. (2021) take a two-step estimation approach. The first step follows directly from Adrian et al. (2019) and uses quantile regression to estimate future capital flows. The second step uses these estimates to construct an empirical distribution for the predicted future capital flows. This two-step approach for analysing capital flows allows us to first deduce the probability that capital flows are at or below a specified level and second to determine the volume of outflows at a specified probability, which is the measure of capital flows 'at-risk' (Gelós et al., 2022).

Unlike in Gelos et al. (2021) this paper will not look at a cross-country panel analysis but will be focusing on South Africa specifically, as in Goel and Miyajima (2021). Goel and Miyajima follow a similar approach to Gelos et al. (2021) and distinguish between different regimes of capital flows based on the results of the quantile regressions. They define the lower tail of the capital flow distribution as the average of estimated coefficients up to the 30th percentile of the distribution, the median between the 40th and 60th percentile ('normal flows') and the upper tail as anything above the 70th percentile ('strong flows'). This paper will take the same approach and use these percentiles as guidelines to determine the tails of the estimated distributions. As not all flows have a historical probability that is symmetrical around the vertical zero line, the median flows episodes for certain flow types can represent either inflows or outflows. Based on historical distributions 'strong flow' episodes will tend to be inflows, 'weak flow' episodes will tend to be outflows, and median flows around zero can either be in- or outflows.

3.2 Model specification

The baseline regression is taken from Goel and Miyajima (2021):

$$\bar{y}_{i,t+1:t+h}^{\alpha} = \gamma_i^{\alpha} + \beta_1^{\alpha} Global_t + \beta_2^{\alpha} Domestic_{i,t-1} + \beta_3^{\alpha} TimeControls + e \quad (1)$$

This equation is estimated for a range of percentiles ranging from the 5th to 95th percentile using quarterly data. In order to represent the average flows over the next year, the time horizon h is set to $h=4$, and time t refers to the current quarter,

The dependent variable in the quantile regression will represent capital flows. Resident and non-resident capital flows will be analysed separately and further disaggregated into types of flows. Resident flows, these are separated into: portfolio flows, FDI flows and other capital flows. Non-resident flows are broken up by sector, specifically corporate, banking, and sovereign sectoral flows, and then looked at also in terms of types of flows.

Resident flows are not disaggregated into sectors as these shocks would be accounted for in the domestic financial conditions index (FCI).

Superscript α is the percentile at which the regression is estimated. In a general quantile regression of a variable $\bar{y}_{t:t+h}$ on a vector of controls x_t , $\bar{y}_{t:t+h} = \delta^{\alpha} x_t$. δ^{α} is the regression slope and is chosen to minimise the quantile-weighted absolute value of errors:

$$\delta^{\alpha} = \underset{\delta}{\operatorname{argmin}} \sum_{t=1}^{T-h} (\alpha \times 1_{\bar{y}_{t:t+h} < x_t \delta} |\bar{y}_{t:t+h} - x_t \delta|)$$

Where $1_{(\cdot)}$ is the indicator function. Percentile $\bar{y}_{t:t+h}$ is the predicted value from the regression conditional on x_t . Equation (1) is estimated for a range of percentiles (5th to 95th) and these estimated are then used to construct an empirical distribution of predicted average portfolio flows (Miyajima & Goel, 2021).

Global_t: VIX index to proxy global “push” factors

Domestic_t: Country-specific factors which are informed by the domestic factors considered in Goel and Miyajima (2021). These include domestic real GDP growth, domestic financial conditions, as informed by Koepke (2019), and domestic asset returns (for portfolio flows: local stock market returns and for banking flows: local currency appreciation, banking sector equity performance).

Fiscal Deficit_t: The fiscal deficit variable is a unique addition of this paper and is added into the base model as defined by Goel and Miyajima (2021).

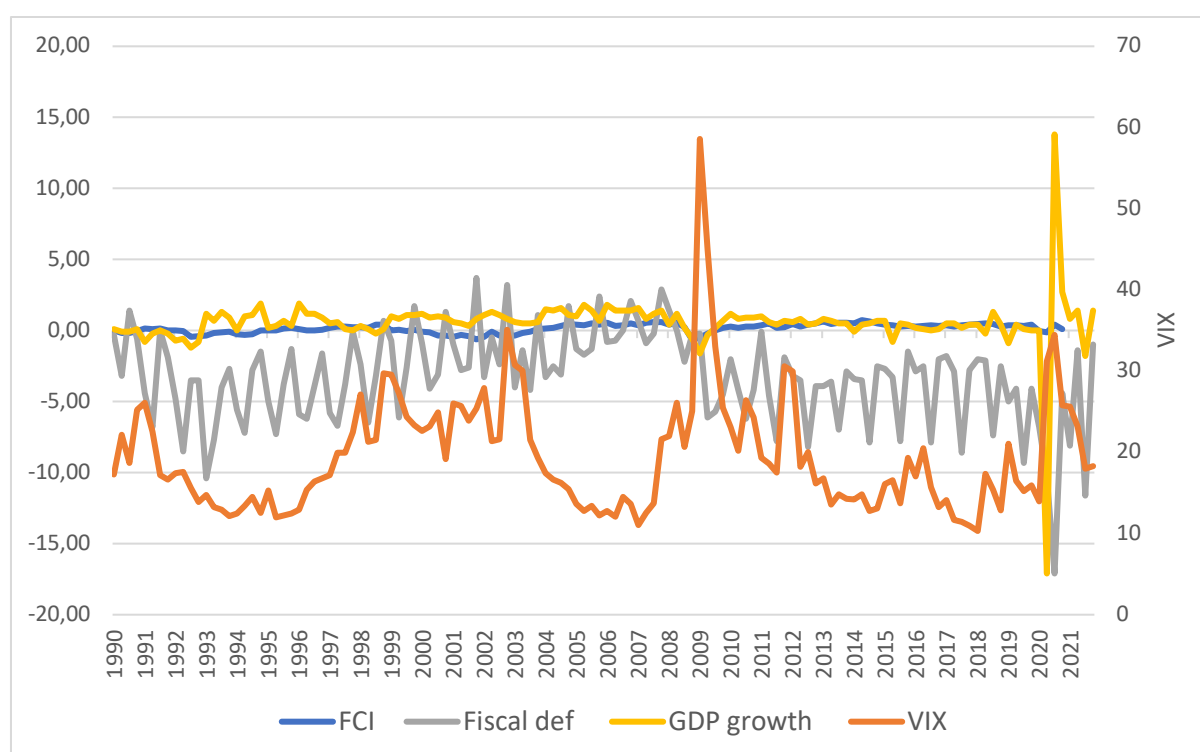
We will also test a regression that extends the baseline regression (1) to include a fiscal deficit component:

$$\bar{y}_{i,t+1:t+h}^{\alpha} = \gamma_i^{\alpha} + \beta_1^{\alpha} Global_t + \beta_2^{\alpha} Domestic_{i,t-1} + \beta_3^{\alpha} FiscalDeficit_t + \beta_4^{\alpha} TimeControls + e \quad (2)$$

The addition of fiscal deficit to this model will allow for a more detailed analysis of the response dynamics of resident and non-resident capital flows.

3.3 Data

Figure 1: Variables in model of estimation



Quarterly data were used for all variables with data being taken from the first quarter of 1990 up until the last quarter of 2021. Most of the data used in this paper is sourced from the South African Reserve Bank. For the fiscal deficit, quarterly data for “national government deficit/surplus as % of GDP” was used (source: SARB, series code: KBP4420K). Fiscal deficit as a % of GDP is the sole indicator used to proxy for risks associated to fiscal sustainability and/or sovereign default, it is noted that this approach has limitations and that disaggregation of fiscal deficit into granular components would provide more robust results.²

Moving on to capital flows, it is important to point out that on the South African balance of payments (BOP), inflows are positive values (+), and outflows are negative (-) values (Motsumi et al., 2014).³ Positive gross capital inflows are net purchases of domestic assets by foreign residents, and negative gross inflows are net sales of domestic assets by foreign residents. Similarly, positive gross capital outflows reflect the repatriation of the proceeds of foreign asset sales by domestic residents, and negative gross outflows are net purchases of foreign assets by domestic residents.

For gross resident outflows (SARB QB codes are given in parentheses):

- i. Net portfolio investment (KBP5660K)
- ii. Net FDI (KBP5656K)
- iii. Net other investment (KBP5666K)

The data used for gross non-resident inflows by type:

- i. Net portfolio investment (KBP5644K)
- ii. Net FDI (KBP5640K)

² Hollander (2021) and Havemann and Hollander (2022) disaggregate fiscal deficits to provide a more robust analysis, and more concise policy recommendations

³ Koepke and Paetzold (2020, 14-16) also note that sign conventions are a source of confusion regarding capital flow data. The sixth edition of the IMF’s Balance of Payments and International Investment Position Manual (BPM6) in 2009 changed the long-standing sign convention to reflect that increases in foreign assets now enter with a positive sign (whereas previously they had a negative sign). Motsumi et al. (2014) note that South Africa retained the previous positive and negative sign convention, hence the definitions used here.

iii. Net other investment (KBP5650K)

Non-resident inflows by sector are broken down into:

- i. Corporate non-resident flows, which were calculated by adding:
 - a. Corporate portfolio (KBP5643K)
 - b. Corporate FDI (KBP5649)
 - c. Corporate other flows (KBP5656K)
- ii. Non-resident banking flows which were calculated similarly, using:
 - a. Banking portfolio (KBP5642K,)
 - b. Banking FDI (KBP5646K)
 - c. Banking other flows (KBP5652K)
- iii. Sovereign non-resident flows were calculated by adding the following:
 - a. Public corporation flows (KBP5641K, KBP5647K, KBP5653K)
 - b. Monetary authority flows (KBP5645K, KBP5651K)
 - c. General government flows (KBP5646K, KBP5652K)

Capital flow data was not reported as a percentage of GDP, this calculation was done using the above capital flows data and quarterly nominal GDP data (source: SARB, code: KBP6006K).

The VIX was taken from Federal Reserve Economic Data (FRED®) at the Federal Reserve Bank of St. Louis. The FCI variable was designed for a Growth-at-Risk analysis of South Africa (Farrell, 2021). This FCI used here consists of 23 financial stability risk indicators grouped into three different measures: asset valuations, private nonfinancial sector indebtedness and external conditions. It is important to note that the FCI used in this paper doesn't include any fiscal deficit indicators.

3.4 Preliminary data analysis

Figure 2: Resident and non-resident capital flows (as a % of GDP)

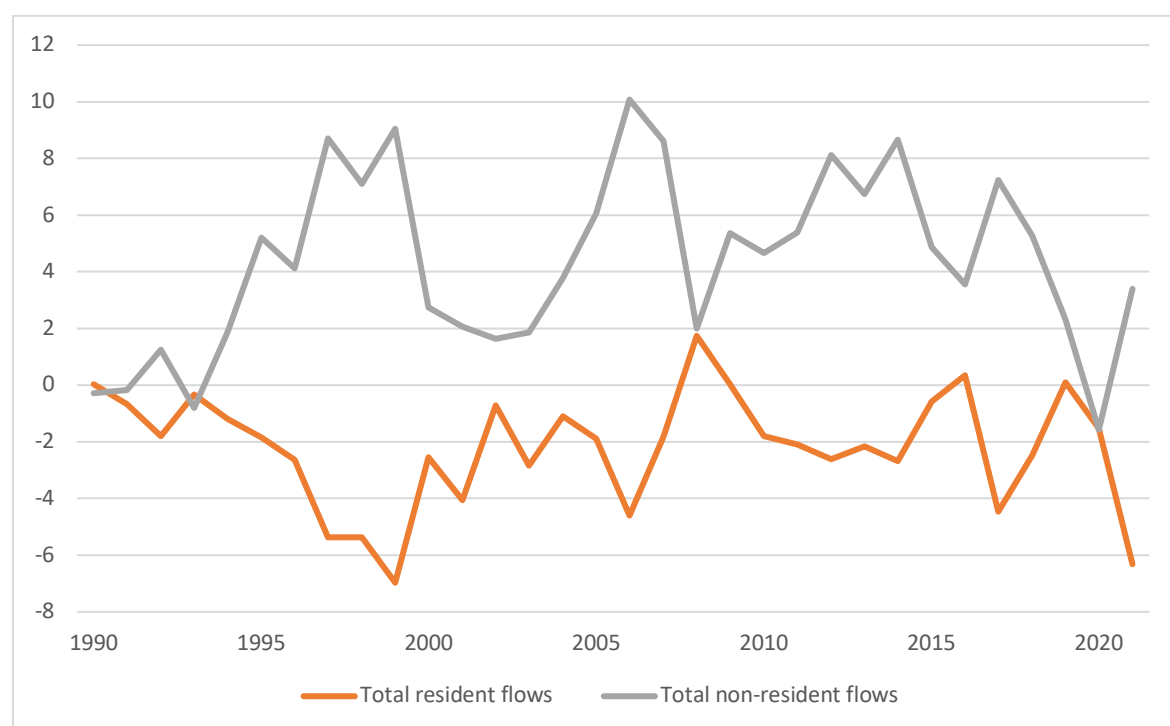


Figure 1 shows that resident and non-resident flow largely move in opposite directions. It is specifically important to note three important shock periods. Firstly, post-1994 when South Africa became a democracy, here we can see the negative responsive of negative response of resident flows potentially to diversify resident portfolios, while there is a significant inflow of non-resident capital, likely due to the increased investment opportunity in a newly democratic country. The second key shock period is during the 2008 Global Financial Crisis (GFC), here again we see resident flows acting as a buffer against non-resident flows. The GFC resulted in a sharp decline in non-resident flows, meaning there was non-resident capital flight, but this happened in conjunction with resident flow retrenchment. The last shock period is COVID-19 in early 2020 where similarly to during the GFC we saw non-resident capital withdrawal and increased resident capital inflows. Historically we see that increasing resident flows help counteract decreasing non-resident flows and vice-versa. This echoes the findings of Goel and Miyajima (2021) and Gumata and Ndou (2019), that resident flows act as a buffer for non-resident flows.

At face value non-resident flows seem more significant in their ability to not only bring money into the country, but also important to consider the reversal-risk these inflows pose. Residents in EM countries are also known to have capital flows that are sensitive to domestic political and economic risk, which makes them susceptible to domestic shocks which may cause capital flight (Schneider, 2003). Observing resident capital flows alone does not give an indication of the economic and political instability in a country or region.

The inverse dynamics of resident and non-resident flows highlight the importance of looking at types of capital flows rather than just the net capital flows in or out of a country. Additionally, breaking up resident and non-resident flows into the specific types of flows rather than just looking at total flows will help us better understand the heterogenous effects that different shocks have on capital flows. Looking at total flows exclusively would provide too narrow an explanation to properly understand the dynamics and give accurate policy recommendations (Eguren-Martin et al., 2021).

Another important area of preliminary data analysis is looking at the historical distribution of the different capital flows we consider in this paper. This is done by fitting the historical distribution to a student's t-distribution, as was done in Goel and Miyajima (2021). Figures 2-4 capture the results of this.

Understanding the historical distributions of capital flows helps provide context in which to interpret the results of the outputs of the 'at-risk' quantile regression. For example, all of the historic distributions have a negative left tail, representing capital outflows. If our 'at-risk' shock responses are also negative for the left tail or 'weak flow' episode, this highlights the fact that there is a negative shock to an already historically negative flow, highlighting the risk of capital flights. Conversely a positive 'weak flow' 'at-risk' response indicates that based on historic trends, the shock in question lessened the outflow effect, or made the outflow "more positive". Understanding these dynamics is important when interpreting the 'at-risk' results, specifically when it comes to highlighting responses that can be potentially detrimental to the economy.

Figure 3: Capital flow distributions for non-resident flows (by type) as a % of GDP

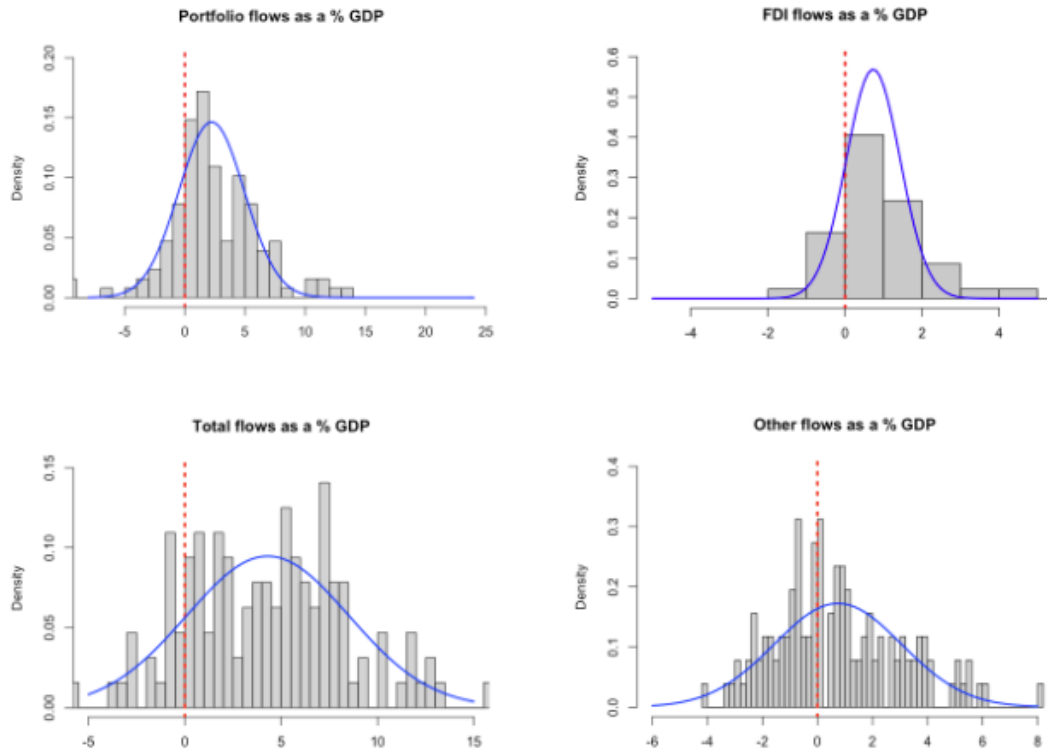


Figure 4: Capital flow distributions for resident flows (by type) as a % of GDP

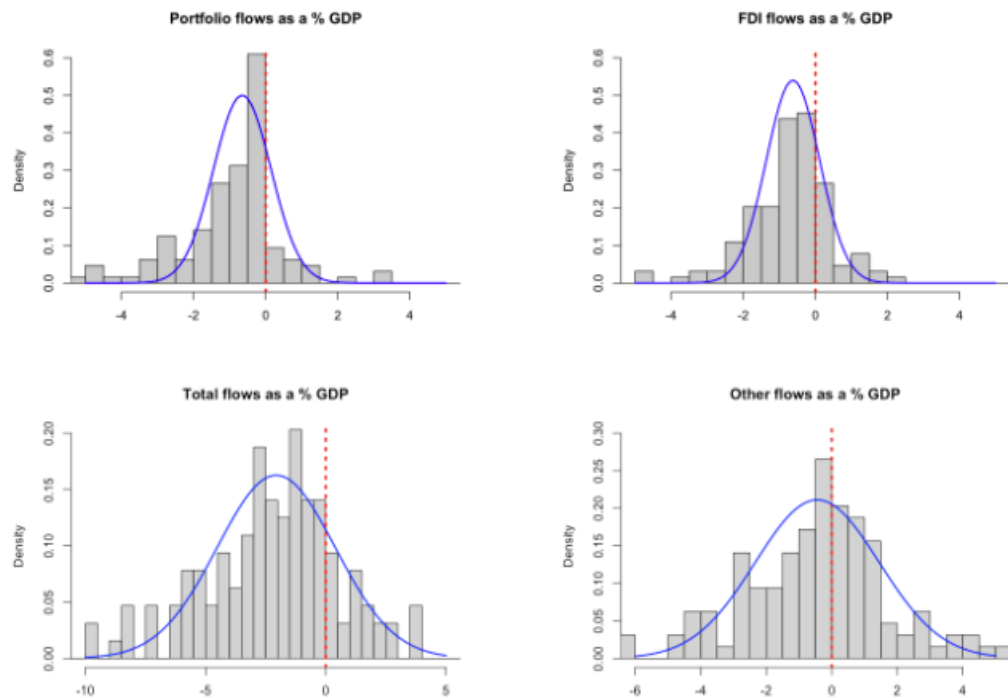
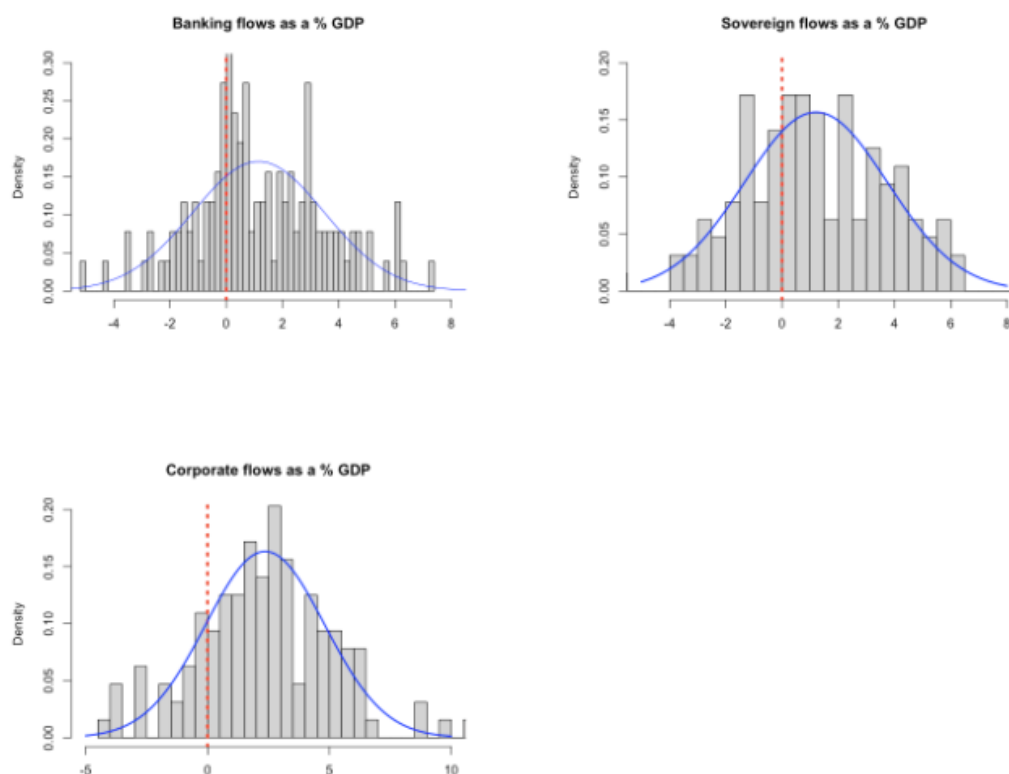


Figure 5: Capital flow distributions for non-resident flows (by sector) as a % of GDP



4. Results

We report the results of quantile regression estimates for (1) resident and non-resident flows and then (2) disaggregated portfolio, FDI and other flows as informed by Goel and Miyajima (2021). Using equations (1) and (2) we explore the response of these different flows to four shocks:

1. Tighter domestic financial conditions
2. Higher domestic growth
3. Increased global risk aversion (proxied by VIX)
4. An increase in domestic fiscal deficit.

The last of these is particularly important as it is a shock that has not been examined in relation to capital flows, the inclusion of fiscal deficits as a driver of capital flows is thus a novel addition to the existing literature.

4.1 Resident and non-resident capital flows ‘at-risk’ (disaggregated by type of flow)

4.1.1 Tighter domestic financial conditions

Tighter domestic financial conditions manifest partly in a higher domestic interest rate, and potentially a widening of the nominal interest rate differential between destination and source countries. This response is expected to support increased non-residents inflows, while simultaneously causing increased resident outflows. Higher relative domestic interest rates mean a better return on investment for non-residents, which would explain the inflow of capital. Conversely, higher domestic interest rates may indicate less domestic liquidity and a reallocation of resident finances to help combat generally tighter domestic financial conditions.

In Figure 2 non-resident capital flows respond more strongly to tighter domestic financial conditions than resident capital flows. Total non-resident capital flows show a strong positive response across weak, median, and strong flow regimes. This demonstrates that tightening domestic financial conditions cause capital inflows by non-residents. Non-resident FDI is the least responsive, albeit still positive. Non-resident portfolio flows respond more positively the stronger the flow, this is in line with the expected volatility of portfolio flows. Interestingly portfolio flows are the only non-resident flow that has a negative response and only for weak flows. This can have negative implications for the South African economy as a withdrawal of non-resident portfolio investment can lead to currency depreciation, capital flight episodes, and financing constraints.

Resident capital flow responses are more negative than those of non-residents. There is a strong negative response for all weak flow types. The only positive responses are portfolio and other flows for strong flow episodes, this may be due to portfolio volatility as well as potentially acknowledging the potential for higher investment returns from increased domestic interest rates as a result of tightening financial conditions. It is important to note that the response of median flows is negligible, but the response of weak flows is strong. This should caution against large resident outflows that could be caused by tightening domestic financial conditions and would have a potentially detrimental impact on the South African economy.

Figure 6: Response of Non-resident Capital Flows to a Change in Domestic Financial Conditions (as a % of GDP)

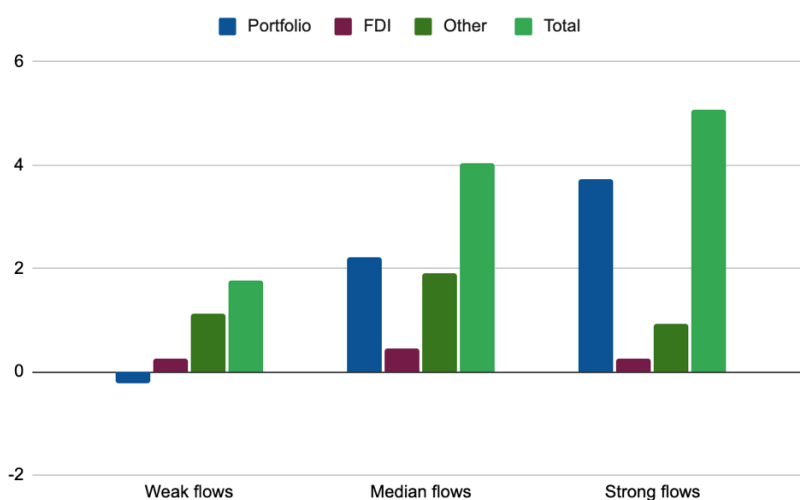
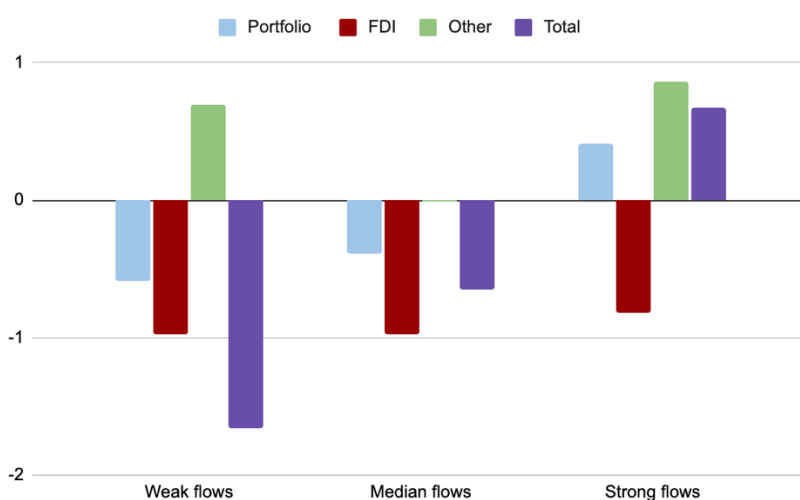


Figure 7: Response of Resident Capital Flows to a Change in Domestic Financial Conditions (as a % of GDP)



4.1.2 Higher domestic growth

Higher domestic growth is expected to have a positive effect on non-resident capital flows as better domestic growth indicates better domestic investment opportunity and a strengthening economy. In Figure 4 the response of non-resident flows to higher domestic growth shows that portfolio and total flows having strong positive responses for weak, median, and strong flows. FDI is seen to be less sensitive, which is expected but interestingly is negative during strong flows episodes.

The response of resident flows to domestic growth is inverse to that of non-resident flows. Figure 5 shows portfolio flows are the most sensitive and increase in sensitivity between weak and strong flows. Like non-resident flows FDI is the least sensitive to domestic growth and is only positive for strong flows. It must be highlighted that the positive inflow result of higher growth can create a feedback effect creating macroeconomic overheating, this may be offset by the inverse dynamics that exist between resident and non-resident flows.

Figure 8: Response of Non-resident Capital Flows to Higher Domestic Growth (as a %of GDP)

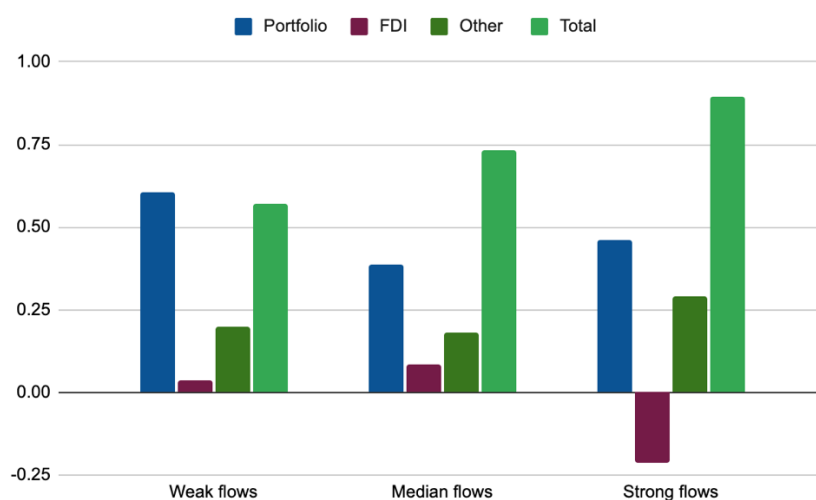
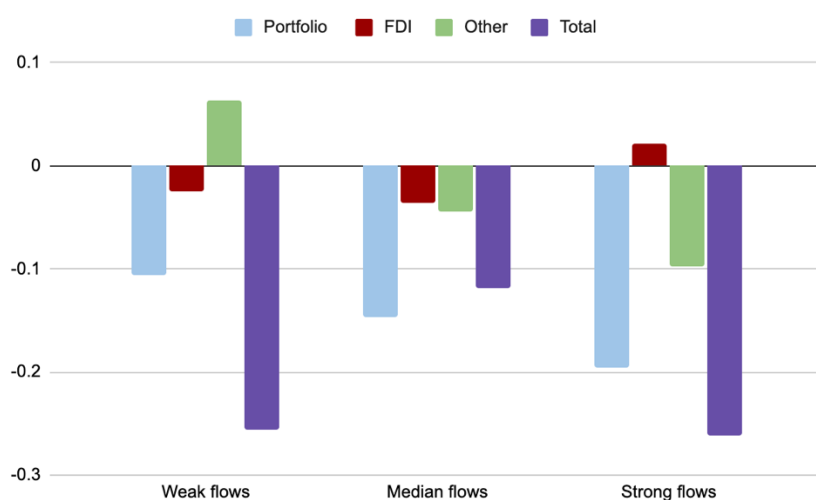


Figure 92: Response of Resident Capital Flows to Higher Domestic Growth (as a % of GDP)



4.1.3 Global risk aversion

Higher global volatility may lead to seeking of better portfolio diversification and thus increased investment in different markets. Higher global volatility may also signal higher return on investment due to the higher risk of investment. Both dynamic responses align with the fact that non-resident flows generally increase despite higher risk aversion. This provides a positive outlook the South Africa economy, as there is still incidence of non-resident capital flows in the face of increased global risk aversion as this exogenous factor is difficult to develop mitigation policies around. In Figure 6 FDI and other flows are less sensitive to global risk aversion. Portfolio flows show a strong negative response during weak flow episodes. Again, negative portfolio flows should be cautioned again as they can have negative effects on the South African economy and lead to increased market volatility and potential capital flight episodes.

Figure 7 show generally low sensitivity of resident flows to a change in global risk sentiment for median and strong flows. Weak flows episodes show a strong negative response of portfolio and total flows.

It has been shown that post GFC, the importance of global risk aversion to the allocation of portfolio flows has decreased (ECB, 2011). This is consistent with our findings as, during median and strong flow episodes, we still see a positive response of non-resident portfolio flows, showing lower levels of portfolio investment reallocation in response to global risk aversion.

Figure 10: Response of Non-resident Capital Flows to a Change in Global Risk Aversion (as a % of GDP)



Figure 11: Response of Resident Capital Flows to a Change in Global Risk Aversion (as a % of GDP)



4.1.4 Increased domestic fiscal deficit

Besides the general impact that fiscal deficit dynamics have on fiscal sustainability, a fiscal deficit can also signal a number of economic outcomes. Higher fiscal deficits could imply potential future tax increases, e.g., which would likely deter investment. The allocation of government spending is also an important consideration when it comes to the perception and impact of fiscal deficits, for example Basu et al. (2014) highlight the different economic impact that government spending in the form of investment in the economy can have compared to government spending in response to economic crises.

The non-resident response to an increase in the domestic fiscal deficit is resoundingly negative as shown in Figure 8. Total non-resident flows are very sensitive during strong flow episodes, as are portfolio and

interestingly, FDI flows. In respect to all other shocks, FDI flows have shown minimal responses. This may be due to the fact that FDI can be impacted by other external factors like tax treaties (Beckmann & Czudaj, 2017).

In Figure 9 resident flows respond quite differently, with high portfolio and total flows during weak flow periods acting as a buffer against non-resident outflows. This buffer effect helps to lessen the need for policy intervention when it comes to capital responses to increased fiscal deficit. Total resident flows are positive across all three flow strengths, besides other flows during weak episodes, solidifying the buffer effect.

An important factor to consider when analysing the impact of changes in fiscal deficits on capital flows is that responses in South Africa may be divergent from general responses to EM fiscal deficits. There have been concerns and low confidence in the South African government debt position, which may lead to disproportional responses to changes in fiscal deficit.⁴

Figure 12: Response of Non-resident Capital Flows to Changes in Domestic Fiscal Deficit (as a % of GDP)

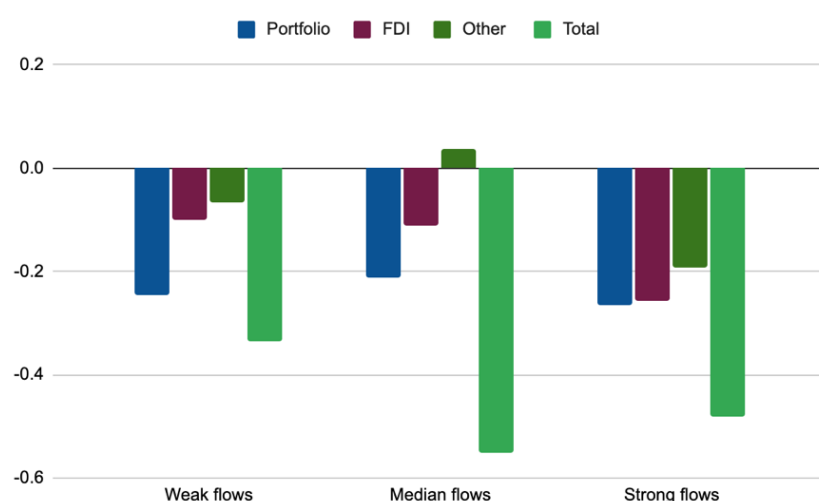
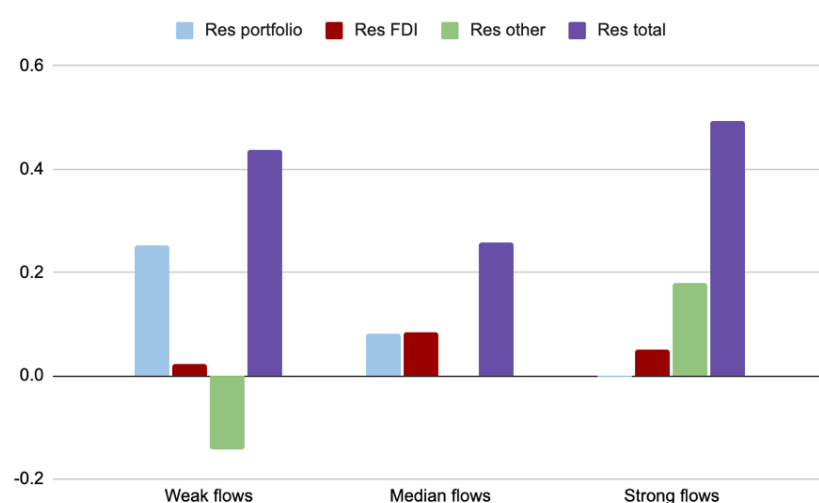


Figure 33: Response of Resident Capital Flows to Changes in Domestic Fiscal Deficit (as a % of GDP)



⁴ This has been shown through the downgrading of South Africa's credit risk rating despite that the post-democracy South African government having never defaulted on debt (last default was in 1985).

4.2 Non-resident flows ‘at-risk’ (disaggregated by sector)

Due to the importance of non-resident flows in an emerging market context, to add another level of granularity we also look at non-resident flows by sector. Namely in the banking, corporate and sovereign sectors as in Goel and Miyajima (2021). Claessen and Ghosh (2013) emphasise the importance of bank flows due to their responsiveness to global conditions, and Garcia Lopez and Stracca (2021) note the number of foreign securities held by public sector investors, solidifying their growing importance in capital flows measurement. Sectoral flows align well to the response of flows by type but give us greater insight into how industry-specific capital flows respond to certain shocks.

4.2.1 Tighter domestic financial conditions

Looking at Figure 10 we see a similar response to that of non-resident flows by type, where there is an overall positive response to tighter financial conditions. This aligns well with the notion that higher interest rates encourage investment through higher returns. The corporate sector is an outlier and responds negatively for weak flows and only slightly positive for strong flows. This may be as a result of increased local risk perception in a flightier sector.

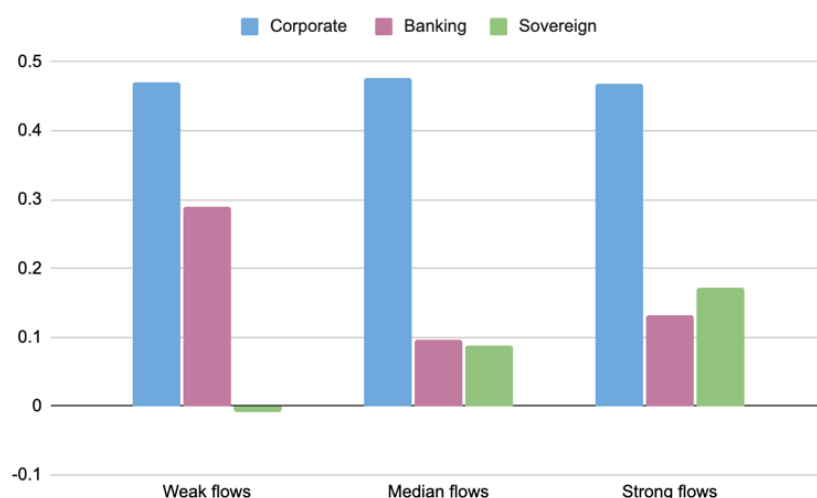
Figure 4: Response of Sectoral Non-resident Capital Flows to Domestic Financial Conditions (as a % of GDP)



4.2.2 Higher domestic growth

Again, sectoral response here is similar to non-resident capital flows. Figure 11 shows that corporate flows are particularly sensitive to higher domestic growth. This can be explained by higher domestic growth indicating fruitful investment opportunities. Banking flows are much more sensitive for weak flows and sovereign flows are largely unaffected by domestic growth. Sovereign flows are the least sensitive.

Figure 5: Response of Sectoral Non-resident Capital Flows to Domestic Growth (as a % of GDP)



4.2.3 Global risk sentiment

The impact of global risk sentiment on non-resident flows gives a mixed response. Figure 12 shows that corporate flows respond positively to global risk sentiment, banking flows are slightly sensitive for weak, median, and strong flows and sovereign flows respond negatively for weak flows and positively for median and strong flows.

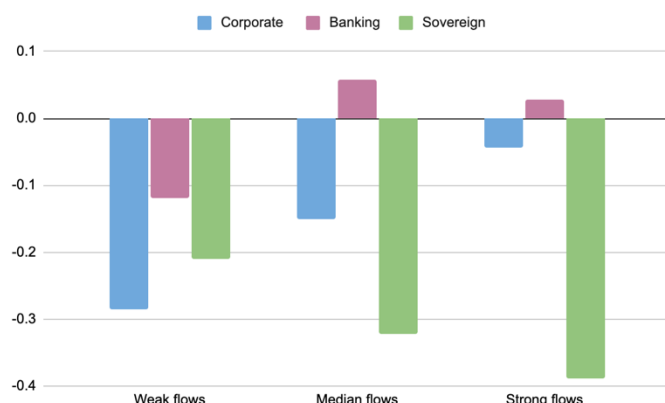
Figure 6: Response of Sectoral Non-resident Capital Flows to Changes in the Global Volatility Index (as a % of GDP)



4.2.4 Fiscal deficit

The sectoral response to fiscal deficits is similar to the response of flows by type. Figure 13 shows that the response is largely negative with a small positive response by the banking sector in median and strong flow episodes. Sovereign capital flows are the most sensitive during strong flow episodes and corporates during weak flow episodes. Budget deficits are shown to dampen economic growth (Mavodyo, 2022), this potential for slowing economic growth may also be a contributing factor to the negative capital flows response. It must be highlighted that a strong negative response for weak flows episodes has the potential to result in reversals or sudden stops of non-resident capital flows, which would have a negative effect on the South African economy.

Figure 7: Response of Sectoral Non-resident Capital Flows to Domestic Fiscal Deficit (as a % of GDP)



5. Analysis of results

In summary, the results show the expected responses to fiscal deficit shocks. Across the board non-resident capital flows respond negatively to an increased fiscal deficit, reflecting non-residents moving their capital out of the country. Resident flows show relatively small responses to fiscal deficit increases, but the responses shown are positive, indicating that fiscal deficits cause residents to invest their capital domestically to some extent.

From a sensitivity perspective, the results show relatively low sensitivity of FDI when compared to total and portfolio flows, which are significantly more sensitive, often showing high volatility and large responses to shocks. This is consistent with the findings of Beckmann and Czudai (2017).

Tightening domestic financial conditions increase total non-resident inflows and create large non-resident portfolio inflows. Due to the volatile nature of portfolio flows this response must be cautioned against. Across both resident and non-resident flows of all types, the response to financial conditions changes is the largest.

Resident flows show low sensitivity to changing global risk sentiment besides portfolio flows during weak flow episodes. While the response to most shocks shows a buffering effect of resident flows on non-resident flows, this is seen least in the case of changing global risk sentiment.

Domestic growth creates large non-resident total and portfolio inflows, while the response of resident flows buffers against the potential negative effects that this may have on the economy. Capital inflow surges end up being procyclical with respect to domestic economic conditions (Claessen & Ghosh, 2013). This view is consistent with the behaviour of non-resident flows, which respond positively to domestic economic growth and negatively to domestic fiscal deficits, this correlation indicates a level of procyclicality.

The following subsections will expand on the analysis of the results with respect to existing literature.

5.1 Domestic financial conditions

As in Goel and Miyajima (2021) we find that the strongest non-resident response is positive total flows, and the strengthening sensitivity of total non-resident flows to domestic financial conditions also aligns with Goel and Miyajima. This indicates that there is a more significant response of non-resident flows to tightening financial conditions, the stronger the flows. Stronger flows indicate an increased surge prospect (Miyajima & Goel, 2021), this may explain the change in resident flows during strong flow periods. The magnitude of capital flow response to tightening financial conditions aligns with economic logic as tightening financial conditions are a direct driver of the profitability of capital investments, through increasing interest rates and thus increasing return on investment.

Goel and Miyajima (2021) also have more heterogenous results with flows being both positive and negative across the different types of flows, but all at an insignificant level. Non-resident FDI shows little response to tightening financial conditions, across median and strong flows which may be accredited to the long-term nature of FDI, this aligns with previous literature (Goel and Miyajima, 2021; Eguren-Martin et al., 2021). Interestingly FDI response to tightening financial conditions for weak flows is significant, which aligns with Rangasamy (2014) who notes higher sensitivity of FDI flows than traditionally expected in South Africa.

Non-resident portfolio flows are positively impacted by tightening financial conditions across median and strong flow episodes. This aligns well with the logic that tighter financial conditions create the opportunity for higher returns on investment, specifically among more short-term investments like portfolio flows. Portfolio flows are known to be highly volatile so despite the potential benefits of these inflows, strong portfolio responses can create a higher risk of a financially destabilising event (ECB, 2011).

5.2 Domestic growth

Goel and Miyajima (2021) found heterogenous responses of resident and non-resident flows to higher domestic growth, specifically in total and portfolio flows. This aligns with the results in this paper and demonstrates how resident flows can act as a buffer against non-resident flows. Again, we see that non-resident flows, specifically total flows respond positively to changing domestic conditions in the form of increased domestic growth.

Unlike in Goel and Miyajima (2021) and Ahmed (2017) the results find that non-resident FDI flows respond more strongly to higher domestic growth than non-resident portfolio flows. This is significant as it demonstrates higher volatility of FDI than expected, as well as demonstrating the ability of higher domestic growth to bring non-resident FDI into the country.

Resident response to higher domestic growth is largely negative. Portfolio responses are particularly sensitive across all flow strengths, which aligns with Goel and Miyajima (2021), and moves in the opposite direction of non-resident flows, again consistent with Goel and Miyajima.

A specific area of concern when it comes to capital flow responses to domestic growth is through the accelerator effect, high levels of capital inflows have the ability to increase the probability of economic crises (Furceri et al., 2012). While it was found that portfolio flows and FDI do not increase the probability of financial crises, banking flows do.

5.3 Global risk aversion

Non-resident total and portfolio flows are the only flows that show significant responses to change in global volatility. As in Goel and Miyajima (2021) our results show that portfolio flows are more sensitive than total flows specifically during weak flow episodes. The idea that portfolio flows are sensitive to risk holds, as during weak flow periods we see highly sensitive portfolio outflows as in Goel and Miyajima (2021) and Gelos et al. (2019). Additionally, this aligns with the volatile nature of portfolio flows and the findings of both Goel and Miyajima (2021) and Ahmed (2017).

Resident flows show very low sensitivity to changing global risk aversion, with the strongest response being weak flow episodes, specifically for portfolio, other and total flows. The same effect was documented in Goel and Miyajima (2021). Koepke (2019) also notes that portfolio flows are more sensitive than other flows to global risk aversion, as we see in the strong response of resident portfolio flows during weak flow episodes. Due to this response, we do not find resident flows to be a buffer during times of increasing volatility as Goel and Miyajima (2021) did, instead we find that resident portfolio flows move more similarly to non-resident portfolio flows.

Claessen and Ghosh (2013) found that capital flows are more responsive to global risk aversion than to domestic financial conditions. Our results differ from that as we find resident and non-resident flows to be more strongly impacted by tightening domestic financial conditions than to increasing global risk aversion. This may be explained by the fact that South Africa has a more robust financial sector than many other EM countries. This also has positive implication for macroprudential and capital flow controls, as financial conditions are domestically controllable whereas global risk aversion is completely independent.

Ahmed (2017) finds that, in response to increased global risk aversion, FDI increases as investors prefer lower risk investments. This holds for both resident and non-resident portfolio flows, with higher sensitivity during strong flow periods for both resident and non-resident flows.

Goel and Miyajima (2021) found conflicting results and only had a positive response in corporate flows during strong episodes, while we find positive corporate and sovereign and banking responses across median and strong flows. Overall, our findings show higher sensitivity of sovereign outflows during periods of flow reversals, in alignment with Goel and Miyajima (2021). This response creates the risk of non-resident capital outflows in response to global risk aversion, which may have detrimental economic impact through flow reversals.

5.4 Fiscal deficit

Fiscal deficits have a large negative impact on non-resident flows, with a highly sensitive response of FDI flows during strong flow episodes. Strong negative responses to domestic fiscal deficits are also seen in non-resident sectoral flows with banking and sovereign flows being the most responsive.

This result is significant as it demonstrates how far reaching and detrimental increased fiscal deficits can be, not only through the potential for lessening fiscal sustainability, but also through creating a higher probability of sudden stops and non-resident capital reversal.

The vulnerabilities in the South African economy are largely due to a capital account that is dependent on capital flows (IMF, 2018). These vulnerabilities will likely be exacerbated by the increasing government debt that is indicated by increasing fiscal deficits. On this basis, policy that buffers against non-resident capital outflows caused by fiscal deficits would have to focus on fiscal sustainability and minimising fiscal deficit shocks.

Total resident flows respond positively across all three flow regimes, sowing the potential for domestic flows to buffer against non-resident flows, although this buffering effect is not as clear for fiscal deficits as for other shocks. This is significant as unlike in other shocks, fiscal deficit shocks cannot rely on the buffering effect between resident and non-resident flows, which could lead to detrimental effects in the case of surges and sudden stops.

6. Conclusion

This paper has analysed the response of capital flows in South Africa to domestic fiscal conditions, domestic growth, global volatility, and domestic fiscal deficits. These flows and their responses to capital flow drivers were analysed using the ‘at-risk’ methodology. The research adds to the literature by including fiscal deficits in conjunction with other capital flows drivers. The types of flows assessed in this paper are portfolio, FDI, total flows and other flows for both resident and non-resident flows. We also analysed sectoral flows (banking, sovereign and corporate) for non-resident capital flows.

One of the key findings of the paper is the strong negative response of non-resident FDI to increased fiscal deficits. A strong FDI response is unexpected due to the generally unresponsive nature of FDI when compared to more volatile flows like portfolio flows. An important implication of this finding is the awareness that across all capital flow drivers, the fiscal deficit is the biggest driver of non-resident FDI flows. We also find that there is an inverse response of resident and non-resident flows showing the existence of a buffering effect, although this buffering effect is not as clear for fiscal deficits as for other shocks.

The results also show a higher response of both resident and non-resident flows to tightening domestic financial conditions than to global risk aversion. This is a promising result insofar as macroprudential and capital flow control measures go, as domestic financial conditions are perhaps possible to control, meaning policy created in regard to domestic financial conditions will likely have high impact on capital flows.

Despite the lower sensitivity of capital flows to global risk aversion, the results show that there is no strong inverse response of resident and non-resident flow responses to global risk aversion. The implication of this is that there is no buffering effect between resident and non-resident flows, which highlights a potential area of domestic vulnerability to surges and sudden stops.

In general, capital inflows tend to be procyclical with respect to domestic economic conditions, with a positive non-resident response to economic growth, and negative response to fiscal deficits. With the exception of responses to global risk aversion, resident and non-resident capital flows have inverse responses to capital flow drivers, reinforcing the buffering effect of resident flows found in existing literature.

Annex 1. Figures and tables

Result tables with fiscal deficit component included in model

Table 1A: Coefficients of Resident Capital Flows by Type in a Fiscal Deficit Model

		Resident portfolio flows	Resident FDI flows	Resident other flows	Resident total flows
Pull (FCI)	<i>Weak flows</i>	-1.1253	-1.2261	-1.9303	-3.5715
	<i>Median flows</i>	-0.7822	-0.2341	-0.2395	-0.2539
	<i>Strong flows</i>	1.0553	-0.4165	1.8364	0.0510
Pull (GDP)	<i>Weak flows</i>	-0.1559	-0.1253	-0.1914	-0.2794
	<i>Median flows</i>	-0.1591	-0.0457	0.0070	-0.2700
	<i>Strong flows</i>	-0.2414	0.0595	0.0812	0.1927
Push (VIX)	<i>Weak flows</i>	-0.2302	0.0199	-0.1099	-0.1639
	<i>Median flows</i>	-0.0360	0.0132	0.0009	-0.0610
	<i>Strong flows</i>	-0.0066	0.0704	0.0379	0.0112
Fiscal deficit	<i>Weak flows</i>	0.2045	0.0641	-0.0627	0.2929
	<i>Median flows</i>	0.0373	0.0261	0.0495	0.2077
	<i>Strong flows</i>	0.0049	0.0659	0.1204	0.2951

Table 2A: Coefficients of Non-resident Capital Flows by Type in a Fiscal Deficit Model

		Non-resident portfolio flows	Non-resident FDI flows	Non-resident other flows	Non-resident total flows
Pull (FCI)	<i>Weak flows</i>	-0.8663	0.0769	-0.1474	2.4105
	<i>Median flows</i>	2.4151	1.0495	1.2468	5.2959
	<i>Strong flows</i>	4.0151	0.9105	1.9238	4.0008
Pull (GDP)	<i>Weak flows</i>	-0.2879	0.1972	0.2976	0.7771
	<i>Median flows</i>	0.1725	0.1535	0.2604	0.5545
	<i>Strong flows</i>	-0.1117	0.5763	0.2137	0.6293
Push (VIX)	<i>Weak flows</i>	-0.2190	0.0142	0.0003	-0.0182
	<i>Median flows</i>	0.0505	0.0194	-0.0047	0.0909
	<i>Strong flows</i>	0.0670	0.1484	-0.0690	0.0147
Fiscal deficit	<i>Weak flows</i>	0.0964	-0.0552	-0.0677	-0.1869
	<i>Median flows</i>	-0.1439	-0.0156	-0.0910	-0.2435
	<i>Strong flows</i>	-0.2231	-0.3167	0.0085	-0.3525

Table 3A: Coefficients of Non-resident Capital Flows by Sector in a Fiscal Deficit Model

		Non-resident corporate flows	Non-resident banking flows	Non-resident sovereign flows
Pull (FCI)	<i>Weak flows</i>	0.4387	-0.3414	0.0219
	<i>Median flows</i>	2.5650	1.6042	2.1170
	<i>Strong flows</i>	2.5900	0.1341	0.7290
Pull (GDP)	<i>Weak flows</i>	0.4263	-0.0537	-0.0715
	<i>Median flows</i>	0.6651	-0.0834	-0.0233
	<i>Strong flows</i>	0.4450	0.2112	0.1016
Push (VIX)	<i>Weak flows</i>	-0.0023	-0.0789	-0.0888
	<i>Median flows</i>	0.0501	0.0182	0.0440
	<i>Strong flows</i>	0.1065	0.0482	0.0908
Fiscal deficit	<i>Weak flows</i>	-0.0686	-0.1029	-0.1339
	<i>Median flows</i>	-0.0357	-0.1204	-0.2315
	<i>Strong flows</i>	-0.0596	-0.3175	-0.2839

Results tables excluding fiscal deficit (as in Goel and Miyajima)

Table 4A: Coefficients of Resident Capital Flows by Type

		Resident portfolio flows	Resident FDI flows	Resident other flows	Resident total flows
Pull (FCI)	<i>Weak flows</i>	-1.5251	-1.1379	-1.5093	-4.2834
	<i>Median flows</i>	-0.8399	-0.2886	-0.1927	-0.4156
	<i>Strong flows</i>	1.0623	-0.3830	1.8861	0.5218
Pull (GDP)	<i>Weak flows</i>	-0.1018	-0.0954	-0.1871	-0.3375
	<i>Median flows</i>	-0.1058	-0.0284	0.0079	-0.2727
	<i>Strong flows</i>	-0.2766	0.0805	0.1608	0.3303
Push (VIX)	<i>Weak flows</i>	-0.2537	0.0314	-0.0764	-0.1702
	<i>Median flows</i>	-0.0366	0.0166	-0.0012	-0.0458
	<i>Strong flows</i>	0.0013	0.0649	0.0820	0.0319

Table 5A: Coefficients of Non-resident Capital Flows by Type

		Non-resident portfolio flows	Non-resident FDI flows	Non-resident other flows	Non-resident total flows
Pull (FCI)	<i>Weak flows</i>	-0.9094	0.2358	-0.1904	2.4864
	<i>Median flows</i>	2.4916	1.0169	1.1368	5.1058
	<i>Strong flows</i>	3.5777	0.7366	1.9922	4.0125
Pull (GDP)	<i>Weak flows</i>	-0.2613	0.1700	0.3079	0.5714
	<i>Median flows</i>	0.1110	0.1593	0.3523	0.8161
	<i>Strong flows</i>	-0.2500	0.3509	0.2152	0.5991
Push (VIX)	<i>Weak flows</i>	-0.2411	0.0094	-0.0079	-0.0420
	<i>Median flows</i>	0.0505	0.0180	0.0019	0.1018
	<i>Strong flows</i>	0.0328	0.2022	-0.0637	0.0113

Table 6A: Coefficients of Non-resident Capital Flows by Sector

		Non-resident corporate flows	Non-resident banking flows	Non-resident sovereign flows
Pull (FCI)	<i>Weak flows</i>	0.4201	-0.7024	0.1433
	<i>Median flows</i>	2.5018	1.4345	1.6349
	<i>Strong flows</i>	2.9014	0.2417	0.2665
Pull (GDP)	<i>Weak flows</i>	0.4165	-0.1139	-0.1386
	<i>Median flows</i>	0.6693	-0.1201	-0.0956
	<i>Strong flows</i>	0.4681	0.0261	-0.0191
Push (VIX)	<i>Weak flows</i>	-0.0167	-0.0971	-0.0645
	<i>Median flows</i>	0.0457	0.0125	0.0160
	<i>Strong flows</i>	0.1172	0.0087	0.0588

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(Note: Using APA 7th edit.)

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