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Abstract

In the run-up to the Global Financial Crisis (GFC), the emerging economies largely benefited from a confluence of tailwinds – low interest rates in the United States (US), rising commodity prices that favored commodity-exporting emerging economies, and substantial capital inflows. However, after a decade (2000-2010) of remarkable economic growth in the emerging economies, the risks have shifted from advanced economies to emerging markets following the Fed's taper tantrum.

Using the multi-sector-multi-country intertemporal G-Cubed model, this paper quantifies and examines the spillover effects of a 200-basis point increase in risk premia shock in emerging economies to the domestic and global economies. The spillover risks of loss of confidence are discussed via the financial and trade channels where the shocked emerging economies experienced negative financial flow-on and positive trade flow effects while the non-shocked advanced economies experienced the opposite. This research also shows that trade and capital markets are important stabilizers for both shocked and non-shocked economies. The adjustment stabilizing process in these markets are necessary to circumvent prolonged adverse impacts of the risk premia shock.

JEL Codes: C50, D58, F40, F62, F65

Keywords: G-Cubed, country risk premia shock, emerging economies, finance, trade

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Jean Christine A. Armas[1]

1. Introduction

While history may not exactly repeat itself, events do actually resonate especially in the sphere of financial markets as have been witnessed from the world history of economic and financial crises.[2] The 1997 Asian Financial Crisis (AFC) and the 2007-2009 Global Financial Crisis (GFC) differ in terms of their origins; but these crises are similar when it comes to one of the underlying key aspects of a crisis – loss of investors' confidence as magnified in the intensified perceived risk in shocked economies. McKibbin (1998) and McKibbin and Wilcoxen (2013) argue that a jump in risk premia, which is instantaneously felt in financial markets, can suddenly become a real shock because of the inter-dependencies between the real and financial economies.

From the run-up to and up to the wake of the GFC, emerging economies (EEs) exhibited sustained growth while the rest of the world contracted. For almost a decade (2000-2010), EEs grew at a robust pace of almost 6 percent and about 63 percent of the world's economic output was accounted for by these economies (European Central Bank, 2016). At the same time, the average growth of EEs from 2003-2008 was recorded at 7.1 percent, well above its long-term average of almost 5-6 percent (Huidrom et. al 2016). On the external front, EEs' trade contribution was likewise exceptional as these economies include some of the world's biggest suppliers of commodities and intermediate goods to the advanced countries (ibid). These trends had continued until 2010 when EEs started to show signs of growth slowdown and trekked a growth trajectory that was below its long-run average at 3.7 percent in 2015 (ibid).

Given the increasing integration of emerging markets into the global economy, any shocks to their economies would inevitably have cross-border spillover consequences. The recession in major advanced economies following the GFC led to EEs' gradual slump through a confluence of headwinds: collapse in trade volumes as

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[2] See (Bourke 2018) for the compendium on the bibliography of the global financial and economic crises, which is accessible at the European University Institute library.

well as declining commodity prices (trade and commodity channel) and volatility in capital flows (financial channel). The financial, trade and commodity, as well as the confidence channels, are the usual modes of transmission mechanisms of a loss of confidence in an economy to the domestic and global economies.

The financial channel is the first mode of transmitting the country risk premia shock from emerging economies, which is magnified in the outflows of their foreign direct and portfolio investments. The buying and selling of financial assets with arbitrage among countries with different structures of financial markets can easily spread shocks from one economy to another (Kose et al. 2003). Since the impact of the risk premia shock via the financial channel can affect the exchange rate of a country, the trade and current account positions of trading countries are consequently affected. These developments are explained through the trade channel where spillovers are known to be greater for countries with greater trade openness (Frankel and Rose 1996).

Implications arising from the trade channel, according to literature, could be exacerbated by the commodity channel. The weak economic outlook of commodity-importing economies could lead to reduced commodity demand and thus, lower commodity prices. These transmission mechanisms could cause adverse effects on the investment and aggregate output of the shocked economies (Eicher, Schubert and Turnovsky 2008). Finally, the confidence channel works such that the magnitude and severity of economic and financial crises experienced by the world economy would have serious implications on consumer and business confidence (Levchenko and Pandalai-Nayar 2015). Consequently, the loss of confidence of these economic agents, if the impact is prolonged, could cripple the real economy. Hence, the confidence channel is also an important channel that needs to be carefully looked at.

Using the G-Cubed intertemporal general equilibrium model, this paper will contribute to the existing knowledge base by: (i) quantifying the domestic and global spillover effects of a loss of confidence in EEs into three categories according to their geographical locations[3] with special segregation of the largest EEs (i.e., Brazil, Russia, India and South Africa); and (ii) analyzing these spillover risks with respect to financial and trade-commodity channels.

The discussions of the remainder of the paper are as follows: the empirical framework and assumptions of the G-Cubed model as well as the modelling of the country risk premia in EEs are discussed in Section 2, the results simulated from the G-Cubed model are analyzed in Section 3 while the research conclusions are presented in Section 4.

[3] These geographical locations are categorized into Asia, Latin America, and BRIS (Brazil, Russia, India, and South Africa).

2. The G-Cubed Model[4]

This section presents the overview and structure as well as the key features and assumptions of the model. The details on how the country risk premia shock was modelled along with the monetary and fiscal policy rules of the G-Cubed are also discussed in this section.

2.1. Overview and Structure of the Model

In an economy characterized by complex dynamics of globalization and continual change, the quest to develop models that offer innovative approaches is inevitable. One such model that has gained increased recognition in the sphere of global macroeconomic modelling is the G-Cubed. The G-Cubed model, developed by McKibbin and Wilcoxen (1999), is a hybrid of dynamic intertemporal and stochastic general equilibrium models and has been widely used in both domestic and international policy agenda – ranging from monetary and fiscal policy to international trade, among others.

The G-Cubed is unique and distinctive from the conventional macroeconomic models in that it includes institutional sectors in detail and its parameters are estimated rather than calibrated. Further, the model accounts for both backward- and forward-looking economic agents (i.e., households and firms) who seek to maximize their objective functions subject to intertemporal budget constraints. Time horizons and agents' expectations are central in constructing the G-Cubed. And, since it is an intertemporal model, the baseline scenarios are calculated before it can be used for policy simulations.

This paper made use of the G-Cubed model version 147G, which includes 24 economies that are categorized into shocked and non-shocked economies (Table 1). Moreover, the model incorporates six (6) sectors that are sub-divided into energy and non-energy sectors. The non-energy sectors are: (i) mining; (ii) agriculture; (iii) durable manufacturing; (iv) non-durable manufacturing; and (v) services.

[4] See McKibbin, W.J. and P.J. Wilcoxen (1999), "The theoretical and empirical structure of the G-Cubed model," *Economic Modelling*, Volume 16, Number 1, pages 123-148, for the history and more practical applications of the G-Cubed model.

Table 1: Countries included in the G-Cubed Model

Shocked Emerging Economies		Non-shocked Economies	
Argentina (ARG)	Turkey (TUR)	United States (USA)	Korea (KOR)
Brazil (BRA)	South Africa (ZAF)	Japan (JPN)	China (CHI)
India (IND)		Germany (DEU)	Italy (ITA)
Indonesia (INO)		United Kingdom (GBR)	Canada (CAN)
Mexico (MEX)		France (FRA)	Australia (AUS)
Other Asia (OAS)		Rest of Euro Zone (EUZ)	
Russia (RUS)		Oil Exporting and the Middle East (OPC)	
Saudi Arabia (SAU)		Rest of Advanced Economies (OEC)	
		Rest of the World (ROW)	

Notes:

1. Rest of Euro Zone (EUZ) includes Spain, Netherlands, Belgium, Luxemburg, Ireland, Greece, Portugal, Finland, Cyprus, Malta, Slovakia, Slovenia, and Estonia.
2. Oil-exporting and the Middle East (OPC) includes Ecuador, Nigeria, Angola, Congo, Iran, Venezuela, Algeria, Libya, Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Palestinian Territory, Oman, Qatar, Syrian Arab Republic, United Arab Emirates, and Yemen.
3. Rest of Advanced Economies (OEC) includes New Zealand, Norway, Sweden, Switzerland, Iceland, Denmark, Iceland, and Liechtenstein.
4. Rest of the World (ROW) includes all countries not included in other groups.

Source: G-Cubed Model version 147G

2.2 Key Features and Assumptions of the Model

For the simulations of the G-Cubed, a range of important assumptions and features are embedded in the model (McKibbin and Wilcoxen 1999; McKibbin and Stoeckel 2011). First, the model takes into consideration the economic agents' behavior where wealth and current disposable income determine aggregate consumption and consumption, respectively. Aggregate investment is a weighted average of investment based on *Tobin's q* and its backward-looking version.[5] Second, the model explicitly differentiates the stickiness of physical capital (i.e., immobile) from the flexibility of financial capital to flow into or out of the sectors and countries (i.e., mobile) depending on the rate of return of financial capital. Another important feature of the model is the nominal wage rigidity in the short run, which varies per economy because of each country's heterogeneous labor market structures. And because wages cannot adjust instantaneously, periods of unemployment in the short to medium term could potentially arise. This assumption, along with the explicit role of money, is what gives the model its "macroeconomic" characteristics. Lastly, the model assumes full rational expectations equilibrium in the global economy.

[5] Tobin's Q is the market valuation of the expected future change in the marginal product of capital (MPK) relative to the cost.

2.3 Modelling the country risk premia shock in Emerging Economies (EEs)

The main research objective of this paper is to quantify and analyze the global spillover consequences of a loss of confidence in EEs when there is an increase in the country risk premia by two percentage points relative to the baseline. The impact of a positive shock (increase) in the risk premia of EEs is transmitted outside their borders via two major channels – trade and finance (Huidrom et al. 2016). The G-Cubed allows for such analyses as the model's global trade and international financial market capture the interlinkages between the real and financial sectors as well as the interconnectedness of economies (McKibbin and Stoeckel 2009).

The increase in country risk premia by 200 basis points implies that the return of all financial assets within the EEs should be twice the increase in risk premia to cover for the extra risk (McKibbin and Wilcoxen 2013). The country risk premia is depicted in the equation of uncovered interest parity condition as below:

$$r_t^i = r_t^{US} + ({}_te_{t+1} - e_t) + \mu_t \quad (1)$$

Equation (1) shows that the difference in the real interest rate between country i and the US at time t $(r_t^i - r_t^{US})$ depends on: (i) the expected change in exchange rate in period $t+1$ based on the information from period t $({}_te_{t+1} - e_t)$ and (ii) the wedge or country risk premia between domestic and foreign bonds (μ_t). A positive change in e implies weaker domestic currency (exchange rate depreciation). If country i (EEs, in this paper) turns to be riskier vis-à-vis the US, then the expected interest rate on holding bonds of country i will be higher. Similarly, investors will seek for the highest returns on domestic assets in the event of exchange rate depreciation to ensure that they can still profit from foreign exchange trading when their investments are converted into US dollar. Also, equation (1) can be explained by solving for the exchange rate as below:

$$e_t = \sum_{s=t}^{T} (r_s^{US} - r_s^i + \mu_s) + e_{T+1} \quad (2)$$

The value of exchange rate at current period is determined by the summation of: (i) interest rate differentials between the US and the EEs; (ii) risk premia on assets up to period T; and (iii) expected exchange rate in period $T+1$. Equation (2) highlights the fact that change in risk premia is not discounted, which implies that risk premia today is equally significant as risk premia in the future. The term e_{T+1} in equation (2) indicates that if shocks are introduced into the model, the exchange rate is expected to vary considerably.

2.4 Monetary and Fiscal Policy Rules

The G-Cubed also specifies monetary and fiscal policy rules. The monetary policy rule is modelled based on the new modified Henderson-McKibbin-Taylor (HMT) rule (Henderson and McKibbin 1993; Taylor 1993). The new HMT rule was designed after the GFC. All countries included in the model have the same equation but with different parameters. Each central bank can stylize their policy rule by changing the parameters. The new modified HMT feedback rule is represented by the following equation:

$$i_t^d = \beta_1 i_{t-1}^d + \beta_2(\pi_t - \pi_t^T) + \beta_3(\Delta y_t - \Delta y_t^T) + \beta_4(ny_t - ny_t^T) + \beta_5(\Delta e_t - \Delta e_t^T) \quad (3)$$

$$i_t = i_{t-1} + \beta_6\left(i_t^d - i_t\right) + i_t^x \quad (4)$$

where i_t^d is the desired interest rate; $(\pi_t - \pi_t^T)$ is actual inflation relative to the target; $(\Delta y_t - \Delta y_t^T)$ is output growth relative to potential output growth; $(ny_t - ny_t^T)$ is nominal income relative to target nominal income; $(\Delta e_t - \Delta e_t^T)$ is change in the exchange rate relative to central banks' target exchange rate; and i_t is the actual interest rate which can either be adjusted gradually to the desired interest rate or shifted exogenously in the short-run by changing the exogenous component i_t^x.

The specific monetary rule for each country can be modelled using different values or coefficients for each parameter (Table 2). There is a trade-off between the output gap (actual – natural rate of output) and inflation, and the model gives equal weights on both. The parameter for both inflation rate and output growth (β_2 and β_3) in all countries, except for Saudi Arabia, is 1.5 which means that if either inflation rate or output growth increases by one percent, the central bank will increase the interest rate by 1.5 percent. Meanwhile, Saudi Arabia and China peg their exchange rate to USD (Alkhareif and Qualls 2016). Saudi Arabia's purely pegged exchange rate regime implies that Saudi Arabia's monetary authority does not pay attention to what is happening to the inflation rate. The actual interest rate parameter (β_6) indicates the speed by which central bank changes the interest rate to achieve the desired interest rate. None of the countries in the model assigns weight on the nominal income (β_4). All central banks assign a value of "1" for the lag of the interest rate parameter (β_1).

Meanwhile, the discussion on exchange rate regimes is a subset of the monetary policy debate wherein the HMT rule states that if all weight is put on the exchange rate, the question is: *"Will it be pegged to US dollar (USD), basket of currencies, or commodity bundle (McKibbin 2018)?"* A central bank which adopts a flexible exchange rate regime sets the value equal to zero for β_5. In this model, China pegs its currency relative to the US dollar partially and assigns a small weight of -1 (Table 2). This implies that if the Chinese Yuan depreciates relative to the US dollar, the People's Bank of

China would raise the interest rate. Saudi Arabia pegs its currency to the US dollar with parameter value of -1000. The rest of the eurozone, France and Italy have different monetary policy rules. The central bank in Germany (DEU) targets European-wide inflation and output gap while France, Italy and EUZ target the German exchange rate. This is equivalent to the European Central Bank (ECB) targeting European-wide inflation and output gap. The EUZ, France and Italy peg their exchange rates to the German exchange rate relative to the US dollar. The European central banks targeting the German exchange rate set their interest rate equal to one (1).

Table 2: Coefficients in the New Modified HMT Rule by Country

Countries	β_1 (lag interest rate)	β_2 (inflation rate)	β_3 (output growth)	β_4 (nominal income)	β_5 (exchange rate)	β_6 (interest rate)
Shocked Emerging Economies						
ARG (QQ)	1	1.5	1.5	0	0	0.2
BRA (BB)	1	1.5	1.5	0	0	0.2
IND (DD)	1	1.5	1.5	0	0	0.2
INO (WW)	1	1.5	1.5	0	0	0.2
MEX (MM)	1	1.5	1.5	0	0	0.2
OAS (VV)	1	1.5	1.5	0	0	0.2
RUS (RR)	1	1.5	1.5	0	0	0.2
SAU (SS)	1	0	0	0	-1000	1
TUR (TT)	1	1.5	1.5	0	0	0.2
ZAF (HH)	1	1.5	1.5	0	0	0.2
Non-shocked Economies						
USA (UU)	1	1.5	1.5	0	0	0.2
JPN (JJ)	1	1.5	1.5	0	0	0.2
DEU (GG)	1	1.5	1.5	0	0	0.2
GBR (KK)	1	1.5	1.5	0	0	0.2
FRA (FF)	1	1.5	1.5	0	-1000	1
EUZ (EE)	1	1.5	1.5	0	-1000	1
ITA (II)	1	1.5	1.5	0	-1000	1
CHI (CC)	1	1.5	1.5	0	-1	0.2
CAN (NN)	1	1.5	1.5	0	0	0.2
AUS (AA)	1	1.5	1.5	0	0	0.2
OEC (OO)	1	1.5	1.5	0	0	0.2
KOR (XX)	1	1.5	1.5	0	0	0.2
ROW (LL)	1	1.5	1.5	0	0	0.2
OPC (PP)	1	1.5	1.5	0	0	0.2

Source: G-Cubed Model version 147G

The fiscal rule is the same for every country to make the debt sustainable. The fiscal instruments used by the government include tax rates, lump-sum tax, expenditure on goods, services and labor. In addition, the government chooses which

variables should be targeted at a specific time horizon. In the G-Cubed model, the government targets the incremental interest payment rule which means that when the government runs budget deficit, it imposes taxes to cover for the interest of the deficit (McKibbin and Stoeckel 2011). The fiscal rule also ensures that the transversality condition holds, that is, the present value of debt does not explode overtime.

3. Discussion of the Simulation Results

This section presents the simulation results of a loss of confidence in EEs with an increase in the country risk premia (μ) by 200 basis points from the baseline (Figure 1).[6] The results presented in this paper are truncated to 20 years and these outcomes are reported as percentage deviations from the baseline, unless otherwise stated. The country risk premia shock is tantamount to an increase in the risk premia of different economic agents – households, firms, and international investors – in the EEs.

For a deeper analysis of the simulation results, the author categorized the shocked EEs into three groups according to geographical region but with special segregation of the global economy's largest emerging markets – the BRICS. However, this research excludes China ("C") in the shocked EEs and thus, BRIS will be used in this paper. Thus, the three groups of EEs are BRIS, Asia, and Latin America.[7]

3.1 Financial Channel

The financial channel is one of the direct conduits of transmission of the confidence crisis in EEs as it has both explicit and implicit effects on the real economy. This channel will be analyzed through the lens of domestic and global effects of the risk premia shock.

3.1.1 Domestic Impacts to Shocked Economies

While the initial drop in the real GDP of the shocked EEs is seen to be broad-based, the groups of BRIS (Figure 2a) and Asia (Figure 2b) exhibit significant growth contraction. From the baseline, real GDP instantaneously falls from a range of 3.8 percent to 4.3 percent in Russia, South Africa and Brazil while Turkey and Indonesia experience a hard dip of 3.8 percent and 4.1 percent, respectively. Despite signs of gradual recovery among EEs overtime, real GDP remains below the baseline.

As country risk premia in EEs rise, the financial value of stock market plunges instantaneously as portfolio investors veer away from EEs' financial assets (Figures 3a, 3b, and 3c). The stock markets in Saudi Arabia (Figure 3b) and Russia (Figure 3a) are

[6] All figures are shown in the Appendix of the paper.

[7] BRIS includes Brazil, Russia, India and South Africa. Asia comprises of Turkey, Indonesia, Other Asia and Saudi Arabia. Latin America consists of Argentina and Mexico.

hard hit as the total values of stocks plummet by 31.2 percent and 16.7 percent, respectively. Moreover, the exchange rate, which is a forward-looking asset price, reacts contemporaneously to massive financial capital outflows. These outflows cause substantial fall in the real exchange rate of EEs (Figures 4a, 4b, and 4c) amid excess supply of EEs' currencies in the non-shocked economies. Among the groups of EEs, Brazil (29.5 percent, Figure 4a) experiences the biggest currency depreciation along with Indonesia (24.7 percent, Figure 4b) and Argentina (24.7 percent, Figure 4c). With currency depreciation and investors' intensified risk perception, the capital outflows consequently lead to an increase in the 10-year real interest rate where the trends do not revert to the baseline (Figures 5a, 5b, and 5c). The long-term (10-year) real interest rate, which is indicative of higher country risk premia, is likewise manifested in the trends of short-term real interest rate (Figures 6a, 6b, and 6c).

Saudi Arabia registers the sharpest rise in short-term real interest rate at 3.9 percent following the shock because among the EEs, only Saudi Arabia pegs its exchange rate to USD (Figure 4b). As a result of Saudi Arabia's active foreign exchange intervention to control for rapid currency depreciation, interest rate rises while inflation decreases substantially (Figure 7b). While all shocked EEs demonstrate an increase in inflation (Figures 7a and 7c), Saudi Arabia is an exception (Figure 7b). However, inflation in shocked economies reverts to the baseline in the long run. In addition, the initial rise in Saudi Arabia's interest rate mirrors the inverse relationship between interest rate and stock market price as this economy experiences the worst slump in its stock market (Figure 3b). These developments ensue because as the interest rate rises, the cost of borrowing to finance investments goes up, resulting in reduced appetite to invest in equities or stocks. This, in turn, dampens the demand to hold these assets; thereby, pulling the stock values lower.

With respect to the spillover effects of financial outflows and high interest rates to the goods market, it is important to investigate the trends in capital stock (Figures 8a, 8b, and 8c) and investment (Figures 9a, 9b, and 9c). Capital outflows have weighed down investment in shocked EEs, with Russia recording the largest drop at 44.9 percent in 2019 (Figure 9a). The higher risk premia, likewise, translate to lower capital stock. This reflects the inverse relationship between marginal product of capital (MPK) and capital stock. The capital stock in Russia falls considerably and the impact is rather persistent as the biggest drop occurs five (5) years after the shock to register an approximately 40 percent deviation from the baseline (Figure 8a). It can be inferred from these results that Russia's significant slump in real GDP is largely accounted for by the negative trends in investment.

With the loss of confidence in EEs, the rational expectations behavior of households is also at work. Households tend to heavily discount their expected future income at a higher rate as the present value of lifetime income decreases. At the same time, households have to reduce their consumption because the present value of

lifetime income has to equal the present value of lifetime consumption. The decline in consumption is noticeable in the economies of Russia, South Africa, Saudi Arabia and Turkey (Figures 10a and 10b). Consequently, to smoothen households' consumption overtime, they have to save. Hence, savings increase initially in EEs (Figures 11a, 11b, and 11c) except for Brazil, Russia, Indonesia, and Saudi Arabia. The increase in savings, however, is very marginal except for Turkey where private savings are markedly high at 6.7 percent above the baseline (Figure 11b).

3.1.2 Spillover Effects to Non-Shocked Economies

The growth setbacks in the EEs following the risk premia shock generate positive spillover effects to non-shocked economies in the short run. Immediately following the country risk premia shock, the real GDP in non-shocked economies generally picks up at 1.4 percent (Figure 12). After two (2) years, however, real GDP growth rate gradually diminishes except for the oil-exporting and Middle East countries (OPC) where real output starts to decrease only after about 11 years. The short-run desirable spillover effects to non-shocked economies are elaborated below, which are actually the opposite of the trends and developments in the shocked economies.

As concerns about growth setbacks in EEs escalate following the shock, investors would rather place their portfolio investments to non-shocked economies with positive economic outlook. As a result, capital flows into these economies where placement of financial capital is deemed to be safer. This can be observed from the short-run increase in their total stock market value, ranging from a low of 0.4 percent to a high of 3.6 percent in 2018 (Figure 13). But, among the non-shocked economies, only the OPC reaps prolonged positive spillover effect to the stock market. It is interesting to note that the response of stock markets in OPC mirrors that of the trends in GDP. Drawing inference from the simulation results, oil is considered as an inelastic good and there is no perfect substitute for it. Hence, even if there is loss of confidence in EEs, the drop in oil price is immaterial and the OPC can still benefit from the positive income effect. This effect leads to higher aggregate demand and higher expected cash flows for firms in the OPC.

Meanwhile, the currencies of non-shocked economies have likewise weakened relative to USD but the magnitude is not striking as in shocked EEs due to financial capital flowing into non-shocked regions. The currency depreciation is only modest at 3.4 percent because the increased trade exposure of some non-shocked economies to EEs makes their currencies stronger relative to the currencies of shocked economies but weaker vis-à-vis the US dollar (Figure 14).

As financial capital is reallocated from shocked to non-shocked economies, both the short-term risk-adjusted (Figure 15) and 10-year real interest rates (Figure 16)

fall and remain at rates lower than the baseline. Subsequently, inflation in non-shocked regions instantaneously falls following the shock but stabilizes and goes back to the baseline after around three or four years (Figure 17). This is because the monetary rule is defined in this paper as the central banks targeting inflation except for Saudi Arabia, China, EUZ, France and Italy.

Meanwhile, accumulation of capital stock (Figure 18) and investment spending (Figure 19) in non-shocked economies increases amid the low cost of capital and borrowing following the risk premia shock in EEs. Given the Keynesian multiplier effect of increased investment to income and aggregate output, households in non-shocked economies feel wealthier and, thus, consumption rises initially (Figure 20). The OPC, though, is an outlier in that consumption treks a fairly increasing trajectory for 14 years before it declines but still remains above the baseline. Finally, as rational households in these economies predict future to be less uncertain, they reduce savings in the long run (Figure 21). The low interest rates in these economies discourage households from placing their funds in the banks and thus, savings decline.

3.2 Trade and Commodity Channel

Another channel that amplifies the domestic and cross-border effects of risk premia shock is the trade and commodity channel. This channel captures the increasing significance of EEs as trading partners of advanced (non-shocked) economies.

3.2.1 Domestic Impacts to Shocked Economies

The negative financial flow-on effects of confidence crisis in EEs are attenuated by the general improvement in the trade balance (Figures 22a, 22b, and 22c) and current account positions (Figures 23a, 23b, and 23c) of shocked EEs. As currencies in shocked EEs depreciate, the three groups of shocked economies (BRIS, Asia and Latin America) register large trade surpluses amid cheaper exports. The top five EEs which post huge net exports following the risk premia shock are: Russia (5.8 percent), Argentina (5.2 percent), Indonesia (5.1 percent), Brazil (4.9 percent) and South Africa (4.8 percent). Likewise, the positive current account balances in these economies remain above the baseline overtime. These positive trade effects, which counterbalanced the negative impacts of financial capital outflows, can partly explain why the contraction in real GDP (Figures 2a, 2b, and 2c) of shocked economies is relatively subdued in the long run.

Overtime, the trends and developments in the trade and current account balance of shocked EEs are decreasing as the loss of confidence is gradually taking its toll in the non-shocked economies. The non-shocked economies, majority of which are advanced market economies, are estimated to account for 60 percent of global

import demand (Huidrom et al. 2016). Because of the deepening integration of shocked EEs into global supply chains, the downswing in the capital stock and total capital goods demanded (investment) reflects the weak investment demand from non-shocked regions; hence, the decline in the net exports of EEs overtime. This is because capital goods are often the most import-intensive component of total demand (ibid).

As global commodity demand from commodity-importing non-shocked economies diminishes amid growth slowdown in the long run (Figure 12), the global commodity prices are expected to decrease. The easing of global commodity prices contributes to the slowdown in the terms of trade of commodity-exporting shocked economies in the long run. Consequently, the shocked EEs are faced with running fiscal deficits as revenues from commodity-driven exports shrink (Figures 24a, 24b, and 24c). These developments can pose serious fiscal challenges to these economies as governments that are heavily dependent on commodity-driven revenues would need to adjust their fiscal policy strategies, such as subsidizing the affected commodity-exporting sectors, in order to ensure fiscal sustainability.

3.2.2 Spillover Effects to Non-Shocked Economies

As the trade and commodity channel spillovers to non-shocked economies exactly mirrors that of shocked EEs, the positive financial flow-on impacts of the shock are matched with negative trade effects. The immediate impact is the expected trade (Figure 25) and current account deficits (Figure 26) as currencies of non-shocked economies strengthened relative to that of the shocked economies' respective national currencies. Among the non-shocked (advanced) economies, France and the rest of the Eurozone have the largest trade deficit at 1.1 percent (Figure 25).

The easing commodity prices as a result of confidence crisis in commodity-exporting shocked EEs alleviate fiscal pressures in non-shocked commodity-importing economies. The fiscal position in these regions improves as fiscal deficit, expressed as percentage of GDP deviation from the base year, is at most reduced at 0.5 percent before it reverts to the baseline in the long term (Figure 27).

4. Conclusion

The global consequences of a loss of confidence in the EEs are analyzed in this paper using the G-Cubed model. The simulated results are discussed in the context of financial and trade-commodity channels, which are viewed as the two major channels of the spillovers from a loss of confidence in EEs. The results are examined in both the short- and long-run horizons.

In both channels, the results showed that while the risk perception has negative financial and positive trade flow effects in EEs in the short run, the non-shocked regions

experience the opposite effects. Overall, the real effects of the country risk premia shock to the EEs via the financial channel are amplified in their consumption (as a function of income and savings) and investment (as a function of interest rate). Meanwhile, as the model incorporates rational expectations behavior, households in shocked EEs cut down on their consumption and increase savings. These trends, coupled with higher cost of capital, intensify the divestment process in EEs.

On the external front, the extent and scale of the spillovers to non-shocked economies of a loss of confidence in EEs depend on several factors such as the degree of trade openness, external trade dependence, commodity price sensitivity, and trade composition. While the financial capital outflows from the shocked EEs are offset by positive trade flows through an initial improvement in their trade balance and current account positions, the effects are rather transitory as the long-run impact of commodity channel comes into play. Through this channel, investment demand from the commodity-importing non-shocked economies is reduced as growth slowdown in non-shocked economies in the long run is feared due to the loss of confidence in EEs. These developments, along with the lower capital stock and investment goods in shocked EEs, exacerbate the easing of commodity prices.

This paper concludes that financial markets and trade channels act as important stabilizers for both shocked and non-shocked economies where the negative financial capital outflows in EEs are tempered by a temporary improvement in their trade balance. Similarly, the relatively strong domestic demand faced by non-shocked regions is complemented by the inflows of financial capital into their economies. These adjustments in the domestic and external sectors in both shocked and non-shocked economies are necessary to circumvent prolonged adverse impacts of the shock.

In the policy sphere, managing risks should be given preeminence over regulating international capital flows because capital controls might encumber the usual stabilizing adjustment process of trade and capital markets. Risk management entails close monitoring and supervision of the financial system so that any impending signs of risk premia shocks could be averted by having accurate and timely information about the dynamics in the financial system.

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Appendix

Figure 1: Country Risk Premia in EEs

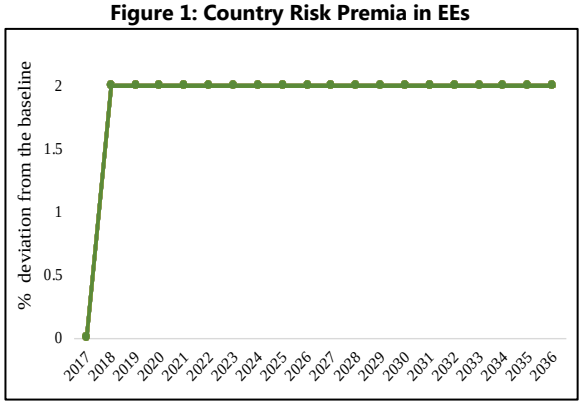


Figure 2a: Real GDP in EEs (BRIS)

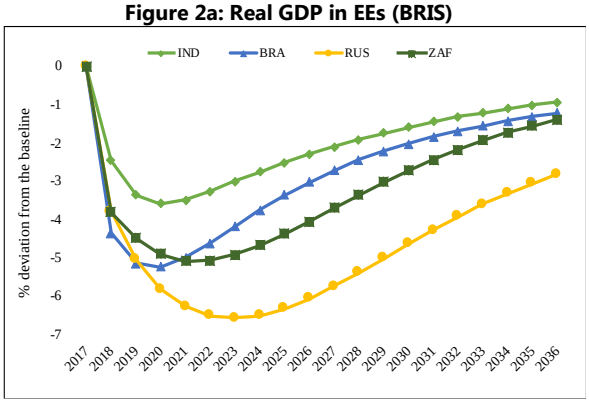


Figure 2b: Real GDP in EEs (Asia)

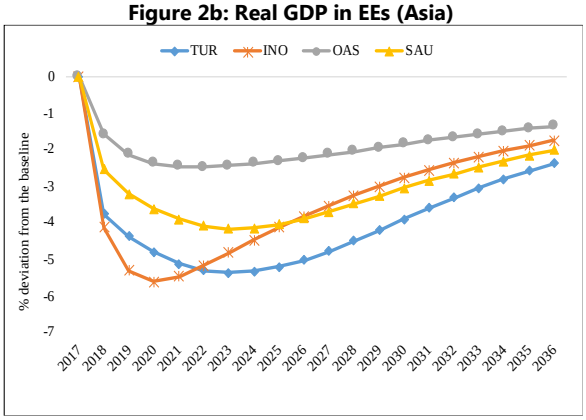


Figure 2c: Real GDP in EEs (Latin America)

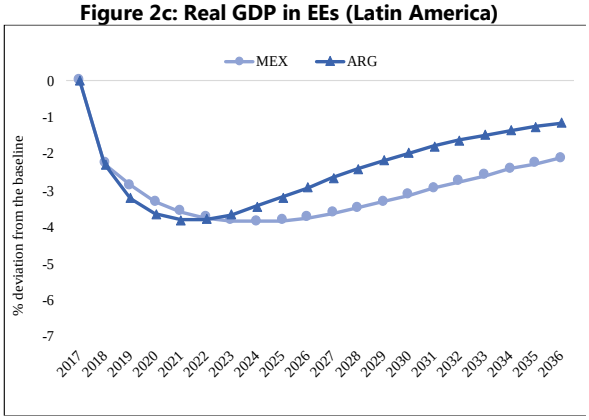


Figure 3a: Stock Market Value in EEs (BRIS)

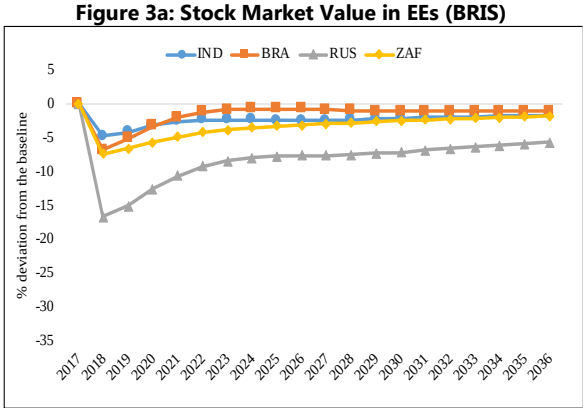


Figure 3b: Stock Market Value in EEs (Asia)

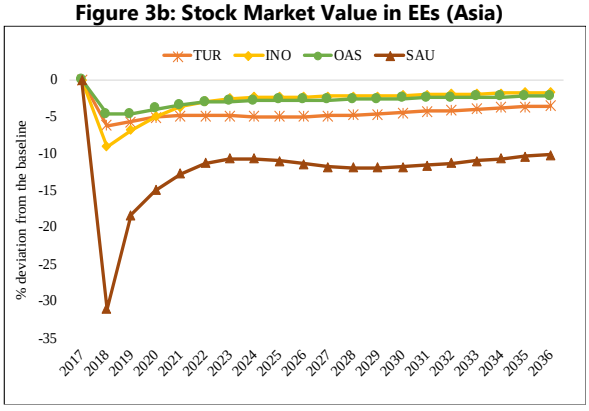


Figure 3c: Stock Market Value in EEs (Latin America)

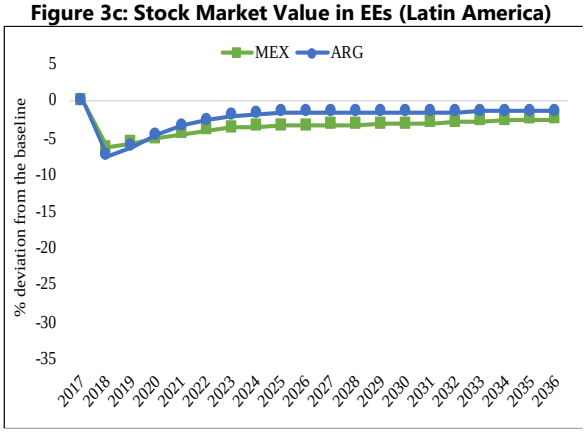


Figure 4a: Real Exchange Rate in EEs (BRIS)

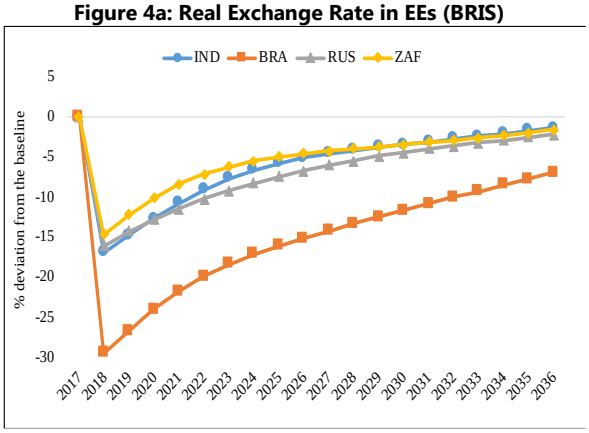


Figure 4b: Real Exchange Rate in EEs (Asia)

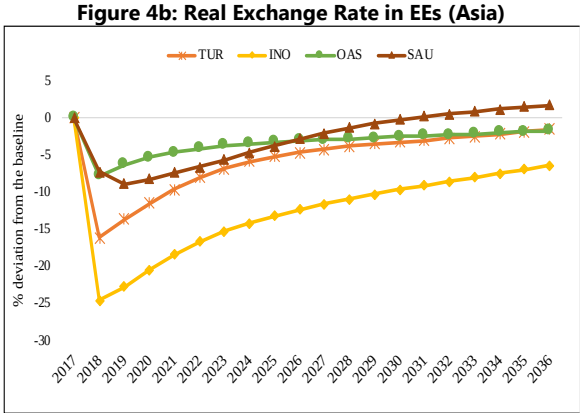


Figure 4c: Real Exchange Rate in EEs (Latin America)

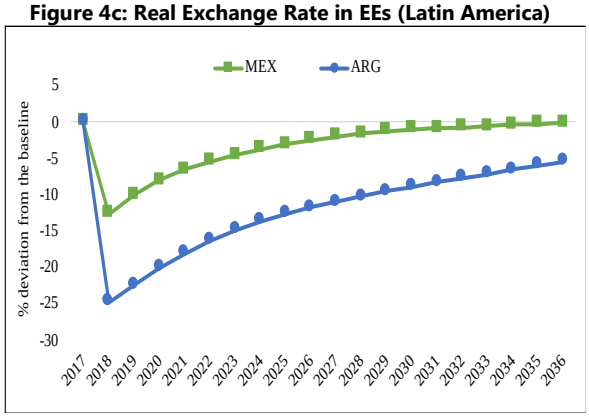


Figure 5a: 10-yr Real Interest Rate (RIR) in EEs (BRIS)

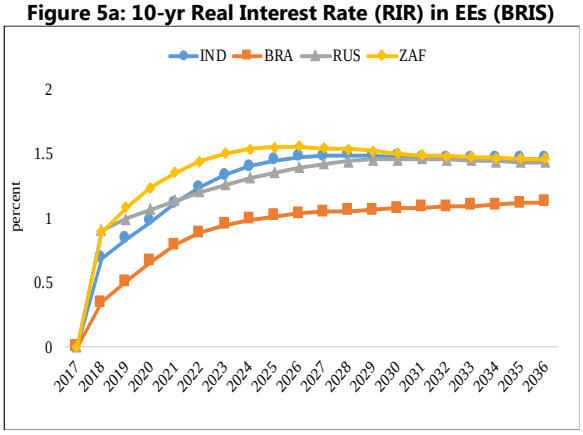


Figure 5b: 10-yr RIR in EEs (Asia)

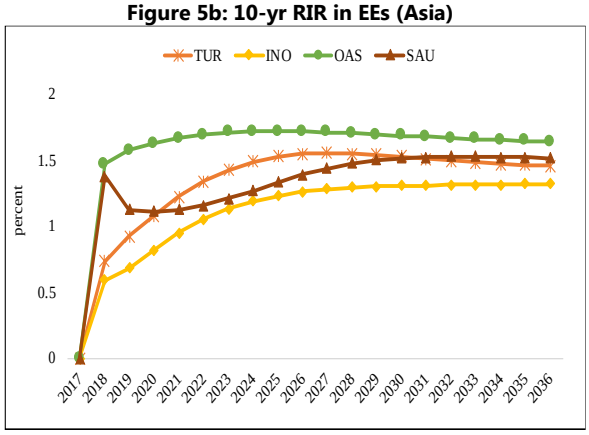


Figure 5c: 10-yr RIR in EEs (Latin America)

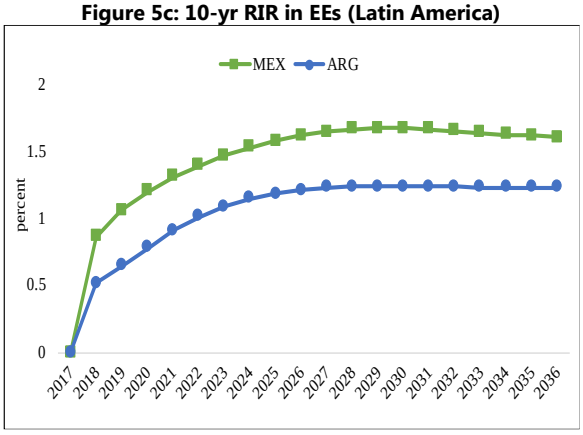


Figure 6a: Short-term risk-adjusted RIR in EEs (BRIS)

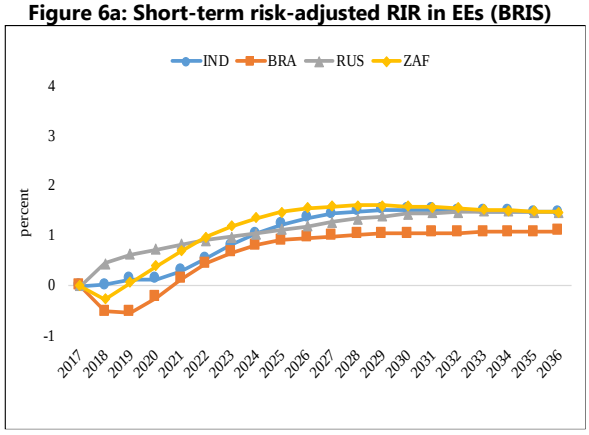


Figure 6b: Short-term risk-adjusted RIR in EEs (Asia)

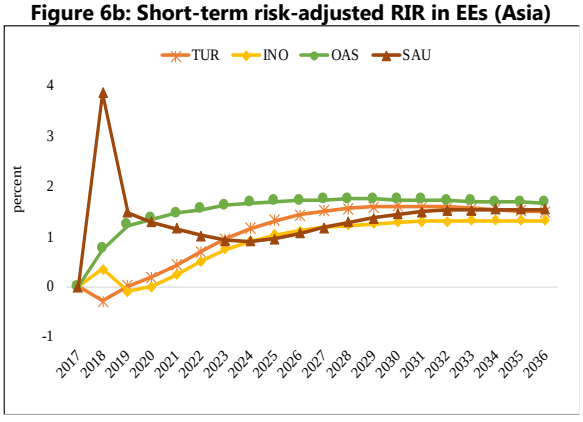


Figure 6c: Short-term risk-adjusted RIR in EEs (LatinAm)

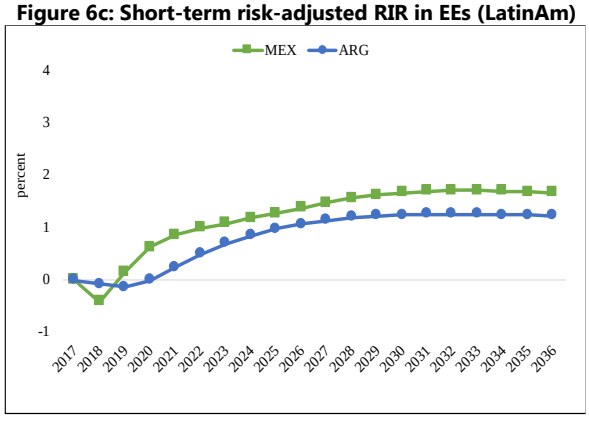


Figure 7a: Inflation Rate in EEs (BRIS)

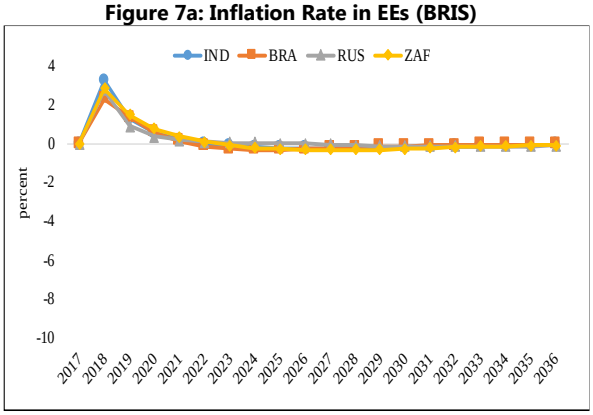


Figure 7b: Inflation Rate in EEs (Asia)

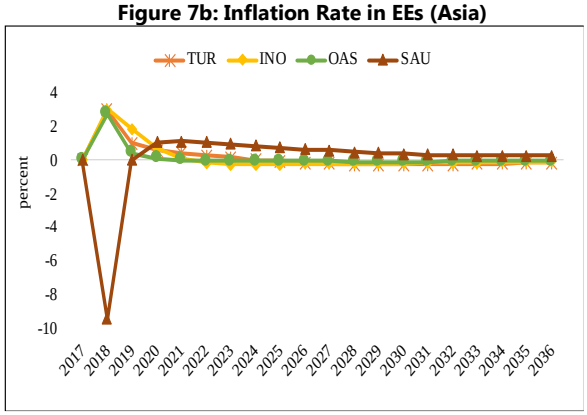


Figure 7c: Inflation Rate in EEs (Latin America)

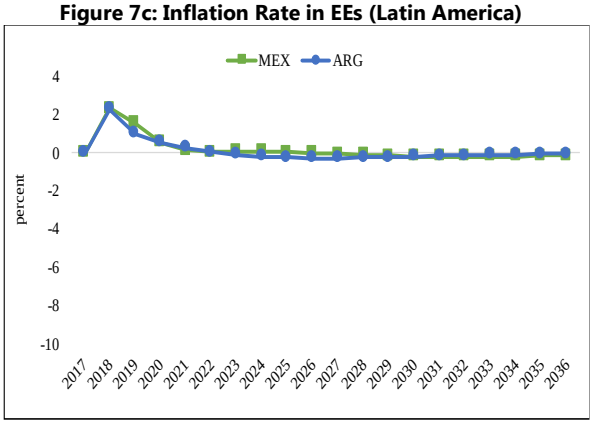


Figure 8a: Capital Stock in EEs (BRIS)

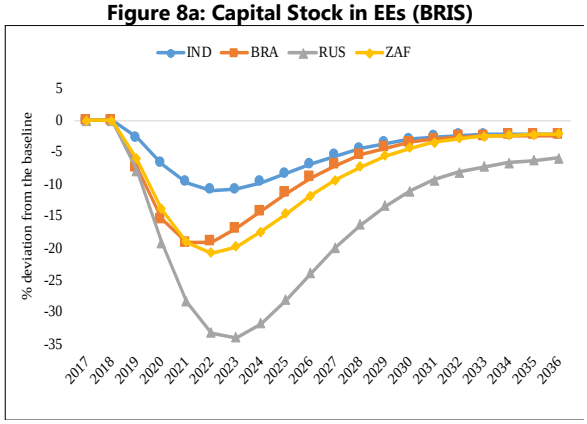


Figure 8b: Capital Stock in EEs (Asia)

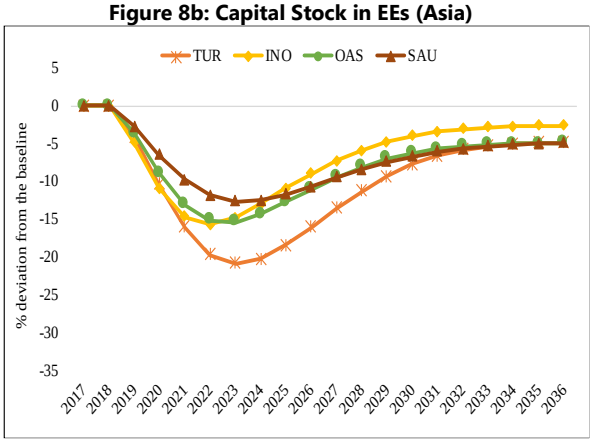


Figure 8c: Capital Stock in EEs (Latin America)

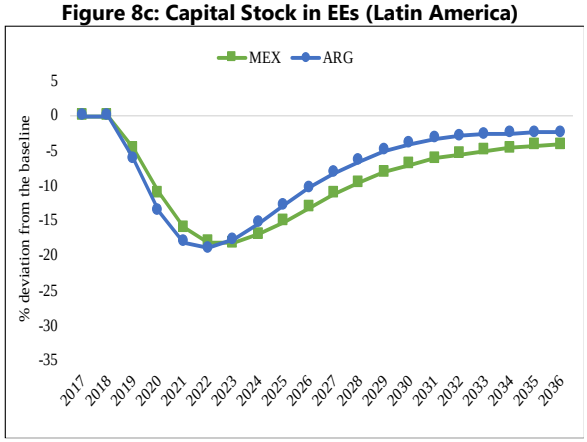


Figure 9a: Investment in EEs (BRIS)

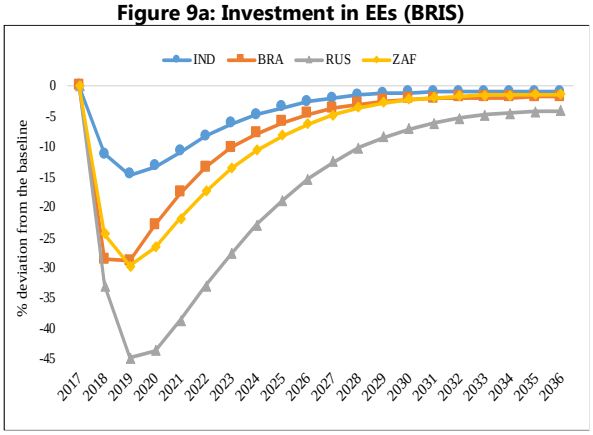


Figure 9b: Investment in EEs (Asia)

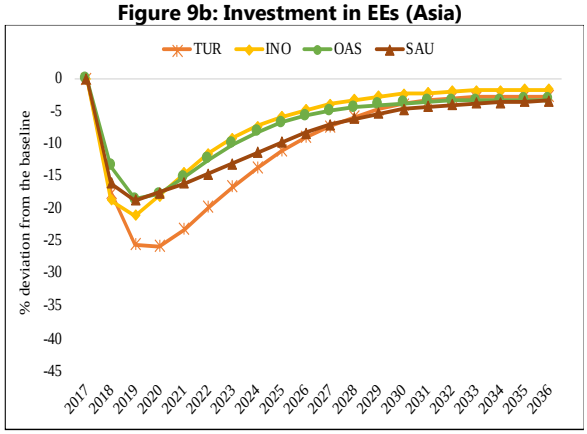


Figure 9c: Investment in EEs (Latin America)

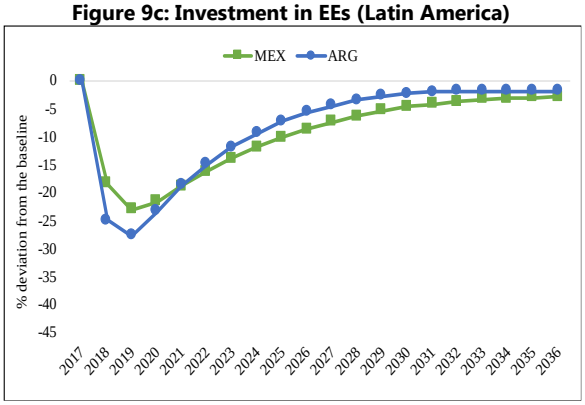


Figure 10a: Consumption in EEs (BRIS)

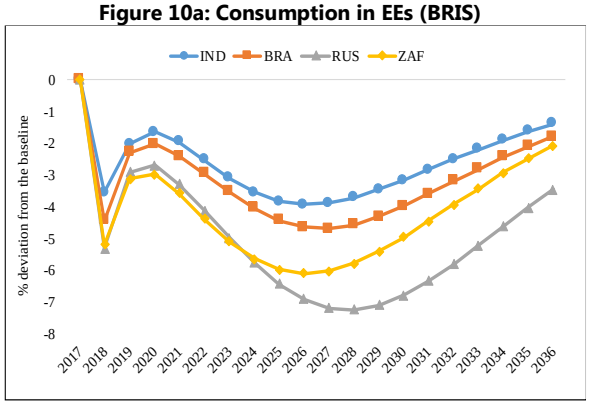


Figure 10b: Consumption in EEs (Asia)

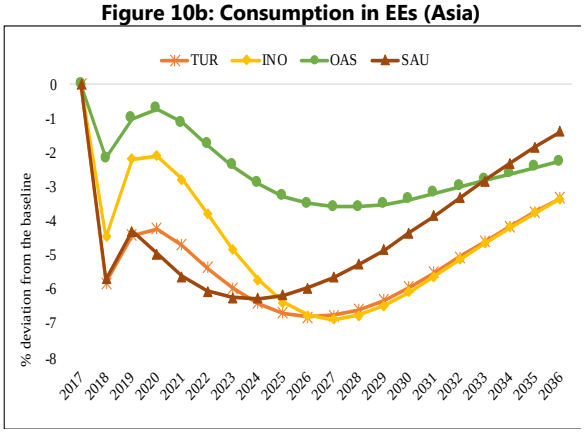


Figure 10c: Consumption in EEs (Latin America)

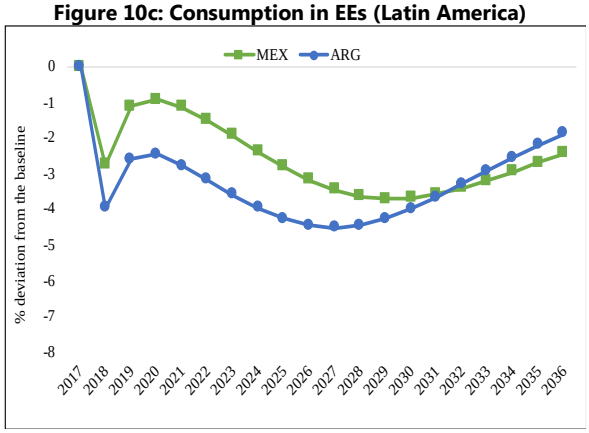


Figure 11a: Domestic Private Savings in EEs (BRIS)

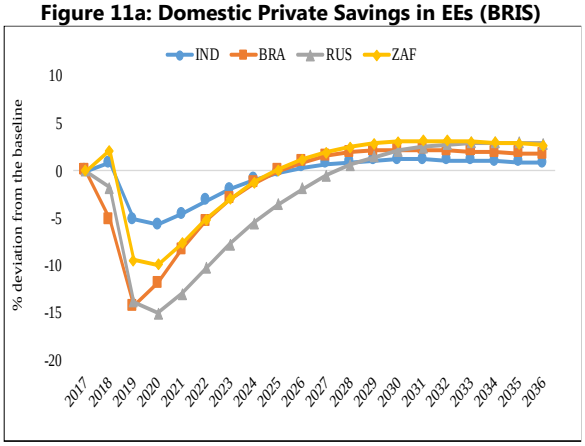


Figure 11b: Domestic Private Savings in EEs (Asia)

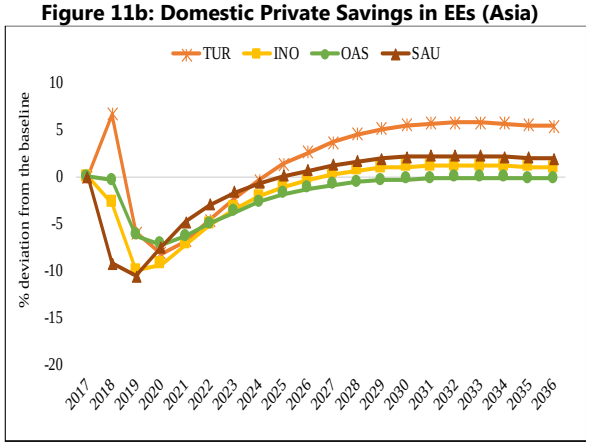


Figure 11c: Domestic Private Savings in EEs (Latin Am)

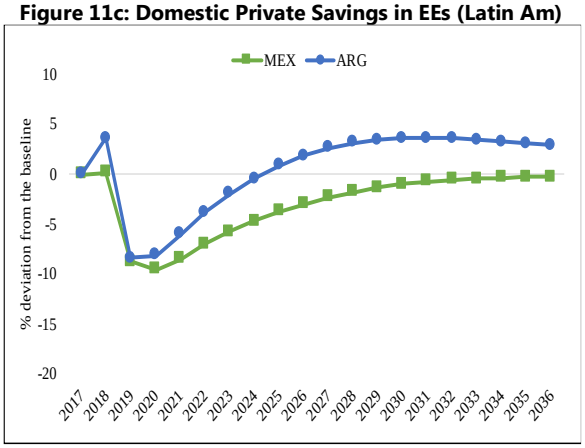


Figure 12: Real GDP in Non-EEs

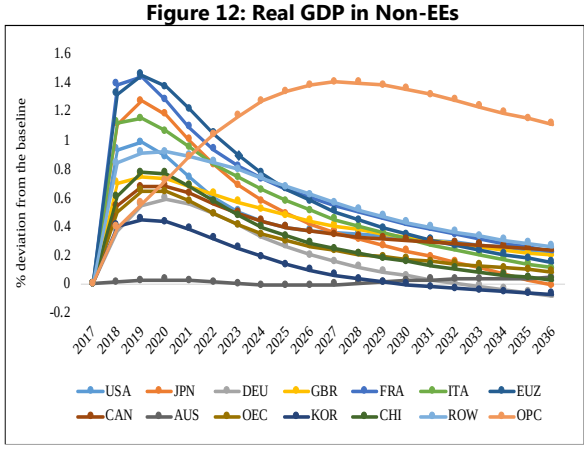


Figure 13: Stock Market Value in Non-EEs

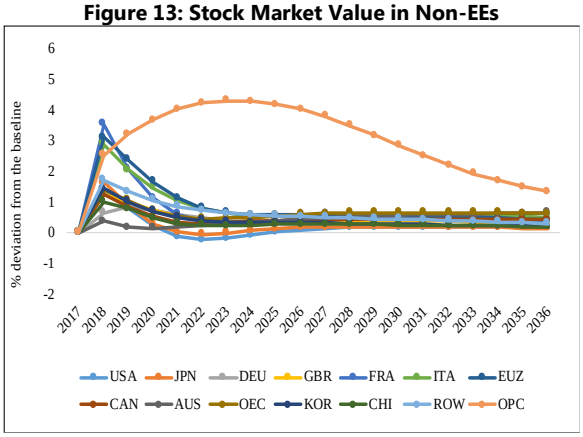


Figure 14: Real Exchange Rate in Non-EEs

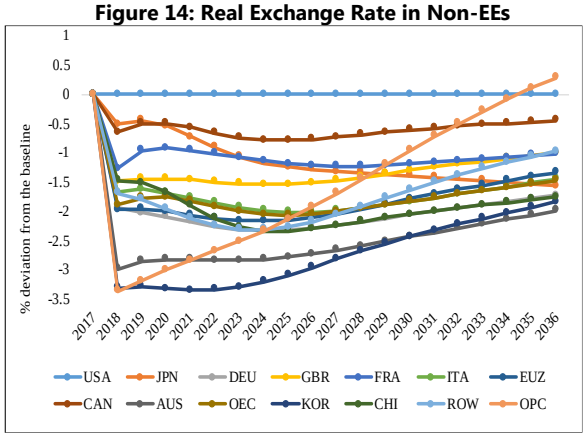


Figure 15: Risk-adjusted Real Interest Rate in Non-EEs

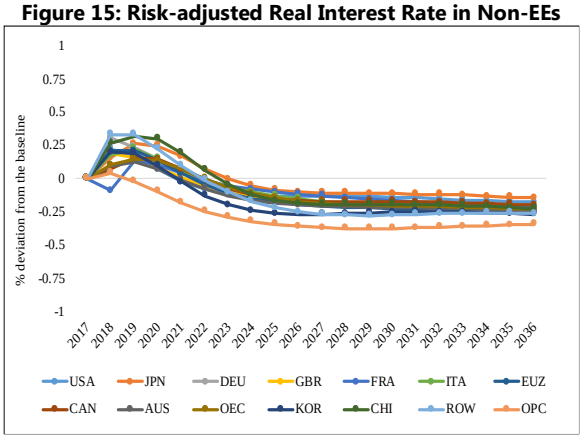


Figure 16: 10-yr Real Interest Rate in Non-EEs

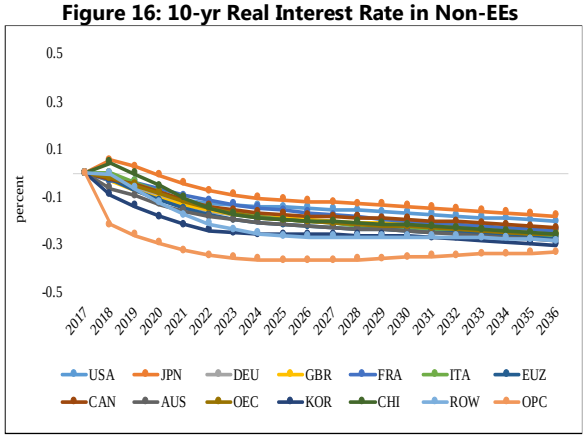


Figure 17: Inflation Rate in Non-EEs

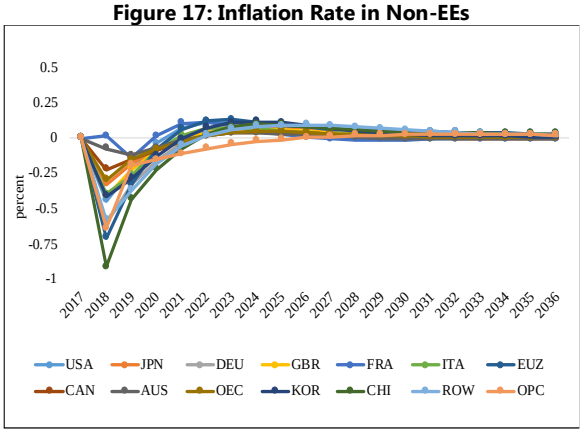


Figure 18: Capital Stock in Non-EEs

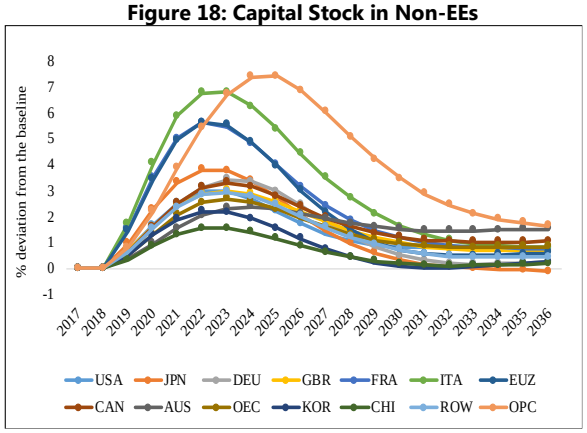


Figure 19: Investment in Non-EEs

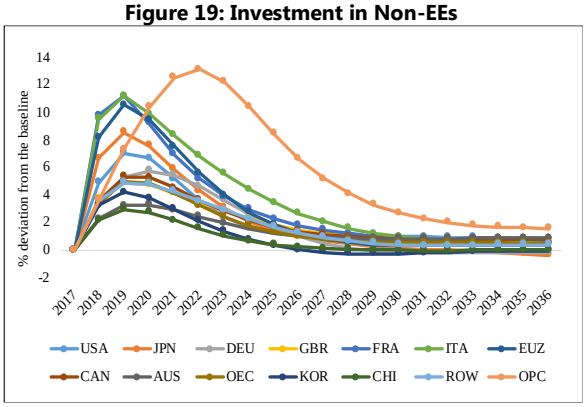


Figure 20: Consumption in Non-EEs

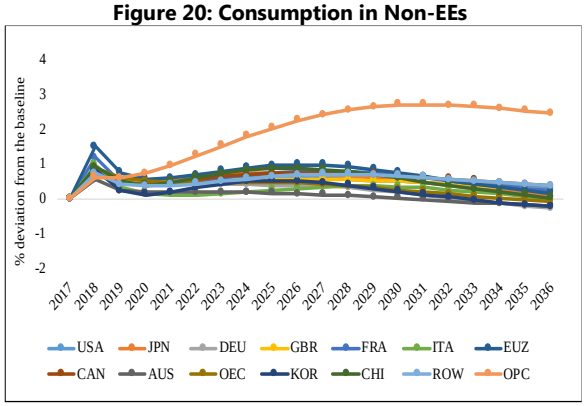


Figure 21: Private Savings in Non-EEs

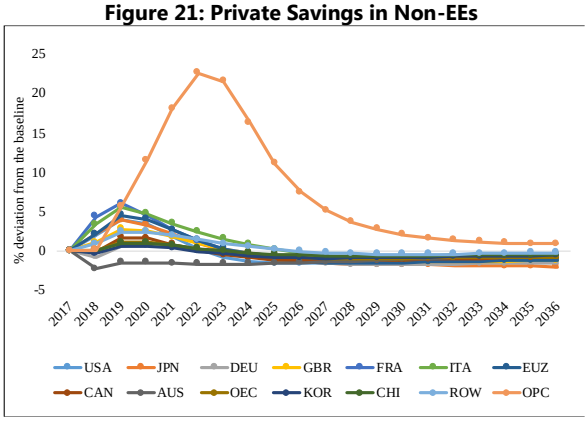


Figure 22a: Trade Balance in EEs (BRIS)

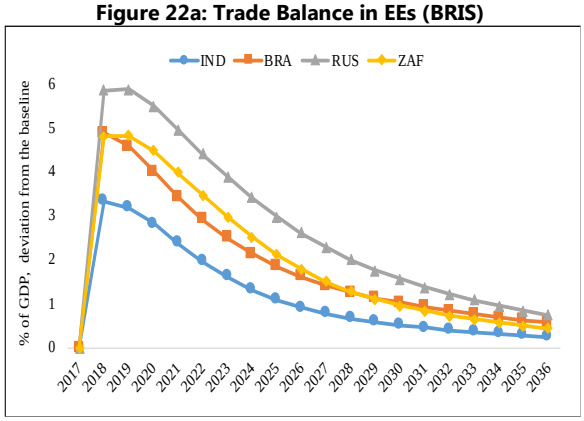


Figure 22b: Trade Balance in EEs (Asia)

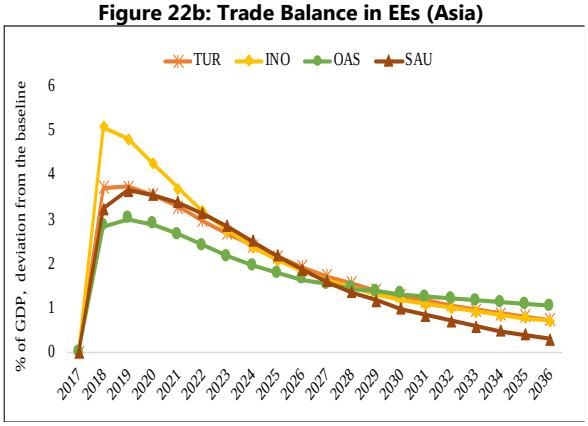


Figure 22c: Trade Balance in EEs (Latin America)

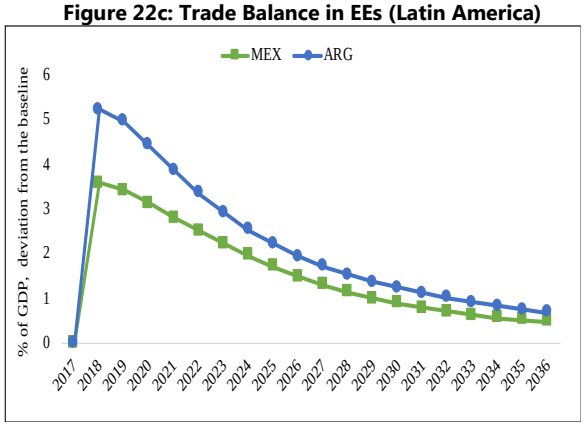


Figure 23a: Current Account Balance in EEs (BRIS)

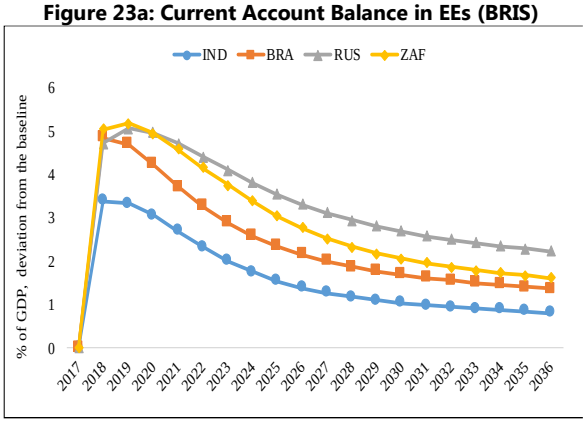


Figure 23b: Current Account Balance in EEs (Asia)

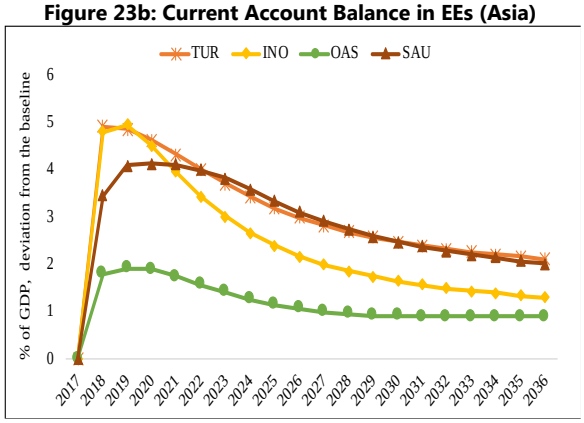


Figure 23c: Current Account Balance in EEs (Latin Am)

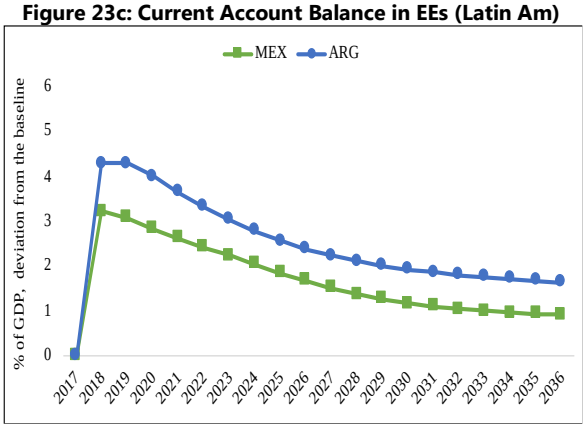


Figure 24a: Fiscal Deficit in EEs (BRIS)

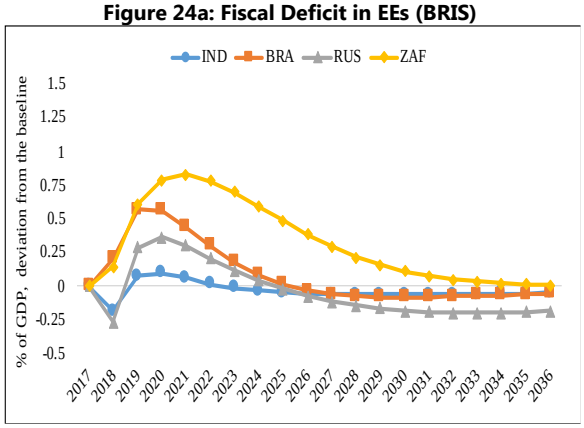


Figure 24b: Fiscal Deficit in EEs (Asia)

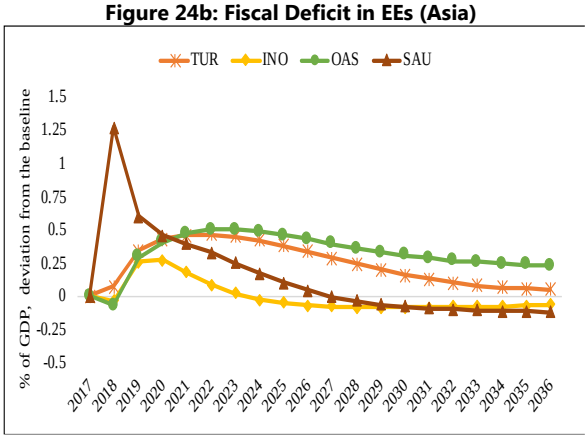


Figure 24c: Fiscal Deficit in EEs (Latin America)

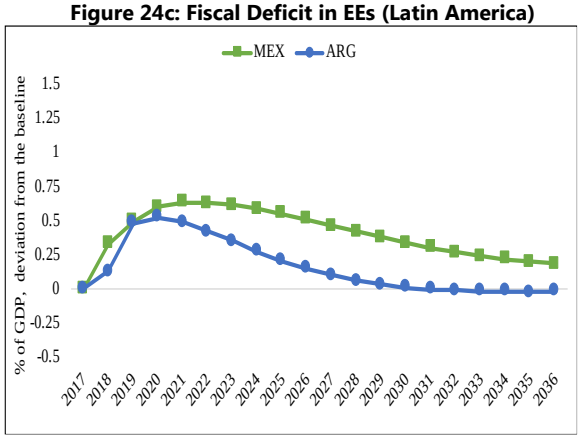


Figure 25:Trade Balance in Non-EEs

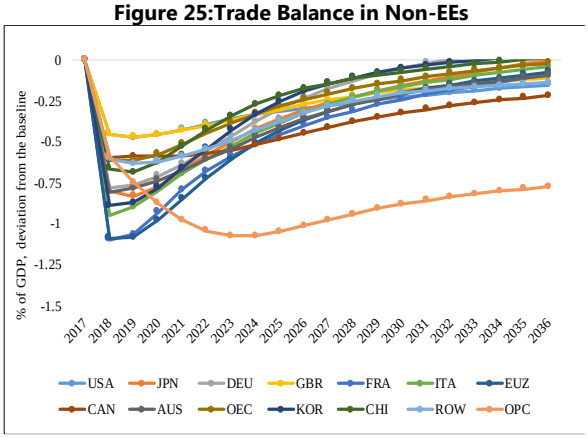


Figure 26:Current Account Balance in Non-EEs

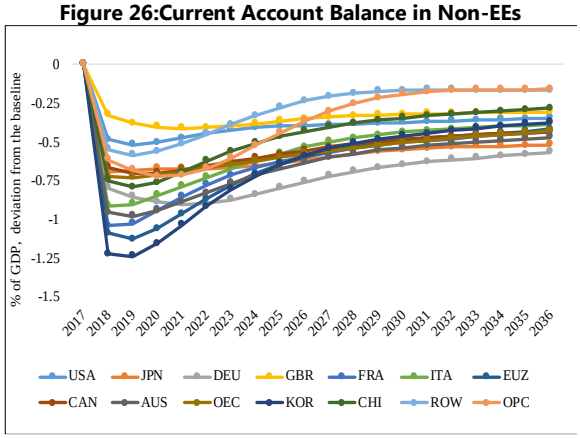
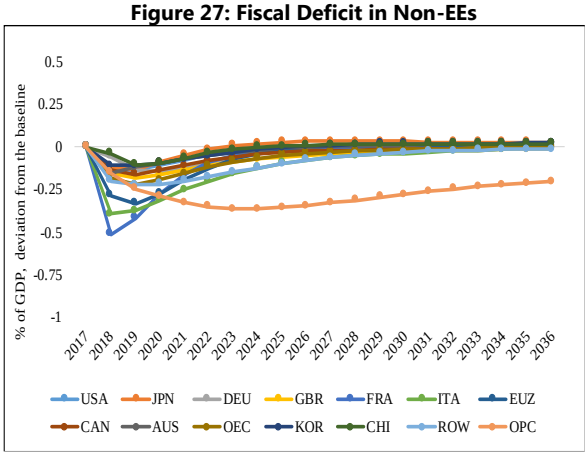


Figure 27: Fiscal Deficit in Non-EEs



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