Emerging Market Exchange Rate Policies: Stabilizing or Manipulation?

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Abstract

Currency manipulation involves a joint hypothesis; first, that a country can effectively lower the international value of its currency by accumulating foreign reserves, and second, that the weaker currency leads to an unfair trade advantage. Critically, the joint hypothesis is one-sided; only polices that result in under-valuation of the currency and trade advantage are at issue. Many emerging market countries rely on exchange rate stabilization policies to offset external shocks and facilitate trade; in most cases, the stated objective of policy is not to "undervalue" the domestic currency in order to influence trade flows, but these stabilization policies could nonetheless be labeled as manipulation by trading partners if they meet certain criteria. The objective of this project is to determine whether it is possible to distinguish exchange rate policies that are stabilizing from those that are manipulative. The focus will be on emerging market countries that are both active interveners in currency markets and relatively dependent on trade for economic growth.

Keywords: Exchange Rate, Foreign Exchange Intervention, Foreign Reserve Accumulation, Current Account Balances, Synthetic Control Method

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I. Introduction

Accusations of currency manipulation and threats of retaliation are on the rise. The most recent salvo from the United States (US) is a policy proposal to use countervailing import duties against countries that subsidize their exports by manipulating exchange rates.[2] The World Trade Organization (WTO) allows countervailing duties in response to subsidies on specific industries or products, but the US proposal will be a test case for whether this form of remedy can be used against all exports from specific countries. There have long been implicit rules that countries should not deliberately weaken the value of their currencies to secure a competitive advantage, but the US proposal may lead other countries to bring similar cases to the WTO, forcing global policy-makers to make the current implicit currency rules explicit.

In the current global monetary system countries are free to choose among macroeconomic policies to achieve domestic goals. Countries can chose to coordinate their policies, as is the case among the Eurozone countries, but there are no global monetary rules that countries must follow. At the same time, it is understood that macroeconomic conditions are influenced by the policy choices made by other countries as well as own policy choices. These spillovers tend to be positive when global economic growth is high. Higher economic activity in one country may lead it to increase imports, which in turn, improves economic conditions abroad. Symmetrically, when global economic conditions deteriorate, spillover effects can often be negative and lead to cross-country tensions. It is for this reason that macroeconomic policy choices are likely to be viewed differently depending on global economic conditions. Policy conflicts, and discussions of new international rules-of-the-game, are most likely to occur during periods when policy-makers are concerned about a slowdown in economic growth. We seem to be in one of those periods.

Allegations of currency manipulation have a long history. In the interwar period, during a time when some countries were back on the gold standard, and others had not re-joined, many countries made the case that others were engaging in currency manipulation. Currency conflict intensified as global economic conditions deteriorated during the Great Depression and countries resorted to devaluations in an attempt to stimulate their economies. Although there is no formal definition of currency manipulation, it describes exchange rate policies taken by one country that are viewed as unfairly providing that country with a trade advantage. The US has developed a well-defined set of criteria it uses to determine whether any country "manipulates its rate of exchange against the US dollar to prevent effective balance of payments adjustments or to gain unfair competitive advantage in international trade." The US approach focuses on the impacts of exchange rate policies on US bilateral trade balances. Other countries have at times accused other countries (including the US) of currency manipulation, though they have not done so in the systematic way that the US has done.

Currency manipulation involves a joint hypothesis; first, that a country can effectively lower the international value of its currency by accumulating foreign reserves, and second, that the weaker currency leads to an unfair trade advantage. Each of these hypotheses is controversial. The first hypothesis requires that foreign exchange intervention policy, possibly combined with capital

[2] The US Department of Commerce proposal to amend 19 CFR Part 351 is dated 23 May 2019 and is described in the Federal Register: https://www.govinfo.gov/content/pkg/FR-2019-05-28/pdf/2019-11197.pdf. The proposal would require the US Treasury's evaluation and conclusion as to whether the currency of a country is undervalued as a result of government action and the extent of any such undervaluation.

restrictions, effectively influences exchange rates. The second hypothesis requires exchange rate changes to influence trade balances. Importantly, currency manipulation requires that the connections between intervention policy, currency value, and trade are not just statistically significant, but economically significant in the sense that one country can make the case that they have been harmed as a result of the currency policy. Further, the joint hypothesis is one-sided; only polices that result in under-valuation of the currency and trade advantage are at issue.

The one-sided nature of currency manipulation is critical because many emerging market (EM) countries rely on exchange rate stabilization policies to offset external shocks and facilitate trade. In most cases, the stated objective of policy is not to "undervalue" the domestic currency in order to influence trade flows, but these stabilization policies could nonetheless be labeled as manipulation by trading partners if they meet certain criteria. One of the objectives of this project is to determine whether it is possible to distinguish exchange rate policies that are stabilizing from those that are manipulative. The focus will be on EM countries because they are both active interveners in currency markets and relatively dependent on trade for economic growth.

This project will examine the available data to provide stylized facts on: (1) how extensively EM countries use exchange rate based stabilization policies, (2) how intensively (in terms of size of operations and persistence over time) these policies are used, (3) whether there is evidence that the policies are effective at influencing currency values, and (4) whether these policies impact trade balances. Along with descriptions of country-specific intervention policy, currency values and trade balances using criteria similar to those used by the US Treasury, counterfactual matching techniques will be used to test causality.

Countries do not use intervention policies at random times; they are most likely to intervene in reaction to unwanted currency movements, making it difficult to disentangle causality. The ideal counterfactual experiment would allow us to compare movements in the exchange rate and trade balances for a country that intervenes with an identical country that does not. The ideal experiment is not possible, but synthetic control techniques can create the non-intervention counterfactual during time periods when all emerging market countries are hit by a large external shock and therefore have an incentive to intervene. The external shocks are selected based on their strong impact on private capital flows and exchange rates, but because not all countries respond by intervening, they identify the countries that can serve as experimental controls. Along with providing estimates of the causal links between intervention and currency values, the synthetic control approach can also test the second hypothesis, that reserve accumulation improves trade balances.

II. Defining Currency Manipulation

The International Monetary Fund (IMF) was designed to ensure the stability of the post-WWII international monetary system; a central part of its original mandate was to monitor exchange rate policies and provide rules for member countries. The IMF Articles of Agreement explicitly prohibit: (1) unilateral acts to restore the balance of payments, such as restrictions on current payment, and (2) multi-currency and discriminatory currency practices. Under the Bretton Woods system of fixed exchange rates countries were required to maintain a par value of the national currency, but with the collapse of that system, the IMF's role has evolved to providing "surveillance over exchange-rate policies." Article IV (1) (iii) states that each member shall "avoid manipulating exchange rates or the international monetary system in order to prevent effective balance of payments adjustment or to gain

an unfair competitive advantage over other members." In 2007 the IMF Executive Board made this surveillance more specific; subparagraph (ii) refers to the "excessive and prolonged official or quasi-official accumulation of foreign assets"; subparagraph (v) lists examples of "fundamental exchange rate misalignments", and subparagraph (vi) adds "large and prolonged current account deficits or surpluses".[3]

The IMF's monitoring of exchange rates, foreign reserve accumulation, and current account imbalances has always been a part of Article IV consultations. More recently the IMF research department has publicly provided extensive cross-country information on reserve adequacy and external balances,[4] but it has stopped short of setting criteria against which countries could be judged as manipulators. The complicated politics of international organizations may explain this reticence,[5] but the IMF's silence has allowed countries to develop their own (potentially inconsistent) definitions of manipulation.

Economic theory is especially useful when markets function efficiently; in such a world, free-floating exchange rates serve as global automatic stabilizers. The currencies of countries that experience negative demand or supply shocks will weaken, leading to a fall in export prices and an increase in competitiveness, and an eventual improvement in the current account. If just one country, or a small group of countries, experiences the negative shock, the corresponding rise in counter-party currency values will generally be small, as it will be spread across a large group of countries. However, if much of the world experiences the negative economic shock, the process of macroeconomic stabilization via market determined exchange rate movements is less clear-cut. When the negative shock is global, all countries will feel the need for depreciation, and no country will want the offsetting appreciation. This is the scenario in which currency wars are most likely to develop, but exchange rate intervention is least likely to be effective.

Theory is less clear-cut as soon as we allow for market frictions, which lead to many circumstances in which countries will be tempted to intervene in currency markets. In models with frictions exchange rates may be influenced by capital flows that are disconnected to macroeconomic fundamentals in the short run. The rationale for intervention in this case is to smooth the impacts of these temporary capital flow shocks. This approach to intervention is often described in practice as "leaning against the wind." The objective of these stabilizing interventions, along with other countercyclical macroprudential policies, is not to impact long-term equilibrium exchange rates, but simply to dampen deviations from equilibrium levels.

Countries have a variety of rationales for intervention, but if capital markets are unrestricted interventions will at best have short-lived influence on exchange rates. In standard models, if capital is freely mobile, an undervalued nominal exchange rate will boost exports, overheat the economy, and result in higher domestic prices. This would bring the real exchange rate back to an equilibrium value consistent with desired saving and investment. However, if capital flows are restricted, interventions can have longer lasting effects. If capital restrictions are effective a central bank that purchases foreign

[3] The 2007 Decision on Bilateral Surveillance over Members' Policies is available at: https://www.imf.org/en/News/Articles/2015/09/28/04/53/pn0769#decision

[4] See the IMF's Assessing Reserve Adequacy webpage: https://www.imf.org/external/datamapper/datasets/ARA and the IMF's External Balance Assessment webpage: https://www.imf.org/external/np/res/eba/data.htm.

[5] Bergsten and Gagnon (2017) criticize the IMF's reluctance to set current account norms and explicitly name currency manipulators.

currency reserve assets and finances them by issuing domestic bonds can force the private sector to increase its net saving. Adjustment comes from the domestic interest rate, which can deviate from the world interest rate because of the capital controls. This is the scenario in with a policy of reserve accumulation, together with capital controls, can influence the equilibrium real exchange rate by directly affecting the underlying balance of saving and investment.

In order to further understand how foreign reserve accumulation can impact the current account, it is useful to start with the usual adjustment scenario to a current account surplus in a frictionless world. A surplus arises when sales of exports exceed the demand for imports, which is most likely to happen in business cycle downturns. Current account surpluses tend to be countercyclical because demand for investment and intermediate goods decreases during downturns. As investment falls during the downturn, savings also decreases to smooth consumption, but in standard models it does not fall as much as investment. After the downturn, investment opportunities increase and growth rises. The automatic stabilizer role of exchange rates will kick in with an appreciation of the domestic currency. This makes imports less expensive and exports less competitive, leading to a current account reversal. Intervention policies that slow down or thwart exchange rate adjustment in this scenario will likewise slow the process of current account reversal, and potentially lead one set of countries to run persistent surpluses while another group of countries is in persistent deficit. In this scenario it will be the countries running the persistent deficits that will be the ones accusing the surplus countries of currency manipulation.[6]

III. Literature Review

While there is a large and growing set of policy and popular press articles focused on currency manipulation, there are few academic papers that directly examine the topic.[7] The academic literature has instead focused more narrowly on each of the two underlying hypotheses: whether foreign exchange intervention is effective, and whether exchange rate changes impact trade balances.

Recent accusations of currency manipulation have stemmed from a wide range of policies, including the quantitative easing policies put in place by many of the advanced economies in the aftermath of the financial crisis,[8] but the policy most under scrutiny is foreign reserve accumulation. The official purchases of foreign assets against domestic assets that result in rising foreign reserve stocks are interventions. In some countries, it is the central bank that both decides to intervene and purchases the foreign assets, while in other countries (especially the advanced economies) the decision to intervene is made by the Treasury or Finance Ministry and the implementation of the policy is done by the central bank. If intervention operations are unsterilized, they change the monetary base and impact exchange rates in the same way as open market operations do. The more interesting and controversial question is

[6] Although theory suggests that the adjustment scenario is symmetric for current account deficits, Bergsten and Gagnon (2017) emphasize that interventions to maintain over-valued currencies are less likely to be effective as those against under-valued currencies, especially when governments are willing to intervene forcefully by accumulating foreign reserve stocks.

[7] An exception is Hassan, Mertens and Zhang (2016) which examines currency manipulation in the context of large country effects.

[8] An example is the following widely cited accusation by the Brazilian Finance Minister Guido Mantega in the fall of 2010, after the Fed announced its second round of quantitative easing and many emerging-market currencies, including the Brazilian real, dramatically appreciated: “The world is in an international currency war as governments manipulate their currencies to improve their export competitiveness.”

whether these operations matter when they are sterilized, which results in changes in foreign reserve stocks, but no change in the monetary base.[9] In order for a sterilized operation to matter in standard macroeconomic models a financial constraint must bind. In portfolio balance models the constraint arises from the perception that domestic and foreign-currency denominated assets are imperfect substitutes.[10] More generally, any model that allows for deviations in interest parity or goods market arbitrage provides a role for sterilized interventions (and capital controls) to influence the exchange rate and mitigate the financial distortions.[11]

Survey evidence indicates that central banks believe that interventions are effective at influencing currency values and trends (Neely, 2008). Using confidential daily intervention data for a broad set of countries Fratzscher et al. (2019) document that foreign exchange intervention polices are widely used, both by countries that self-describe as floaters and countries that explicitly manage the value of their exchange rate (within broad and narrow bands). The daily data indicate that intervention operations are most often used during turbulent periods, when market volatility is high, when countries experience unusually large capital inflows or outflows, and when exchange rates move dramatically.[12]

Empirical studies that focus on recent EM country experience with intervention policy find evidence that interventions slow the pace of appreciation. Intervention effects are found to be strongest in the context of already overvalued exchange rates, and efficacy diminishes with the degree of capital account openness (Adler and Tovar (2011), Adler et. al (2015), Blanchard et al. (2015), Daude et al. (2016)). There are also a number of country-specific studies that focus on intervention tactics and instruments.[13] Kolscheen and Andrade (2014) use high frequency data to study the impact effects of Brazil's currency swap auctions during the period 2011 to March 2013 when the central bank objective was to reduce BRL appreciation. They find strong within-day auction effects typically weakening the BRL by 0.33 basis points. Chamon et al. (2017) examine a subsequent Brazilian swap program that was initially focused on

[9] Central banks that target inflation require intervention operations to be sterilized, but most countries claim to routinely sterilize their intervention operations. However, in practice sterilization is not always possible. In countries with less developed financial markets the ability to sterilize may be constrained by the size and depth of the domestic bond market. It is for this reason that East Asian central banks often use FX swaps as sterilization instruments (after purchasing foreign currency in the spot market, the central bank implements a swap in which it sells the foreign currency spot and purchases it forward.) Countries with fixed exchange rate systems and some degree of capital mobility may find it difficult to sterilize because sales of domestic-currency assets may attract capital inflows, forcing the country to sell additional assets, setting off a vicious circle. Finally, the fiscal costs (which depend on the interest differential between domestic and foreign assets) and the valuation risk of holding foreign-currency denominated assets may also deter countries from fully sterilizing operations.

[10] Dominguez and Frankel (1993) describe the portfolio balance channel for intervention in detail.

[11] Gabaix and Maggiori (2015) focus on an intermediation friction. Chang (2018) focuses on a credit supply constraint, specifically the net credit position of the central bank with domestic banks (sales of official reserves allows the central bank to increase the supply of credit to banks). Fanelli and Straub (2016) focus on a capital constraint; they derive a small open economy model with limited capital mobility where interventions are part of the optimal planning policy.

[12] Fratzscher et al. (2019) use daily data from 33 advanced and emerging market countries to examine impacts of intervention from 1995-2011. Dominguez (2003, 2006) uses daily G3 (US, Japan and Germany) data to examine the impacts of intervention in the 1980s and 1990s.

[13] Domanski et al. (2016) examine EM interventions. Chamon et al. (2019) examine interventions by inflation – targeters in Latin America. Dominguez (2014) examines interventions by non-eurozone European countries, Dominguez et al. (2013) examine the impacts of foreign reserve sales by the Czech National Bank, and Dominguez (2003) examines the Fed's intraday intervention tactics.

countering the BRL depreciation in the summer of 2013. Based in part on the perceived success of these swap programs, in 2017 Mexico and Turkey adopted similar rules-based intervention strategies. Kuersteinera et al. (2018) use tick-by-tick intervention and order book data provided by the Central Bank of Colombia and exploit a change in the policy rule to identify the surprise component of their rule-based regime. They also find significant but short-term effects of intervention on the COP.

Empirical studies of intervention's influence on exchange rates must grapple with simultaneity bias. The decision to intervene is unlikely to be independent of movements in exchange rates. Indeed, interventions are most likely to occur in reaction to undesirable (from the government's point of view) exchange rate changes. Interventions may also be part of a broader set of policy actions (monetary and/or fiscal policy, capital controls). A wide variety of econometric approaches have been used to control for potential estimation bias, though it is worth noting that the bias is toward finding no effect compared to the true estimate.[14]

Along with testing the overall efficacy of intervention, studies also examine whether the economic context matters. In fixed exchange rate regimes intervention is required to counter market pressure, but many countries that allow their currencies to float nonetheless intervene for various reasons.[15] A commonly stated rationale for intervening is to stabilize exchange rates during "disorderly market conditions." Countries also intervene to rebalance or build their foreign exchange reserve holdings. Central bank intervention reaction functions typically take these (and other objectives) into account but regression goodness of fit is typically extremely low. The most likely reason for this is that intervention policies tend to be episodic, with frequent interventions in some time periods and then none in other periods even when external circumstances repeat themselves.

The IMF explicitly allows countries to intervene to counteract "disorderly market conditions" without actually defining the term. Disorder in this context refers to unusually high market volatility. In the case of EMs, large changes in private capital flows are often the source of heightened market volatility. There is a large literature examining the determinants of these capital flows, and many of these studies focus on the relationship between EM capital flows and policy changes in advanced economies (Fratzscher (2012), Forbes and Warnock (2012), Mishra et al. (2014), Sahay et al. (2014), Ahmed et al. (2015), Clark et al. (2016), Chari et al. (2017)).[16] Most of these studies find strong evidence that advanced economy (especially US) policy changes are important drivers of EM capital flows, but they also find that initial conditions in EMs and EM policy responses are important.

[14] Duade et al (2016) among others make this point.

[15] A related literature distinguishes between de jure and de facto exchange rate regimes (Levy Yeyati and Sturzenegger (2005), Klein and Shambaugh (2008) and Ilzetzki et al. (2017)) and the reasons self-described floaters still intervene (Levy Yayati et al. (2013)). Obstfeld et al. (2017) find evidence that exchange rate regimes matter because the transmission of global financial shocks is larger for fixed rate economics. Goldberg and Krogstrup (2018) explicitly measure the transmission of global shocks using a new version of an "exchange rate pressure index."

[16] Mishra et al. (2014), Sahay et al (2014), Ahmed et al (2015), Clark et al. (2016) and Chari et al. (2017) all focus on the impacts of changes in Federal Reserve policy on EM capital flows in the aftermath of the global financial crisis. Fratzscher (2012) and Forbes and Warnock (2012) examine a broader set of external and local shocks.

Along with using intervention policy, many EMs have recently introduced various forms of capital restrictions to reduce market pressure on their exchange rates.[17] Panel studies of the effectiveness of these policies generally find some support for the hypothesis that capital restrictions can temper the impacts of large capital flows (Ostry et al. (2012), Ahmed and Zlate (2014), Ghosh et al. (2017), Pasricha et al. (2018)). Chamon and Garcia (2016) focus on the efficacy of Brazil's countercyclical capital controls and also find some evidence of success. Eichengreen and Rose (2014) document the durability of capital controls and provide evidence that restrictions are rarely used dynamically; once in place, they stay in place.

Studies that examine the role of exchange rate policy in facilitating or hindering trade come to a wide range of conclusions. Exchange rates change, sometimes dramatically, while trade (im)balances are often stubbornly persistent. Staiger and Sykes (2010) examine the theoretical relationship between exchange rate policy and trade, and argue that the role of price adjustment is critical. If prices are flexible they show that effective intervention is equivalent to a uniform import tariff and export subsidy, which will have no real effect on trade. If prices are slow to adjust this equivalence depends critically on how traded goods and services are priced (whether these are denominated in the producer currency, the currency of the consumers, or in dollars). They conclude that the impacts of intervention on trade are likely to be complex. Bergsten and Gagnon (2017) examine intervention and trade with a focus on the US and its major trading partners, their conclusion is less nuanced: "foreign reserve accumulation has a very large – nearly one-for-one – effect on the current account" (page 32). Rose (2018) examines whether unconventional monetary expansion via quantitative easing (QE), which should have stronger impacts on exchange rates than sterilized intervention, leads to export booms. He finds the opposite to be true: QE is associated with exports that are about 10% lower relative to countries not engaged in QE.

IV. Data

This project focuses on the exchange rate policies and current account adjustments of 20 EM countries (Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey) over the post global financial crisis (GFC) period. The selection of countries is largely driven by data availability, but also attempts to include countries across a range of continents, exchange rate histories, and policy activism. The data appendix provides detailed information on the sources for each of the variables used in the tables and empirical analysis.

The foreign reserves data used in the paper comes from the IMF's Special Data Dissemination Standard (SDDS) Reserve template, which provides detailed, marked-to-market, end-of-month values in US dollars. In order for assets to "count" as reserves they must be denominated in foreign currency, owned by the government or monetary authority, and be highly liquid.[18] Total reserves include foreign currency assets (the component used here), as well as monetary gold, special drawing rights, reserves

[17] Magud et al. (2011) provides an excellent summary of the findings from studies of country experiences with capital controls before the global financial crisis.

[18] According to the sixth edition of the IMF Balance of Payments Manual (BPM6), a country's reserve assets refer to "those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy, and serving as a basis for foreign borrowing). Reserve assets must be foreign currency assets and assets that actually exist." (Chapter 6, 6.64; page 111)

held at the IMF in the country's "reserve tranche," as well as IMF loans, assets held in special purpose government funds (often termed Sovereign Wealth funds), and assets created under reciprocal facilities (swap arrangements). Foreign currency assets are used in this study because they are the component of total reserves that directly reflects intervention policy actions. The dollar value of the stocks of these assets changes for three main reasons: (1) due to purchases or sales of assets, (2) due to the receipt of interest income on existing assets, and (3) due to valuation changes in existing assets.[19]

All of the EMs in our sample hold substantial stocks of foreign reserves. Figure 1 shows aggregate reserve accumulations by country. Table 1 provides country level information on the IMF's assessment of the adequacy of these reserve holdings since the financial crisis (2009-2018).[20] The range of assessments goes from High to Low and is based largely on whether the stock of reserves is large enough to cover 100% of short-term debt, 20% of broad money, and 3 months of imports. Countries like India that have a relatively low level of reserves to GDP (15%) are still considered High because the reserves adequately cover short-term debt, broad money and imports. South Africa has the same level of reserves relative to GDP (15%) but adequacy is considered Low because of poor coverage of broad money.[21] The IMF's reserve metrics explain why countries feel the need to accumulate substantial reserve stocks, but there are also costs to holding reserves. Countries with large stocks of reserves and a high domestic interest rate may inadvertently be counter-parties to the carry trade. While carry-traders borrow in low interest currencies and invest in high interest currencies, most reserve-building countries invest in low interest foreign currencies and borrow at the (relatively higher) domestic interest rate. Holding reserves also exposes the country to currency risk. If the domestic currency appreciates vis-à-vis the currencies denominating the reserve assets, the domestic currency value of reserves drops.

Table 1 also provides various other stylized facts that describe each country's exchange rate regime, currency crisis history, whether they restrict capital flows, the average annual current account as a percent of GDP, and measures of exchange rate stability, monetary policy independence and financial openness (the last three are the trilemma indices created by Aizenman, Chinn and Ito (2016)). The countries with the fewest capital restrictions and most stable currency regimes include Chile, Israel, Korea and Mexico. Argentina, Brazil, Russia and South Africa experienced currency crises since 2009. The four central European countries (Czech Republic, Hungary, Poland and Romania) have relatively open capital markets but have crawling band exchange rate regimes. The countries with the least open capital markets and high reserve adequacy include China, India, Malaysia and the Philippines. Figure 2 shows aggregate reserve accumulation for the 20 EM countries grouped by exchange rate regime (reserves held by countries in fixed regimes are shown in blue and those in floating regimes are in

[19] Few countries provide detailed accounts of the individual assets (or their currency denomination) in their reserve portfolios. Some central banks provide general information regarding their reserve management strategies, which are often published in annual reports. For example, De Gregorio (2011) provides a discussion of the motives for reserve accumulation in emerging economies with a special focus on the Chilean approach. Dominguez et al. (2012) use the limited information provided in the SDDS template to distinguish active (reason 1 in the text) and passive (reasons 2 and 3) reserve accumulation.

[20] The IMF's Reserve Adequacy webpage includes visualization tools to view measures by country and across alternative metrics of reserve adequacy: https://www.imf.org/external/datamapper/ARA/index.html

[21] China is considered to have High reserve adequacy, and indeed holds the largest stock of reserves, though starting in 2014 reserves have not covered 20% of broad money.

yellow). The majority of the EMs allowed their currencies to float over this time period, but these same countries also accumulated substantial reserves.

V. US Treasury Approach

Although the rhetoric against currency manipulation in the US has reached new highs, concerns regarding the role of currencies in unfair trade practices have a long history. Along with its episodic public accusations of currency manipulation, the US is unique in its systematic approach to monitoring trading partner policies. The Omnibus Trade and Competitiveness Act of 1988 requires the Secretary of the Treasury to provide biannual reports on the international economic and exchange rate policies of the major trading partners of the United States. Under Section 3004 of the Act, the report must consider whether any foreign economy manipulates its rate of exchange against the US dollar to prevent effective balance of payments adjustments or to gain unfair competitive advantage in international trade.

The Trade Facilitation and Trade Enforcement Act of 2015 formalized the US approach by requiring Treasury to monitor trading partners if they meet an explicit set of criteria. The criteria included: (1) a bilateral trade surplus with the United States that is at least $20B, (2) a current account surplus of at least 3 percent of GDP, (3) one-sided intervention (net purchases of foreign currency) conducted repeatedly and totaling at least 2 percent of GDP over a 12 month period. The Act also set out "monitoring list" criteria for countries meeting two of the three manipulation criteria. Once on the monitoring list, countries remain there for at least two consecutive Reports to help ensure that any improvement in performance versus the criteria is durable and is not due to temporary one-off factors. In 2017, as an added measure, Treasury included countries to the monitoring list if they accounted for a large and disproportionate share of the overall U.S. trade deficit even if that economy had not met two of the three criteria from the 2015 Act. The one country that met the new 2017 criteria was China. In 2019 Treasury again revised its approach by expanding the potential number of trading partners covered in the Report and adjusting downward the thresholds for the three criteria as described in Table 2.

The biannual Treasury reports have evolved over the years; they have always included a set of tables and graphs describing data on foreign reserves, bilateral trade, and current accounts for a select group of trading partner countries, but it is only starting in Fall 2018 that the currency manipulation criteria are evaluated for each country in one table. Further, because the evaluation criteria have changed over the years, it is not possible to get a consistent list of manipulators from the historical reports. Table 3 provides the published list of manipulators (based on each year's criteria), and the much longer list of countries on the monitoring list. The last year in which any country was named by the United States as a manipulator is China in 1994.

While there is no coherent economic rationale for focusing on bilateral trade imbalances, the other US criteria that focus on the size and persistence of foreign exchange intervention and current account surpluses are likely to be included in any quantitative assessment of currency manipulation. The trigger thresholds may differ, but it is the combination of persistent reserve accumulation and current account surpluses that typically lead countries to accuse each other of manipulation.

Tables 4.1 to 4.10 replicate the most recent US Treasury Report evaluation criteria (excluding the bilateral trade column) for the group of twenty EM countries in our sample over the period 2009

through 2019. The numbers in red text are ones that exceed the threshold criteria. For example, Table 4.1 presents data for 2009. The first row in Table 4.1 to contain three red numbers corresponds to China. In 2009 the Chinese current account surplus was 4.8% GDP, the dollar value of the surplus was $243.3 billion (well above the $40 billion threshold), the number of months of net purchases of foreign reserves was higher than six (at 10) and the sum of the monthly increases was above 2% of GDP. Table 5 summarizes the information in the yearly tables. In the column labeled "currency manipulator" the years in which each country met the 2019 US Treasury criteria are listed. China met the criteria in 2009, 2010, and 2012.[22] The other countries that met the criteria for at least one year include Korea (2012), Russia (2009-2012), and Thailand (2016-17). Four additional countries (Hungary, Israel, Malaysia, Philippines) did not meet the "manipulator" criteria because the dollar value of their annual current account surpluses was never above $40 billion. In the nomenclature of the US Treasury Reports, these countries would be on the Monitoring List.[23]

Figures 3.1 to 3.20 show the reserve accumulation and current account data (as a percent of GDP) that are included in the tables for each country over time, as well as net private capital inflows. The current account and private capital inflow data are quarterly from the IMF IFS database, and reserve accumulation is measured quarterly using monthly SDDS foreign currency reserves.[24] Negative numbers indicate net purchases of reserves in the figures, since these are capital outflows from the EMs perspective. The figures show that half of the countries in the sample have had persistent current account deficits since 2009 (these include Argentina, Brazil, Chile, Colombia, India, Indonesia, Mexico, Romania, South Africa and Turkey). All of the countries both purchased and sold reserves over the 2009-2018 period, though as the calculations in tables 4.1 to 4.10 indicate, the majority of operations involve reserve accumulation. The figures also show that in many cases official flows (reserve purchases and sales) offset private flows.

It is worth noting that some countries do not consider the quarterly changes in reserves shown in figures 3.1 to 3.20 as interventions. Indeed, the daily data provided by Turkey indicate only six days of intervention sales over this time period, while Figure 3.20 shows continuous reserve changes involving both purchases and sales.[25] Ideally, analysis could be done on the operations identified as interventions by each country, as well as valuation-adjusted reserve changes. These (ideal) data are unfortunately not publicly available for most countries. However, even if the underlying motivation for many reserve changes is not to influence exchange rates, models in which intervention operations can influence exchange rates, including portfolio balance models, are agnostic about intention; in these models any change in the stock of foreign reserve assets can impact exchange rates.

VI. Policy Identification

Figures 3.1 to 3.20 and the calculations in tables 4.1 to 4.10 show the yearly and country-by-country changes in reserve accumulation and trade balances, but they do not establish causality. In order to

[22] Note that China did not meet the US manipulation criteria in these years because the contemporaneous criteria were different; the assessments in table 5 are based on 2019 US Treasury criteria.
[23] Bergsten and Gagnon (2017) use different criteria but also name China, Korea, Israel, Malaysia, Russia and Thailand as currency manipulators over the period 2003-2013 (table 4.1, page 72).
[24] The monthly data for China are total reserves (downloaded from FRED) because they only provide SDDS data starting in 2015.
[25] Turkey's daily intervention data is available from Fred at: https://fred.stlouisfed.org/series/TRINTDEXR

investigate the extent to which increases in reserves are responsible for improvements in trade, this section will use the synthetic control method described in Abadie et al. (2010) to show what would have happened to exchange rates and trade balances in the absence of intervention. Further, the empirical strategy relies on the exogenous nature of US policy shocks from the point of view of each EM in the sample, and exploits the cross-section variation of intervention responses to these exogenous shocks.

The two specific US policy shocks examined are the announcement by the Federal Reserve (Fed) that it would begin a second round of quantitative easing (QE2) in the last quarter of 2010, and the so-called Taper Tantrum announcement in the second quarter of 2013, indicating that the Fed would begin reducing its asset purchases.[26] Figure 4 shows that net private capital flows to EMs rose after the announcements of QE2 and QE3, leading to EM currency appreciations. Net private capital flows did not increase to EMs after QE1, but the program's proximity to the global financial crisis makes it difficult to disentangle the source of the decline (which started well before the QE1 announcement). After the announcement that the Fed would begin tapering its asset purchases, net private capital inflows to EMs declined, leading to dramatic EM currency depreciations.

After each of the Fed shocks EM countries had an incentive to intervene if the objective was to stabilize their exchange rates. In the case of QE2, stabilization would have involved accumulating reserves to offset currency appreciation, whereas after the Taper announcement, stabilization would involve sales of reserves. Interestingly, countries that did not intervene to offset the exchange rate effects of the Taper Tantrum, and instead allowed market forces to drive down the value of their currencies, would not meet the US criteria for currency manipulation.

The Fed shocks together with the Abadie et al. (2010) synthetic control method provide a quasi natural experiment that allows a comparison of EM exchange rates for countries that intervened relative to those that did not. The outcome variable of interest is the change in the bilateral dollar exchange rate, and the event dates are the two Fed announcements. The treatment countries are those that engaged in exchange rate stabilization based off the reserve data described in tables 4.1-4.10 and figures 3.1 to 3.20. The controls include the EM countries that did not accumulate substantial reserves after QE2 in one set of experiments, and the countries that did not sell substantial reserves after the Taper Tantrum in the second set of experiments. The synthetic control approach is needed because the economic characteristics of the non-intervening EMs are unlikely to perfectly match those of the interveners. Any differences in exchange rate reactions to the Fed shocks for interveners and non-interveners may therefore have more to do with country-specific characteristics than with intervention. The synthetic

[26] The Fed's quantitative easing programs to purchase large volumes of assets were announced in three steps (known as QE1, QE2 and QE3). In November 2008, the Fed announced the first program, QE1, which involved purchases of housing agency debt and agency mortgage-backed securities (MBS) of up to $600 billion. On March 2009, the Fed expanded its purchases of agency-related securities and began to purchase longer-term Treasury securities. In November 2010, the Fed announced the second program, QE2, which involved purchases of $600 billion long-dated Treasury securities. In September 2011, the Fed announced a new program that involved purchasing $400 billion of long-term treasury bonds by selling short-term treasury bonds. This (operation twist style) program was further extended in June 2012 until the end of the year. In September 2012, the last round of quantitative easing was announced, QE3, which consisted of an open-ended commitment to purchase $40 billion mortgage backed securities per month. In December 2012, this program was expanded further by adding the purchase of $45 billion of long-term treasury bonds per month. In May 2013 the Fed announced it would begin slowing (tapering) its QE3 asset purchases (it did not actually begin tapering until December 2013). Quantitative easing officially ended in October 2014.

approach uses the pre-event period to estimate optimal weights for each of the potential control countries to create an "identical twin" country that is used for the post-event counterfactual comparison.

Let E^{FXI}_{it} denote the exchange rate in countries i which intervene (denoted with the superscript FXI) in reaction to an exogenous shock after time t=0. E_{it} is the unobserved exchange rate that would have occurred had country i not intervened. During the pre-event period (when $t < 0$) we assume that any intervention program in place is small relative to the post-event intervention policy (and that these smaller interventions are equally likely in the treatment and control countries). The effects of the post-event interventions are measured as the difference between E^{FXI}_{it} and E_{it} from period t=1 to t=T. We model E_{it} as a function of unknown time-dependent common factors and a vector of observable variables Z. X_1 is the vector of pre-event characteristics of the treatment countries that includes E and Z, and X_0 is a similar vector of characteristics for the control countries. The optimal weight vector W is chosen through the minimization of the square root of the following criterion: $(X_1 – X_oW)' V (X_i - X_oW)$ where V is a $k \times k$ symmetric and positive semi-definite matrix (k is the number of explanatory variables) and V is chosen to minimize the mean square prediction error in the pre-event period.

The outcome variable is the bilateral exchange rate with respect to the US dollar, and the potential explanatory variables include standard quarterly predictors (monetary and growth differentials) as well as variables that measure country i and aggregate market volatility. Monetary differentials are measured as the difference between the policy rate in country i at time t and the US policy rate (which is the fed funds rate prior to the first quarter of 2009; after 2015, it is the shadow fed funds rate constructed by Wu and Xia (2016) between 2009Q2 through the end of 2015). Growth differentials are measured as the growth in GDP of country i relative to the average growth rate of the advanced economies. Country i market volatility is captured by the country-specific EMBI Global spread for country i during the quarter and net private capital inflows to country i (measured as a share of country i GDP). Aggregate market volatility is measured using the change in the VIX, and the quarter on quarter change in the commodity price index constructed by the IMF.[27] All data are quarterly. The pre-event window is one year prior to each Fed announcement and the post-event window is one year after the Fed shock. These windows are relatively short in order to avoid confounding impacts of other potential policy shocks.

Table 6 lists the countries that intervened to stabilize their currencies in reaction to each of the two Fed announcements. Countries are designated as "interveners" based on the size and persistence of their net reserve accumulations after QE2 and net reserve sales after the Taper announcement. The countries that did not meet the "intervener" criteria make up the list of "control" countries. It is worth noting that some of the designated "intervener" countries, including Brazil, Chile and Mexico, have at times used rules-based auction systems to buy and sell reserves that are pre-announced.[28] These

[27] In some cases the maximum likelihood optimization to determine the W matrix failed to converge when all five explanatory variables were included; in those cases dropping one of the explanatory variables (typically the change in VIX or the commodity index) led to convergence.

[28] Chile pre-announced reserve accumulation programs that were in place in 2008 and 2011, and auctioned forex swaps in 2008 and 2009 (Pincheira, 2013); Colombia and Mexico use rules-based auctions that were triggered when daily foreign exchange rate volatility exceeded a pre-established threshold (both countries discontinued these programs in 2016). Brazil put in place a rules-based intervention program in response to the Taper Tantrum that involved preannounced swap and repo operations (Chamon et al., 2017).

countries meet the "intervener" criteria based on net reserve accumulations, but the impact of rules-based interventions may differ from operations that are unexpected and discretionary. Some of the countries in the sample publish daily intervention amounts (Argentina, Chile, Colombia, Mexico and Turkey), but the majority of countries only provide foreign reserve information on a monthly basis, so the panel analysis uses this data.

The outcome variable used in the estimation is the log change in the exchange rate due to the well-known stationarity issues with levels. In order to better visualize the effects of intervention on the level of the exchange rate, the figures plot the cumulated quarterly percentage changes for the actual and for the synthetic exchange rates for each "intervener" and its synthetic twin.[29] In most cases, the two exchange rates are very similar in the pre-event period and diverge significantly in the post-event window. This pattern suggests that exchange rate movements in the countries that intervened in reaction to the Fed shocks (accumulating reserves after QE2 and selling reserves after the Tapering announcement) are substantially different than they would have been had the interventions not taken place.[30]

The synthetic control matching in the period before QE2 worked well for China, Indonesia, Israel, Korea, Mexico, the Philippines, and Thailand. In all of these cases figures 5 show the exchange rate of the counterfactual synthetic twin to be higher (more appreciated) than the actual exchange rate in the post QE2 period. In other words, these cases provide a causal link between reserve accumulation and a less appreciated exchange rate. It was not possible to create a good synthetic twin for a number of the "intervener" countries, including Brazil, Chile, Hungary, Malaysia, Poland, Romania and Russia. In most of these cases the post-QE2 actual exchange rate was also less appreciated than the synthetic twin, but the poor pre-event matching makes these experiments hard to interpret. Figures 6 show the synthetic control experiment around the Taper Announcement. Interestingly the results in this case (for the experiments with good pre-event matches) are not uniform. The figures for Indonesia and Malaysia go in the expected direction; they show the exchange rate of the counterfactual synthetic twin to be lower (less appreciated) than the actual exchange rate in the post Taper-Tantrum period, providing evidence for causality (reserve sales lead to currency appreciation). However, the figures for Brazil, Poland, Romania and Russia show the actual exchange rate as more depreciated relative to the synthetic twin suggesting that their post-Taper Tantrum interventions were not successful.[31]

Identifying the influence of reserve accumulations on trade balances is complicated because we would not expect trade to be immediately impacted in the same way as exchange rates. The synthetic control approach can be used in a similar manner, but without the benefit of an exogenous event date. Figures

[29] The synthetic control figures were produced in Stata using the *Synth* module; detailed information about the method and code is available at: https://web.stanford.edu/~jhain/synthpage.html

[30] Tables and figures describing results from a number of placebo and robustness tests of the synthetic control results will be included in the next draft of this paper.

[31] In the case of Brazil, Chamon et al. (2017) document that it was not until August 2013 that the Central Bank of Brazil responded to the Fed announcement with a large scale intervention program involving FX swaps; but they do find evidence for significant strengthening of the BRL immediately after the intervention program was announced using a similar synthetic control approach. One potential important difference in the two sets of experiments is the group of countries included in the synthetic. A number of the EMs that are not included in the control group here because they also intervened (Indonesia, Malaysia, Poland, Russia, South Africa and Thailand) are in the Chamon et al. (2017) control group.

7 compare annual current accounts (as a share of GDP) for each of the countries that meet the "manipulator" or "monitoring list" criteria (as listed in table 5) against a synthetic twin that was created using data from the countries that do not appear on either list. The explanatory variables include a subset of those used in the IMF's External Balance Assessment (EBA) model (excluding the variables capturing foreign reserve accumulation, capital controls and terms of trade).[32] One key element of the EBA approach is the transformation of the standard trade balance model variables (demographics, fiscal balances, output gap, output per worker), into deviations from GDP-weighted global averages. This takes relative differences across countries into account. In the case of the demographic variables, this approach allows population aging to matter only to the extent that a country is aging faster than the world average. Figures 7 show the results of the synthetic control experiments using 2010 as the "event year." The first thing to note is that none of the experiments did a good job creating a synthetic twin that matched the "intervener" countries. This was particularly the case for China, where the synthetic current account is farther from China's actual current account in the pre-event window than in the post-event window (this is true even though for China the pre-event window was expanded back to 2000, starting the estimation in 2005 results in an even poorer synthetic match). The countries where the synthetic twin is a closer (though still imperfect) match in the pre-event window include Hungary, Israel, Korea and Russia. In all of these cases, the actual current account is higher than the synthetic twin in the post-2010 period, but the model fit is too poor to make a causal connection between intervention and larger trade balances.[33]

VII. Conclusions

It seems inevitable that accusations of currency manipulation will continue, and may even escalate, as long as global economic growth remains subdued. It will be difficult to adjudicate these cases without an agreed upon framework. This paper uses a version of the currency manipulation criteria developed by the US Treasury to examine the patterns of reserve accumulation and current account balances for a group of EM countries over the period 2009-2018. Four of countries (China, Korea, Russia and Thailand) are found to meet the Treasury criteria for currency manipulation in at least one year. Another four (Hungary, Israel, Malaysia and the Philippines) meet the Treasury's monitoring list criteria. A second set of tests examines whether there is evidence of causality between reserve accumulation and improvements in trade balances. These results are less conclusive. Comparisons of the effects of interventions on exchange rates with synthetic control counterfactuals do suggest that countries are able to influence the value of their currencies in some circumstances, but the connections between interventions and trade balances are less clear.

Currency manipulation involves a joint hypothesis. The first part of the hypothesis is that reserve accumulation can effectively lower the international value of a currency. The findings here and in other research indicate that this hypothesis cannot be rejected. Further, evidence from the Taper Tantrum episode suggests that the effects of intervention are two-sided, reserves sales can effectively strengthen the currency, indicating that intervention can be both stabilizing and manipulative. The second part of

[32] The EBA data are available from the following webpage: https://www.imf.org/external/np/res/eba/data.htm

[33] A quarterly model of the current account would allow a shorter pre-event window (avoiding the trade collapse during the financial crisis) but many of the standard trade balance explanatory variables are only available at an annual frequency. In the next draft of the paper a stripped down quarterly version of the trade model will be used to see if the synthetic matches can be improved.

the manipulation hypothesis is that intervention-induced currency weakening leads to an improvement in the trade balance. The case for manipulation should rest on causal evidence for this second connection. The synthetic control approach was unable to produce good counterfactual matches to effectively test this part of the joint hypothesis, likely due to the confounding effect of the financial crisis in the pre-event window. Future work to find alternative identification strategies is essential to establish the potential for currency manipulation and guide the parameters for new currency-rules-of-the game.

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Table 1: Stylized Facts for the EM sample

Country	Exchange Rate Regime	Exchange Rate Crisis?	Reserve Adequacy	Capital Controls (FKRSU)	Capital Controls (PFBA), avg and (std)	Current Account Balance (percent GDP)	Exchange Rate Stability Index	Monetary Independence Index	Financial Openness Index
Argentina	crawling peg, 2015:12: freely falling	2002 & 2013	Low: 10% GDP, < 100% st debt	Gate	0.19 (1.69)	-1.9	0.385	0.495	0.129
Brazil	managed float	2015	High: 20% GDP	Gate	0.03 (1.29)	-2.4	0.195	0.590	0.394
Chile	managed float	NA	moderate: 15% GDP, < 100% st debt	Gate	0.24 (0.50)	-1.7	0.252	0.628	0.766
China	crawling band	NA	High: 25-35% GDP, < 20% of M3	Wall	-0.02 (0.99)	2.3	0.678	0.505	0.166
Colombia	managed float	1985	High: 15% GDP	Gate	0.05 (0.78)	-3.7	0.223	0.464	0.447
Czech Rep	crawling band	NA	High 20-50% GDP	Gate	na	-0.7	0.462	0.455	1.000
Hungary	managed float, 2009:4: crawling band	NA	High to Moderate: 20% GDP, < 3 mos imports	Gate	na	2.0	0.336	0.369	1.000
India	managed float, 2012:12: crawling band	NA	High: 15% GDP	Wall	-1.20 (2.98)	-2.4	0.311	0.600	0.166
Indonesia	crawling band, 2014:4: managed float	1998	High: 12% GDP	Gate	0.05 (0.63)	-1.5	0.338	0.554	0.510
Israel	managed float	1985	High: 30% GDP	Gate	na	3.0	0.325	0.567	1.000
Korea	managed float	1998	High: 25% GDP	Gate	0.22 (1.00)	4.8	0.255	0.608	0.681
Malaysia	managed float	1998	High: 35% GDP	Wall	0.29 (0.87)	6.0	0.318	0.525	0.336
Mexico	manged float	1995	High: 15% GDP	Gate	0.00 (0.19)	-1.7	0.241	0.335	0.699
Philippines	managed float	1998	High 25% GDP	Wall	0.25 (1.06)	2.1	0.391	0.444	0.323
Poland	managed float, 2012:4: crawling band	NA	Moderate: 20% GDP, < 100% st debt	Gate	na	-2.3	0.324	0.433	0.504
Romania	crawling band, 2012:12: peg	1996	Moderate: 20% GDP, < 100% st debt	Gate	na	-3.2	0.249	0.511	1.000
Russia	crawling band, 2008:12-2014:10: managed float, 2014:11-2016:2: freely falling, 2016:3:managed float	1998 & 2014	High: 30% GDP	Gate	-0.07 (0.78)	3.6	0.217	0.651	0.610
South Africa	managed float	2015	Low: 15% GDP	Gate	0.44 (1.25)	-3.6	0.184	0.502	0.166
Thailand	managed float	1998	High 40% GDP	Gate	0.37 (1.03)	5.4	0.405	0.515	0.194
Turkey	managed float	1996 & 2001	Low: 10% GDP	Gate	0.19 (0.51)	-5.0	0.218	0.548	0.449

Sources and notes: Exchange Rate Regime based on coarse classification in Ilzetzki, Reinhart and Rogoff (2017), available at http://www.carmenreinhart.com/data/browse-by-topic/topics/11/. Exchange Rate Crisis dates from Laeven and Valencia (2018). Reserve Adequacy based on IMF calculations available at

https://www.imf.org/external/datamapper/ARA/index.html. Capital Control (FKRSU) Classifications based on Fernandez et al (2015): "Wall" countries (have capital controls on more than 70 percent of their transactions subcategories over the 1995-2013 sample period and do not have any years in which controls are less than 60 percent of their transaction subcategories), "Gate" countries are neither Walls nor Open and use capital controls episodically. Capital Control (PFBA) Classification based on Pasricha et al. (2018): measure is net-net number of inflow restricting measures, average and standard deviation are calculated over 2001Q1 to 2015Q3. Current Account Balance (percent GDP) is the 2009-2018 average of annual WEO data. The Trilemma Indices are updates from Aizenman et al. (2013). Exchange Rate Stability is the standard deviation of the exchange rate between domestic and base country currency (max 1 "fixed", min 0). Monetary Independence is the correlation between domestic and base country interest rates (max 1 "higher independence", min 0). Financial Openness is a de jure measure based on self-reported restrictions (max 1 "more open to cross-border capital transactions", min 0).

Table 2: New Treasury Thresholds Under the 2015 Act

Criteria	Benchmark	Previous threshold	New threshold
Major Trading Partner Coverage	Total Bilateral Goods Trade (Imports plus Exports)	12 largest trading partners	$40 billion[1]
(1) Significant Bilateral Trade Surplus with the United States	Goods Surplus with the United States	$20 billion	$20 billion
(2) Material Current Account Surplus	Current Account Balance	3% of GDP	2% of GDP
(3) Persistent, One-Sided Intervention in Foreign Exchange Markets	Net FX Purchases	2% of GDP	2% of GDP
	Persistence of Net FX Purchases (months)	8 of 12 months	6 of 12 months

[1] As of 2018, 21 trading partners exceeded this threshold.

Source: Reproduced from the Report to Congress Macroeconomic and Foreign Exchange Policies of Major Trading Partners of the United States, US Department of the Treasury Office of International Affairs, May 2019, page 3.

Table 3 US Treasury Designations 1988-2019

Country	Currency Manipulator	Monitoring List	Large Share of US Deficit
China	1992, 1993, 1994	2016, 2018, 2019	2017
Japan		2016, 2017, 2018, 2019	
Korea	1988, 1989	2016, 2017, 2018, 2019	
Taiwan	1988, 1989, 1992	2016, 2017	
Germany		2016, 2017, 2018, 2019	
Switzerland		2017, 2018	
India		2018	
Italy		2019	
Ireland		2019	
Singapore		2019	
Malaysia		2019	
Vietnam		2019	

Source: various US Treasury Reports available at https://home.treasury.gov/policy-issues/international/macroeconomic-and-foreign-exchange-policies-of-major-trading-partners. Designations in 2019 are based on adjustments to the original thresholds (see table 2) that expand the number of trading partners covered in the Report to include all countries whose bilateral goods trade with the US exceeds $40 billion annually, whose current account surplus exceeds 2% GDP, and whose one-sided interventions occur in 6 of 12 months and the monthly increases are at least 2% of GDP.

Table 4.1 Current Accounts and Reserve Accumulation in 2009

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	2.2	2.2	7.3	-0.4	-1.4	-1.4	6
Brazil	-1.6	-1.6	-26.3	2.3	37.7	13.2	9
Chile	1.9	1.9	3.3	0.6	1.0	3.2	7
China	4.8	4.8	243.3	9.1	466.8	324.1	10
Colombia	-2.0	-2.0	-4.7	0.2	0.4	0.9	7
Czech Republic	-2.3	-2.3	-4.7	0.9	1.8	0.1	8
Hungary	-0.8	-0.8	-1.1	6.4	8.3	11.0	8
India	-2.8	-2.8	-38.4	0.9	12.0	-48.2	8
Indonesia	1.8	1.8	10.6	1.9	11.2	-1.9	8
Israel	3.3	3.3	6.8	7.5	15.6	16.9	10
Korea	3.7	3.7	33.1	7.2	64.7	-27.3	11
Malaysia	15.0	15.0	31.4	0.4	0.8	-34.7	6
Mexico	-0.9	-0.9	-7.9	0.0	0.1	-13.2	5
Philippines	5.0	5.0	8.4	2.6	4.4	2.0	10
Poland	-4.1	-4.1	-17.9	2.8	12.5	-2.2	8
Romania	-4.7	-4.7	-8.1	2.6	4.5	-0.7	6
Russia	3.8	3.8	50.4	-0.6	-7.3	-94.2	8
South Africa	-2.7	-2.7	-8.1	0.7	2.2	0.9	8
Thailand	7.9	7.9	22.2	9.0	25.2	14.9	9
Turkey	-1.8	-1.8	-11.4	-0.3	-1.8	-10.0	5

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data, except for China (which is measured using total monthly reserves because the SDDS data are not available until 2015). Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2009Q4-2008Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2009Q2-2008Q2).

Table 4.2 Current Accounts and Reserve Accumulation in 2010

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-0.4	-0.4	-1.6	0.8	3.5	0.7	7
Brazil	-3.6	-3.6	-79.0	2.2	47.5	49.7	11
Chile	1.4	1.4	3.2	1.1	2.5	0.5	6
China	3.9	3.9	237.8	7.4	450.0	336.0	11
Colombia	-3.1	-3.1	-8.7	1.1	3.2	1.9	10
Czech Republic	-3.6	-3.6	-7.4	0.1	0.3	-1.2	5
Hungary	0.3	0.3	0.4	1.6	2.1	0.5	7
India	-2.8	-2.8	-47.9	0.5	9.2	-4.5	7
Indonesia	0.7	0.7	5.3	3.9	29.4	15.5	11
Israel	3.9	3.9	9.1	5.1	11.9	9.9	8
Korea	2.6	2.6	28.0	2.0	21.8	39.3	8
Malaysia	10.1	10.1	25.7	3.7	9.4	-0.3	7
Mexico	-0.5	-0.5	-5.3	2.0	20.8	20.5	11
Philippines	3.6	3.6	7.2	8.3	16.5	6.0	10
Poland	-5.4	-5.4	-25.9	2.4	11.7	13.8	7
Romania	-5.1	-5.1	-8.6	3.6	5.9	1.4	7
Russia	4.1	4.1	67.5	1.7	27.2	52.5	7
South Africa	-1.5	-1.5	-5.6	0.8	3.0	3.0	6
Thailand	3.4	3.4	11.5	9.4	32.0	23.7	9
Turkey	-5.8	-5.8	-44.6	1.3	10.0	3.7	9

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data, except for China (which is measured using total monthly reserves because the SDDS data are not available until 2015). Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2010Q4-2009Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2010Q2-2009Q2).

Table 4.3 Current Accounts and Reserve Accumulation in 2011

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-1.0	-1.0	-5.3	-1.2	-6.4	1.5	5
Brazil	-2.9	-2.9	-76.3	2.6	67.0	81.6	10
Chile	-1.7	-1.7	-4.2	5.5	13.8	9.4	10
China	1.8	1.8	136.1	4.5	336.7	748.5	9
Colombia	-2.9	-2.9	-9.8	1.1	3.5	4.6	10
Czech Republic	-2.1	-2.1	-4.8	-1.2	-2.8	3.1	4
Hungary	0.7	0.7	1.0	1.6	2.3	11.8	7
India	-4.3	-4.3	-78.2	-0.3	-4.9	33.8	7
Indonesia	0.2	0.2	1.7	1.5	13.6	42.4	7
Israel	2.0	2.0	5.3	0.1	0.2	16.6	6
Korea	1.4	1.4	16.6	0.9	10.9	29.0	7
Malaysia	10.9	10.9	32.5	8.2	24.4	35.9	9
Mexico	-1.1	-1.1	-12.5	1.9	22.2	22.4	9
Philippines	2.5	2.5	5.6	5.0	11.3	18.9	9
Poland	-5.2	-5.2	-27.4	1.0	5.4	20.2	8
Romania	-5.0	-5.0	-9.2	-0.7	-1.2	5.8	6
Russia	4.8	4.8	97.3	0.4	8.6	53.7	8
South Africa	-2.2	-2.2	-9.2	1.1	4.4	6.5	7
Thailand	2.5	2.5	9.4	-0.1	-0.5	35.0	6
Turkey	-8.9	-8.9	-74.4	-0.3	-2.3	22.6	7

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data, except for China (which is measured using total monthly reserves because the SDDS data are not available until 2015). Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2011Q4-2010Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2011Q2-2010Q2).

Table 4.4 Current Accounts and Reserve Accumulation in 2012

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-0.4	-2.5	-2.1	-0.6	-3.3	-5.8	5
Brazil	-3.4	-1.8	-83.8	0.8	18.9	37.7	9
Chile	-3.9	-5.8	-10.5	-0.2	-0.5	5.3	6
China	2.5	-2.2	215.4	1.5	128.3	40.9	8
Colombia	-3.1	-1.1	-11.4	1.4	5.0	2.9	12
Czech Republic	-1.6	0.7	-3.2	1.1	2.2	-5.6	8
Hungary	1.8	2.6	2.3	-2.7	-3.5	-9.5	6
India	-4.8	-2.0	-87.8	-0.1	-1.3	-26.8	7
Indonesia	-2.7	-4.5	-24.4	0.2	2.0	-13.4	8
Israel	0.6	-2.7	1.5	1.1	2.9	-7.2	7
Korea	4.0	0.3	48.8	1.6	19.3	5.6	10
Malaysia	5.2	-9.9	16.2	2.0	6.2	0.8	11
Mexico	-1.6	-0.7	-18.7	1.4	16.3	26.8	9
Philippines	2.8	-2.2	6.9	2.3	5.8	4.1	9
Poland	-3.7	0.3	-18.6	1.9	9.3	-8.1	9
Romania	-4.8	-0.1	-8.2	0.0	0.0	-6.6	5
Russia	3.2	-0.6	71.3	1.7	37.3	-25.0	9
South Africa	-5.1	-2.4	-20.3	0.4	1.4	-1.0	8
Thailand	-0.4	-8.3	-1.7	1.5	5.9	-12.0	8
Turkey	-5.5	-3.7	-48.0	2.5	21.5	-10.6	9

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data, except for China (which is measured using total monthly reserves because the SDDS data are not available until 2015). Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2012Q4-2011Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2012Q2-2011Q2).

Table 4.5 Current Accounts and Reserve Accumulation in 2013

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-2.1	-1.8	-13.1	-1.9	-11.8	-8.6	0
Brazil	-3.2	0.4	-79.8	-0.5	-13.0	-5.1	6
Chile	-4.1	-5.5	-11.3	-0.2	-0.5	0.7	6
China	1.5	-2.4	148.2	5.3	508.4	254.5	9
Colombia	-3.3	-0.2	-12.5	1.6	6.3	6.6	12
Czech Republic	-0.5	3.0	-1.1	5.3	11.0	4.9	8
Hungary	3.8	3.5	5.2	2.2	3.0	4.9	9
India	-1.7	1.1	-32.3	0.3	6.0	-2.3	7
Indonesia	-3.2	-3.9	-29.1	-1.4	-12.5	-7.9	6
Israel	3.0	-0.9	8.7	2.3	6.9	7.3	9
Korea	5.9	3.4	77.3	1.4	18.7	11.3	8
Malaysia	3.5	-6.6	11.3	-1.4	-4.5	2.4	7
Mexico	-2.5	-2.0	-31.8	1.2	14.7	7.8	9
Philippines	4.2	0.6	11.4	0.8	2.2	7.4	8
Poland	-1.3	4.1	-6.7	-0.4	-2.1	9.6	5
Romania	-1.1	4.1	-2.0	1.0	1.9	5.0	6
Russia	1.5	-2.7	33.4	-0.8	-18.9	8.3	4
South Africa	-5.8	-4.3	-21.2	0.2	0.7	-0.6	5
Thailand	-1.2	-4.5	-4.9	-2.9	-12.1	-2.1	5
Turkey	-6.7	-0.9	-63.6	1.2	11.0	22.6	7

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data, except for China (which is measured using total monthly reserves because the SDDS data are not available until 2015). Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2013Q4-2012Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2013Q2-2012Q2).

Table 4.6 Current Accounts and Reserve Accumulation in 2014

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-1.6	-0.6	-9.2	0.2	1.1	-7.9	6
Brazil	-4.1	-1.2	-101.4	0.2	5.8	4.0	9
Chile	-1.7	0.0	-4.4	-0.2	-0.4	0.1	5
China	2.2	0.4	236.0	0.2	19.6	495.6	7
Colombia	-5.2	-2.3	-19.8	1.0	3.8	4.6	11
Czech Republic	0.2	2.3	0.4	0.6	1.3	13.5	7
Hungary	1.5	0.8	2.1	-2.9	-4.1	3.9	5
India	-1.3	3.0	-26.8	1.4	28.2	35.0	9
Indonesia	-3.1	-3.3	-27.5	1.4	12.6	9.3	10
Israel	4.3	2.3	13.3	1.5	4.5	11.0	6
Korea	5.9	4.5	83.0	1.3	18.3	40.5	8
Malaysia	4.4	-6.5	14.8	-4.5	-15.2	-4.4	5
Mexico	-1.9	-0.8	-24.8	1.2	15.6	23.5	8
Philippines	3.8	1.3	10.8	-1.4	-4.0	-2.3	5
Poland	-2.1	3.1	-11.4	0.0	0.1	-5.1	4
Romania	-0.7	4.3	-1.3	-4.9	-9.8	-2.8	3
Russia	2.8	-2.0	57.5	-6.1	-125.3	-36.2	1
South Africa	-5.1	-2.9	-17.8	-0.1	-0.4	1.1	4
Thailand	3.7	1.2	15.2	-2.5	-10.0	-3.2	4
Turkey	-4.7	4.3	-43.6	-0.4	-3.9	6.2	7

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data, except for China (which is measured using total monthly reserves because the SDDS data are not available until 2015). Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2014Q4-2013Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2014Q2-2013Q2).

Table 4.7 Current Accounts and Reserve Accumulation in 2015

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-2.7	-2.4	-17.6	-0.9	-5.5	5.2	6
Brazil	-3.0	0.4	-54.5	-0.3	-6.0	-3.1	7
Chile	-2.3	1.6	-5.7	-0.6	-1.6	-2.5	5
China	2.7	0.2	304.2	-4.7	-528.8	-317.0	2
Colombia	-6.3	-3.3	-18.6	-0.1	-0.2	1.7	5
Czech Republic	0.2	1.8	0.5	6.2	11.5	0.7	7
Hungary	2.8	1.1	3.5	-6.7	-8.3	-9.3	3
India	-1.1	3.8	-22.1	1.5	31.9	42.2	8
Indonesia	-2.0	0.6	-17.5	-0.6	-5.4	1.0	3
Israel	5.3	4.7	15.8	1.6	4.9	0.2	7
Korea	7.6	3.6	105.1	0.4	4.9	9.4	6
Malaysia	3.0	-2.1	9.0	-6.8	-20.0	-22.7	5
Mexico	-2.6	-1.1	-30.5	-1.4	-16.4	3.4	3
Philippines	2.5	-0.3	7.3	0.6	1.8	1.5	9
Poland	-0.6	3.2	-2.7	-1.0	-4.6	7.8	4
Romania	-1.2	3.6	-2.2	0.0	0.0	-9.4	5
Russia	5.0	1.7	67.7	-1.5	-20.0	-116.6	5
South Africa	-4.6	0.5	-14.6	-0.8	-2.7	-1.1	5
Thailand	8.0	8.4	32.1	0.1	0.2	-6.8	5
Turkey	-3.7	1.8	-32.1	-1.6	-13.9	-11.0	3

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data. Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2015Q4-2014Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2015Q2-2014Q2).

Table 4.8 Current Accounts and Reserve Accumulation in 2016

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-2.7	-0.6	-15.1	2.3	13.0	-4.0	8
Brazil	-1.3	1.9	-24.0	0.3	5.0	-8.2	7
Chile	-1.6	2.5	-4.0	0.9	2.4	1.9	7
China	1.8	0.3	202.2	-2.9	-319.8	-488.7	3
Colombia	-4.3	-1.0	-12.0	0.1	0.2	0.6	7
Czech Republic	1.6	2.1	3.0	11.0	21.6	17.8	7
Hungary	6.2	2.4	7.8	-5.8	-7.3	-12.0	2
India	-0.6	1.1	-14.4	0.4	8.7	7.5	6
Indonesia	-1.8	1.4	-17.0	1.1	10.3	1.4	8
Israel	3.7	0.7	11.8	2.7	8.5	9.7	9
Korea	6.9	1.0	97.9	0.1	1.6	-6.2	5
Malaysia	2.4	-1.1	7.2	0.3	0.9	-7.7	8
Mexico	-2.3	0.2	-24.3	0.0	0.4	-14.7	6
Philippines	-0.4	-4.6	-1.2	-0.1	-0.3	4.0	8
Poland	-0.5	0.8	-2.5	4.3	20.1	6.7	9
Romania	-2.1	-1.0	-3.9	0.6	1.2	3.0	7
Russia	1.9	0.5	24.5	0.0	0.3	14.6	6
South Africa	-2.8	3.0	-8.2	0.4	1.2	-1.1	5
Thailand	11.7	12.8	48.2	3.6	14.9	17.6	8
Turkey	-3.8	2.9	-33.1	-0.1	-0.8	0.9	7

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data. Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2016Q4-2015Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2016Q2-2015Q2).

Table 4.9 Current Accounts and Reserve Accumulation in 2017

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-4.9	-3.3	-31.6	2.6	16.5	18.0	8
Brazil	-0.4	3.8	-7.2	0.2	5.0	8.2	7
Chile	-2.1	-0.5	-6.0	-0.6	-1.6	-0.7	4
China	1.4	-0.9	164.9	1.1	129.4	-148.4	11
Colombia	-3.3	1.9	-10.3	0.2	0.5	0.2	4
Czech Republic	1.1	0.9	2.3	28.8	62.1	62.9	7
Hungary	2.8	1.3	3.9	1.3	1.9	-0.6	7
India	-1.8	-0.5	-48.7	1.8	48.5	23.3	11
Indonesia	-1.6	1.5	-16.2	1.3	13.2	13.5	9
Israel	2.6	-1.7	9.3	4.1	14.4	12.1	12
Korea	4.9	-1.0	75.2	1.2	17.8	10.6	9
Malaysia	3.0	-1.4	9.4	2.7	8.4	3.2	11
Mexico	-1.7	0.2	-19.4	-0.2	-2.7	-3.3	5
Philippines	-0.7	-4.5	-2.2	-0.1	-0.5	-3.6	6
Poland	0.1	2.2	0.6	-0.3	-1.5	1.7	5
Romania	-3.2	-2.5	-6.7	2.1	4.5	4.3	9
Russia	2.1	-0.7	33.3	2.4	37.5	15.7	11
South Africa	-2.4	2.7	-8.3	0.8	2.7	1.3	6
Thailand	11.0	7.3	50.2	6.6	29.9	7.3	9
Turkey	-5.6	-0.9	-47.3	-0.9	-8.0	-11.5	6

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data. Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2017Q4-2016Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2017Q2-2016Q2).

Table 4.10 Current Accounts and Reserve Accumulation in 2018

	Current Account			Reserve Accumulation			
	Balance (% of GDP, Trailing 4Q) (1a)	3 Year Change in Balance (% of GDP) (1b)	Balance (USD Bil., Trailing 4Q) (1c)	Net Accumulation (% of GDP, Trailing 4Q) (2a)	Net Accumulation (USD Bil., Trailing 4Q) (2b)	Net Accumulation (USD Bil., Trailing 2Q) (2c)	Net Accumulation (# of months that year) (2d)
Argentina	-5.4	-2.6	-27.7	1.5	7.7	9.1	6
Brazil	-0.8	2.2	-14.5	0.1	2.5	1.9	6
Chile	-3.1	-0.7	-9.2	0.3	0.8	-2.0	5
China	0.4	-2.3	49.2	-0.5	-67.2	55.3	6
Colombia	-3.8	2.5	-12.7	0.2	0.6	-0.4	6
Czech Republic	0.2	-0.1	0.4	-2.6	-6.3	4.3	6
Hungary	0.5	-2.3	0.8	1.6	2.4	1.3	6
India	-2.5	-1.5	-68.5	-0.6	-15.3	18.4	5
Indonesia	-3.0	-1.0	-31.1	-0.9	-9.4	-3.3	4
Israel	1.9	-3.4	7.0	0.5	1.9	5.6	6
Korea	4.7	-2.9	76.4	0.8	13.6	19.1	9
Malaysia	2.3	-0.7	8.3	-0.1	-0.3	5.9	6
Mexico	-1.8	0.8	-22.2	0.1	0.9	-0.6	5
Philippines	-2.6	-5.1	-8.5	-2.7	-9.1	-3.9	3
Poland	-0.7	-0.2	-4.3	0.4	2.4	-2.8	6
Romania	-4.6	-3.4	-11.1	-2.1	-5.0	-3.8	5
Russia	7.0	2.1	114.9	1.6	25.4	36.1	9
South Africa	-3.4	1.2	-12.4	0.2	0.8	3.1	5
Thailand	7.7	-0.3	37.7	0.6	3.0	21.1	4
Turkey	-3.6	0.1	-27.8	-1.5	-11.3	-14.7	6

Sources and Notes: Current account data are annual from the WEO database. Reserve Accumulation is measured using monthly SDDS foreign currency reserve data. Numbers in red denote that the amount or percentage exceeds the US Treasury 2019 “manipulator” or “monitoring list” criteria. Numbers in the last column are in red if the number of months of net reserve accumulation was 6 or greater and the sum of the monthly accumulation was at least 2% of GDP. Trailing 4Q is the change from the previous year’s 4th quarter (e.g. 2018Q4-2017Q4). Trailing 2Q is the change from the previous year’s 2nd quarter (e.g. 2018Q2-2017Q2).

Table 5 Designations of Currency Manipulation Based on (Non-Bilateral) 2019 US Criteria

Country	Currency Manipulator	Monitoring List
Argentina		
Brazil		
Chile		
China	2009, 2010, 2012	
Colombia		
Czech Rep		
Hungary		2013, 2017
India		
Indonesia		
Israel		2009, 2010, 2011, 2013, 2014, 2015, 2016, 2017
Korea	2012	2009, 2010
Malaysia		2009, 2010, 2012, 2017, 2018
Mexico		
Philippines		2009, 2010, 2011, 2012
Poland		
Romania		
Russia	2009, 2010, 2011, 2012	
South Africa		
Thailand	2016, 2017	2009, 2010, 2011
Turkey		

Notes: US Treasury 2019 Currency Manipulator criteria: (1) the number of months of net accumulation of foreign reserves was six or greater and the sum of the monthly increases was at least 2% of GDP, (2) the current account surplus was 2% or higher of GDP, (3) the trade surplus was greater than $40 billion. Monitoring List criteria: country meets two of the three manipulation criteria.

Table 6: “Intervener” and “Control” Countries

	QE2 (2010 Q4)		Taper Tantrum (2013 Q2)		Trade Surplus (2010-)	
Country	(Net) Reserve Accumulator	Control	(Net) Reserve Seller	Control	Manipulator	Control
Argentina		x	x			x
Brazil	x		x			x
Chile	x			x		x
China	x			x	x	
Colombia		x		x		x
Czech Rep		x		x		x
Hungary	x			x	x	
India		x		x		x
Indonesia	x		x			x
Israel	x			x	x	
Korea	x			x	x	
Malaysia	x		x		x	
Mexico	x			x		x
Philippines	x			x	x	
Poland	x		x			x
Romania	x		x			x
Russia	x		x		x	
South Africa		x	x			x
Thailand	x		x		x	
Turkey		x		x		x

Notes: (Net) Reserve Accumulator designation after QE2 based on net reserve accumulations in 6 of 12 months and the sum of monthly increases equal to at least 2% of GDP between 2010Q4 and 2011Q4. (Net) Reserve Seller designation after Taper Announcement based on net reserve sales in 6 of 12 months and the sum of monthly decreases equal to at least 2% of GDP between 2013Q2 and 2014Q2. Manipulator designation based on meeting criteria for Manipulation or Monitoring List in Table 5.

Figure 1 Aggregate FX Reserve Accumulation by Country

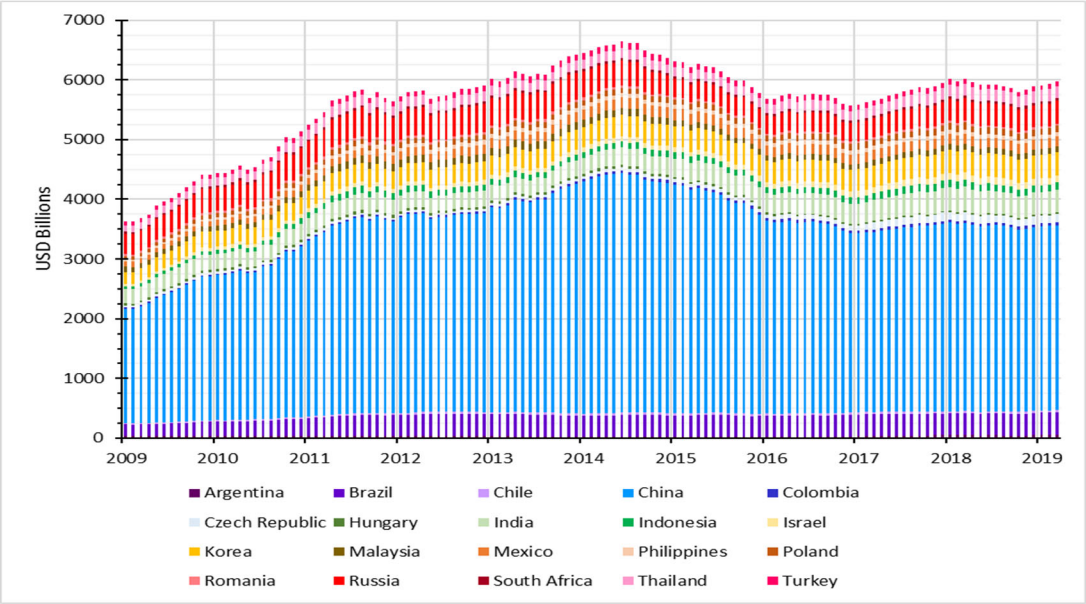
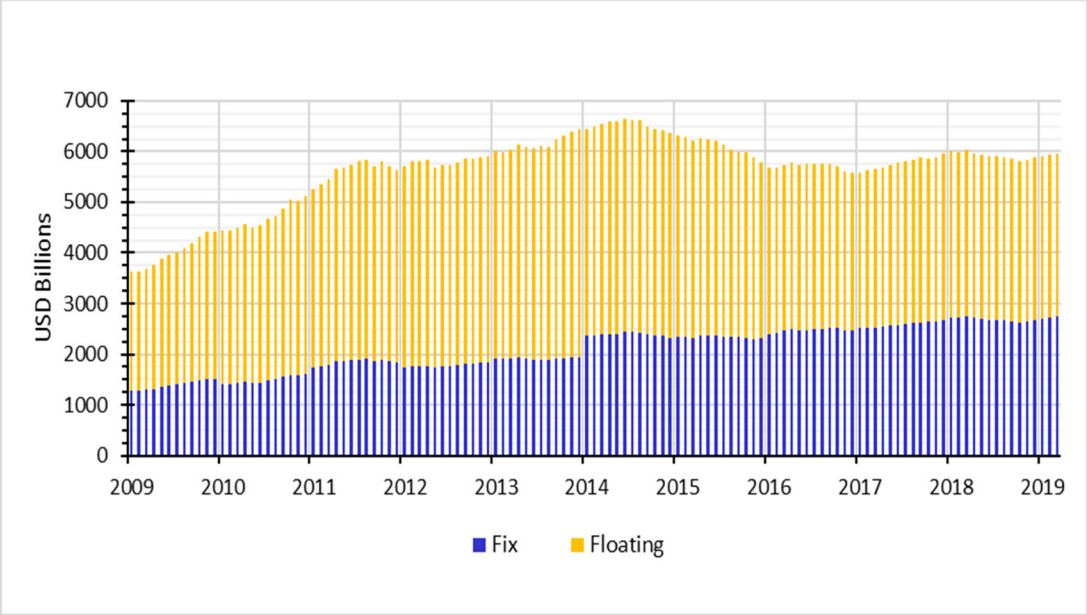


Figure 2 Aggregate FX Reserve Accumulation by Exchange Rate Regime



Sources and Notes: Reserve accumulation is measured using monthly SDDS foreign currency reserve data. The following countries changed their exchange rate regime during the sample period: Argentina, Czech Republic, Hungary, India, Indonesia, Malaysia, Poland, Romania and Russia.

Figure 3.1: Argentina's Balance of Payments (% of GDP)

Figure 3.2 Brazil's Balance of Payments (% of GDP)

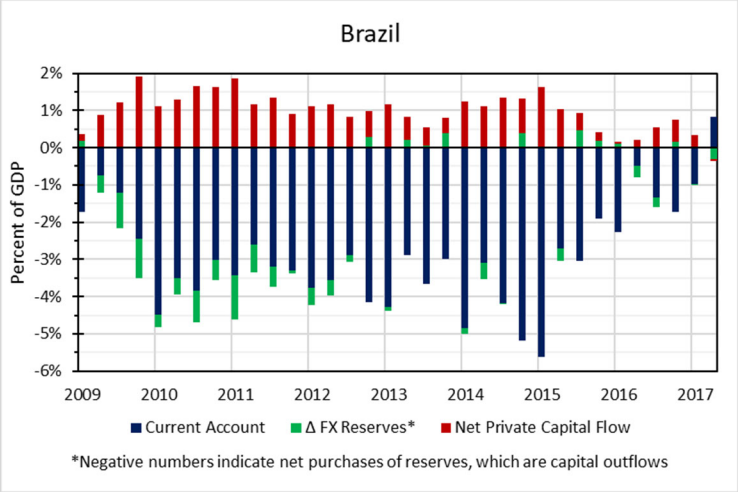


Figure 3.3: Chile's Balance of Payments (% of GDP)

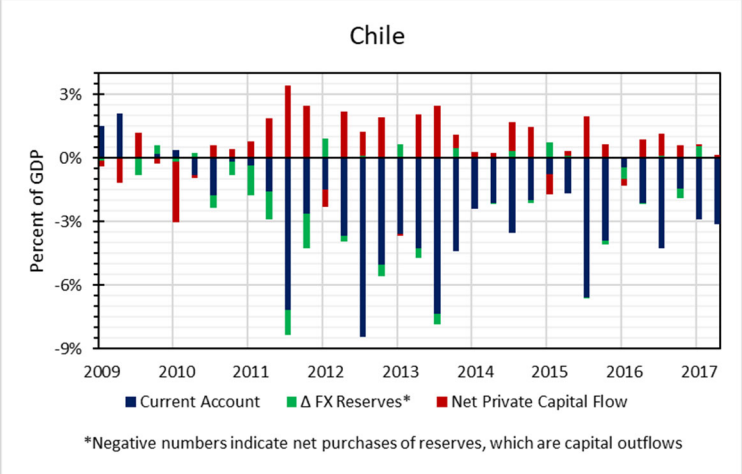


Figure 3.4: China's Balance of Payments (% of GDP)

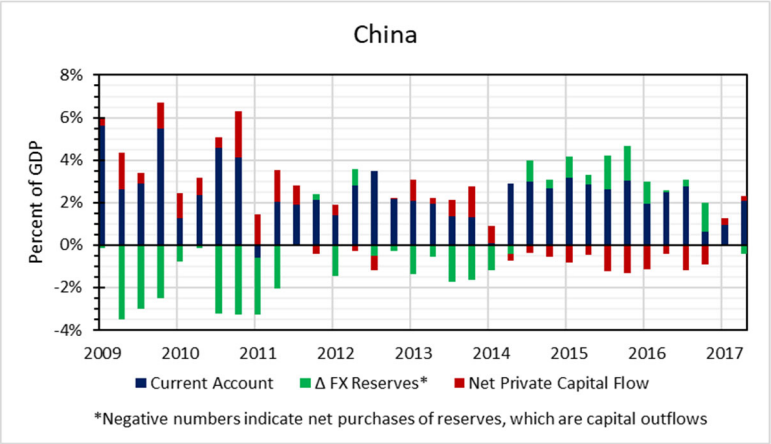


Figure 3.5: Colombia's Balance of Payments (% of GDP)

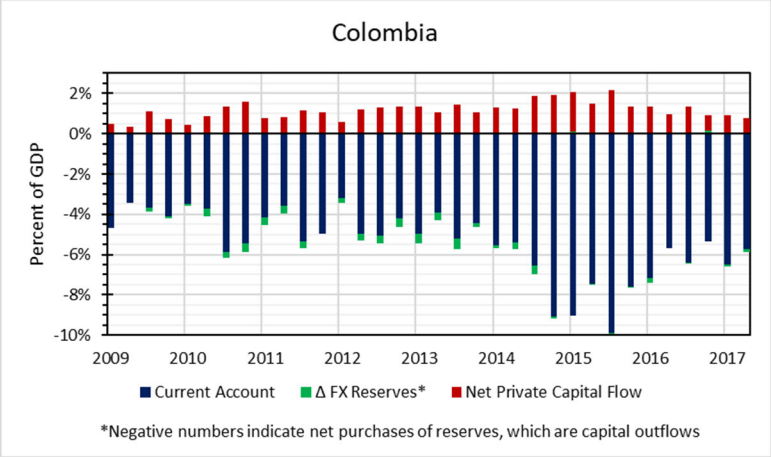


Figure 3.6: Czech Republic's Balance of Payments (% of GDP)

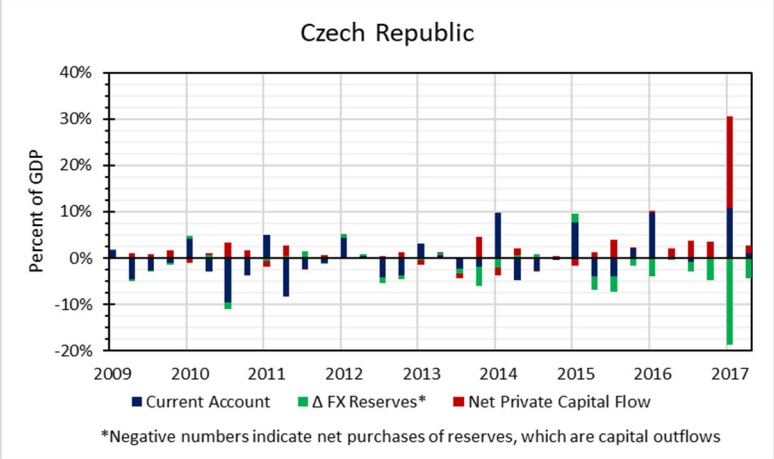


Figure 3.7: Hungary's Balance of Payments (% of GDP)

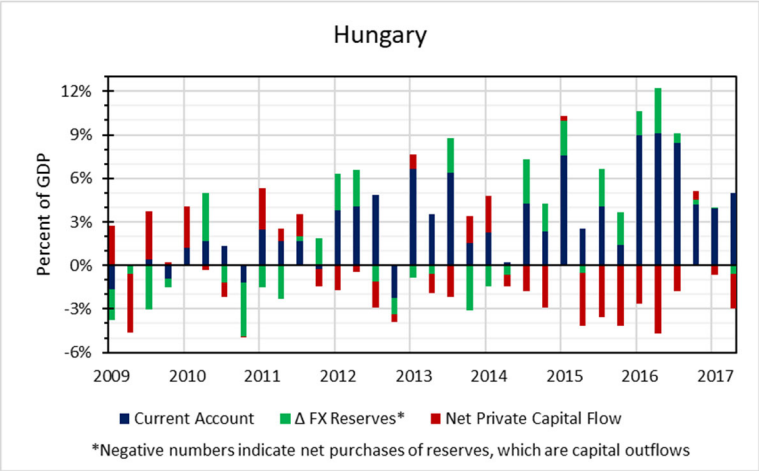


Figure 3.8: India's Balance of Payments (% of GDP)

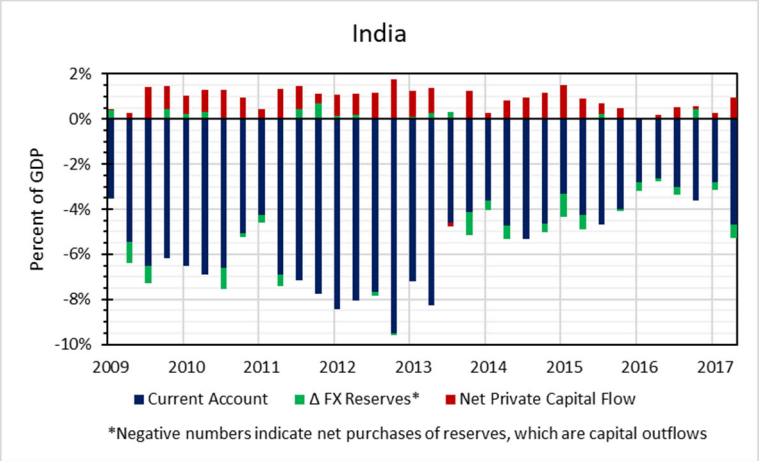


Figure 3.9: Indonesia's Balance of Payments (% of GDP)

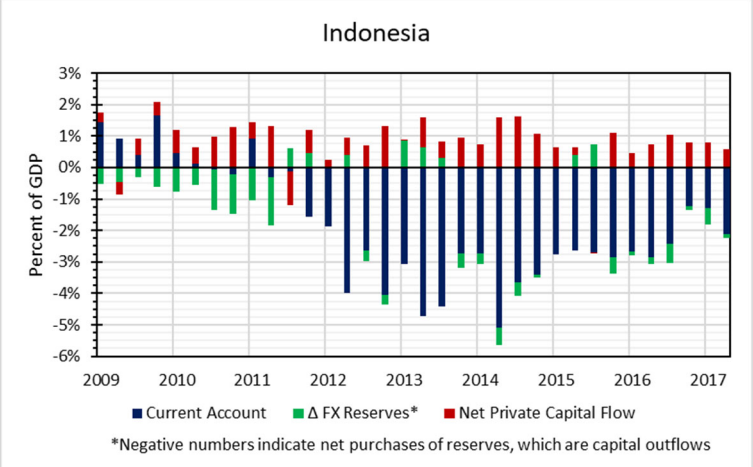


Figure 3.10: Israel's Balance of Payments (% of GDP)

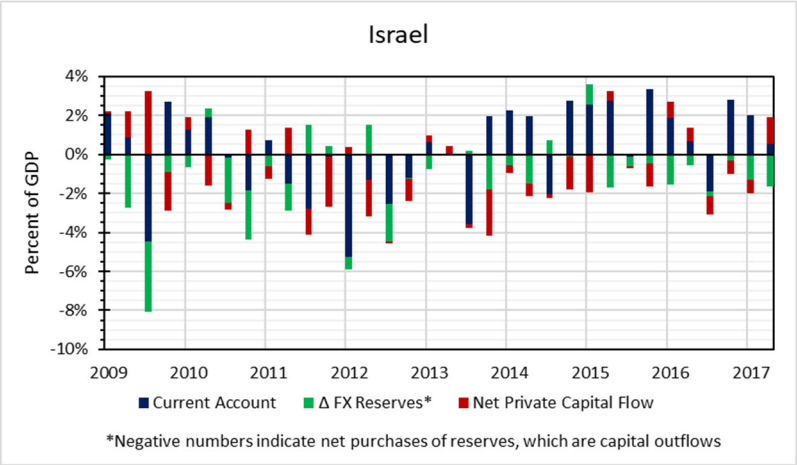


Figure 3.11: Korea's Balance of Payments (% of GDP)

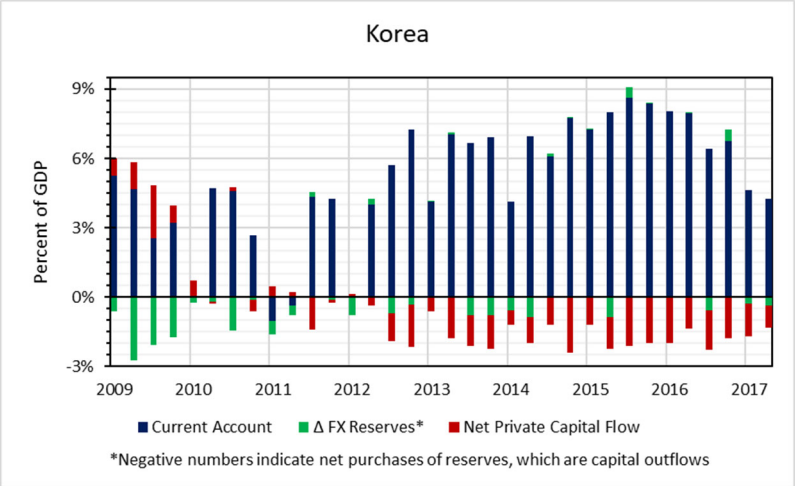


Figure 3.12: Malaysia's Balance of Payments (% of GDP)

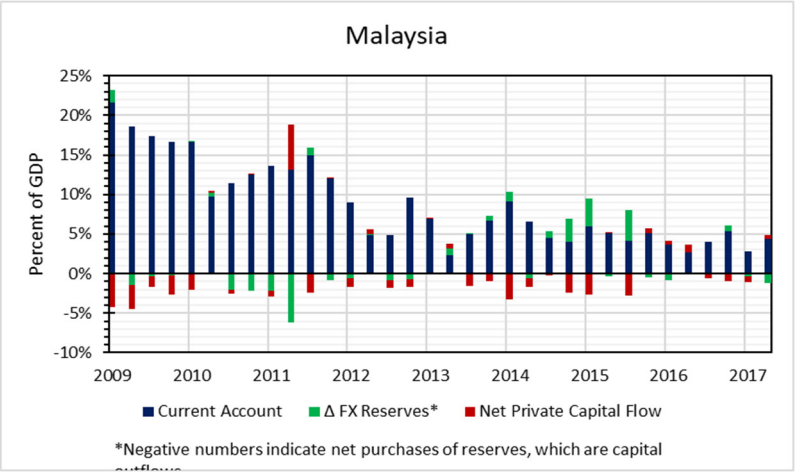


Figure 3.13 Mexico's Balance of Payments (% of GDP)

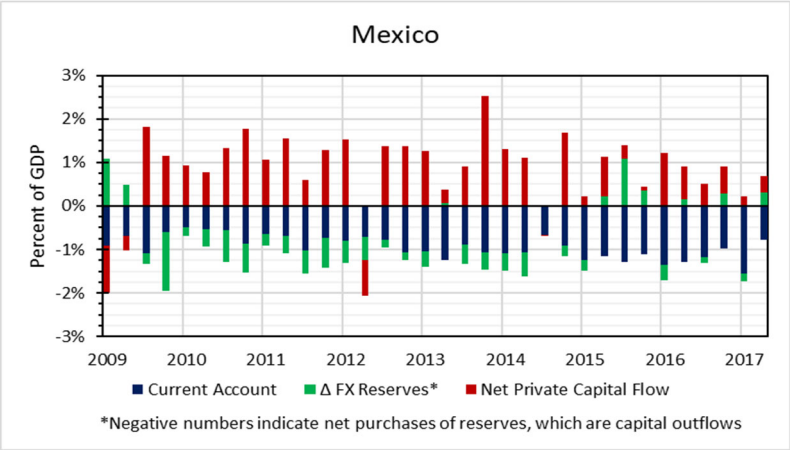


Figure 3.14: Philippines's Balance of Payments (% of GDP)

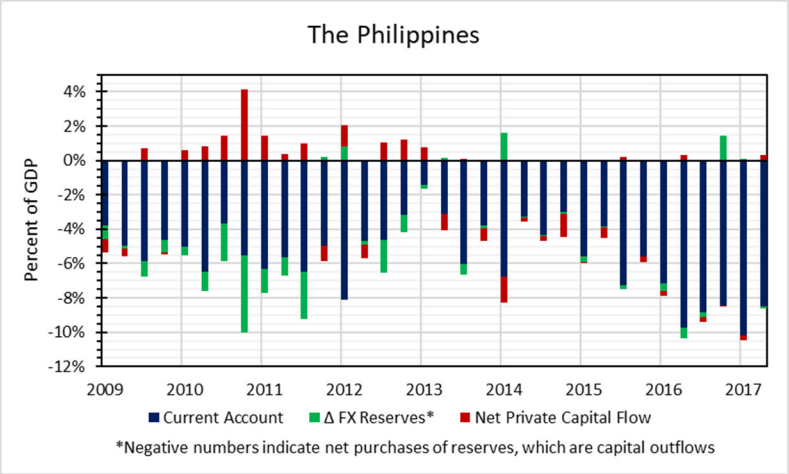


Figure 3.15: Poland's Balance of Payments (% of GDP)

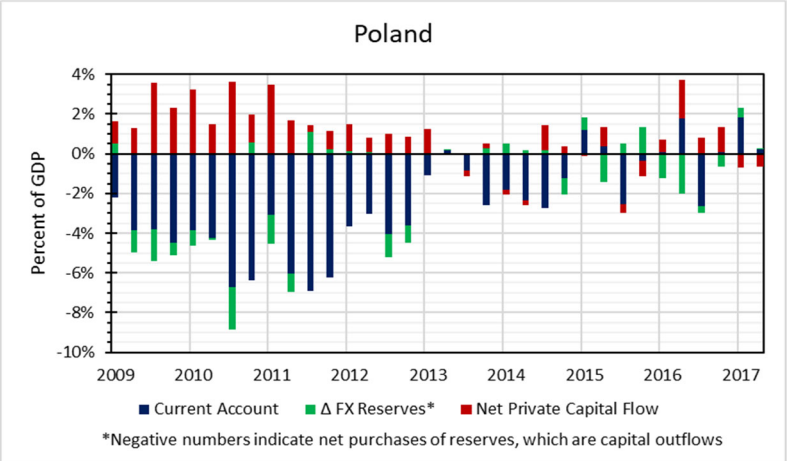


Figure 3.16: Romania's Balance of Payments (% of GDP)

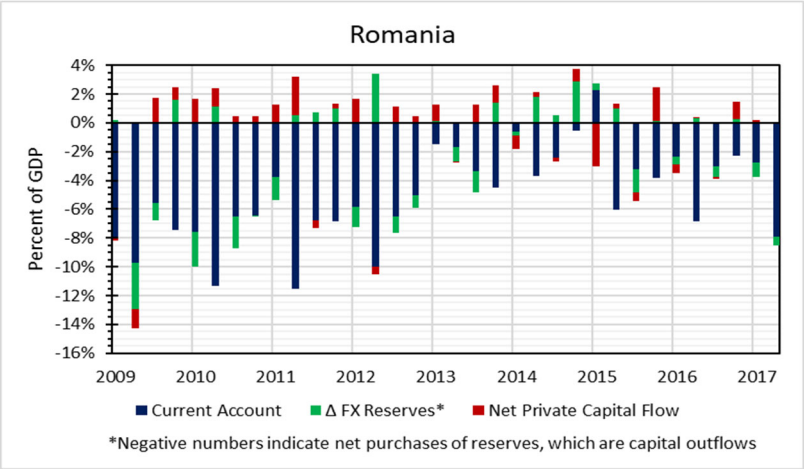


Figure 3.17: Russia's Balance of Payments (% of GDP)

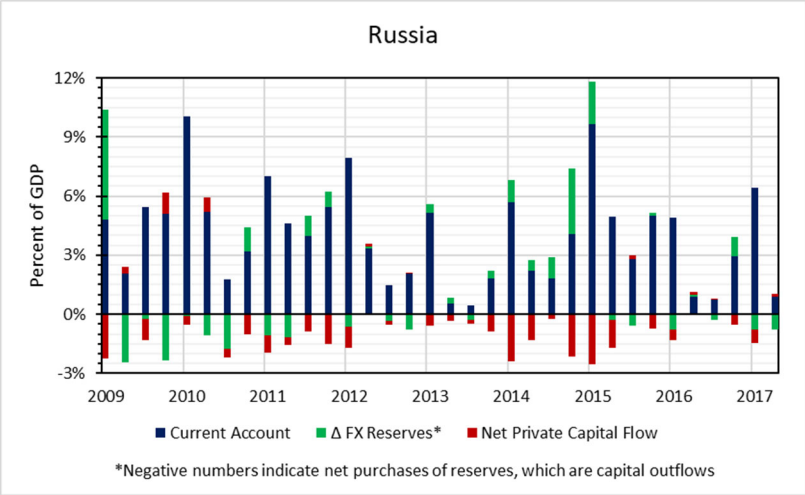


Figure 3.18 South Africa's Balance of Payments (% of GDP)

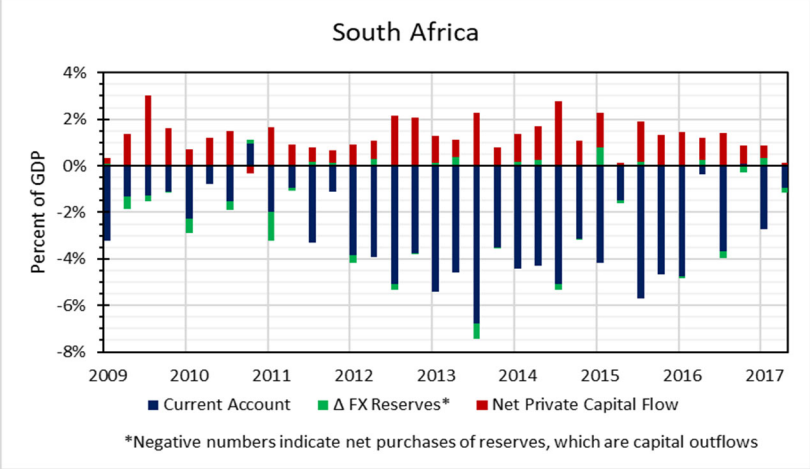


Figure 3.19: Thailand's Balance of Payments (% of GDP)

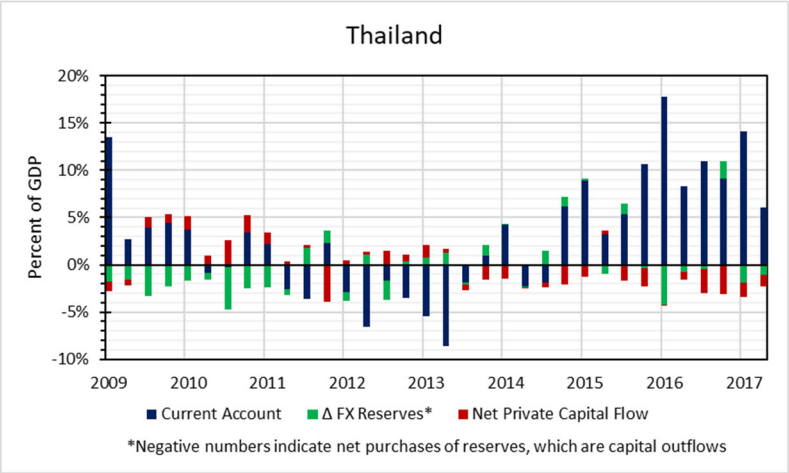
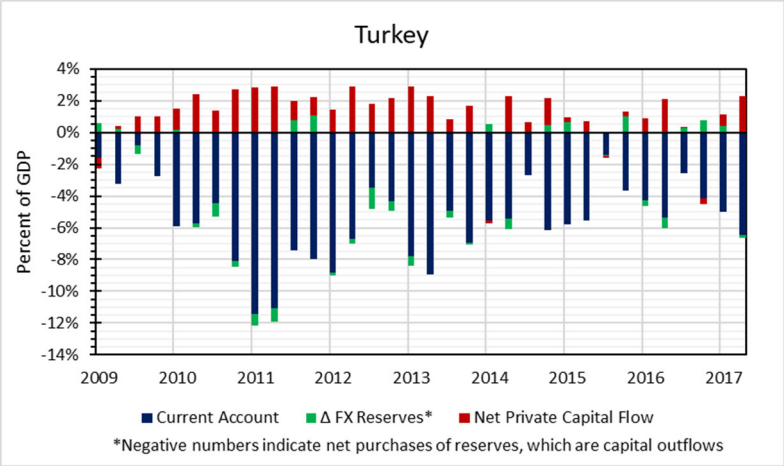
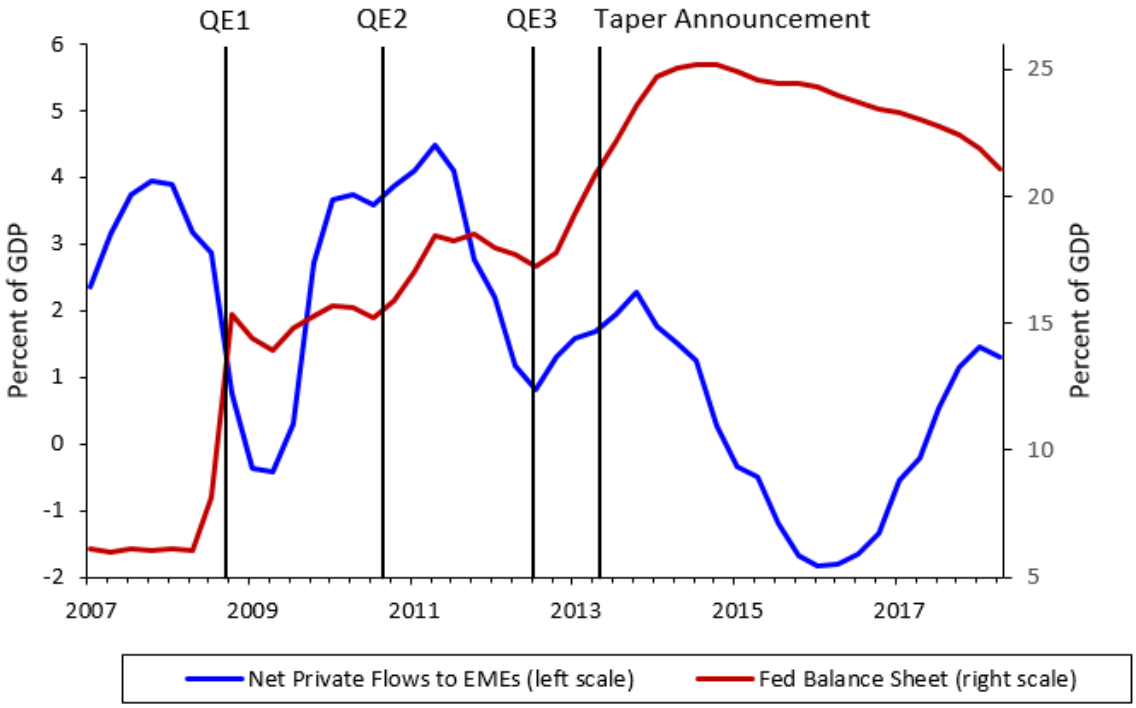


Figure 3.20 Turkey's Balance of Payments (% of GDP)



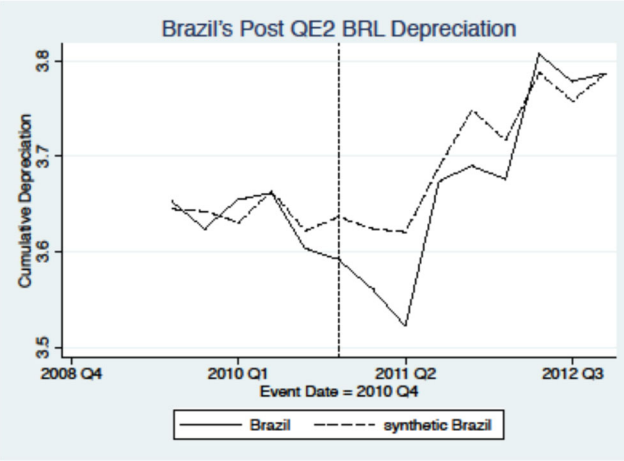
Sources and Notes: Current account, private capital inflow and GDP data are quarterly from the IMF IFS database. Quarterly FX Reserve changes are measured using monthly SDDS foreign currency reserve data, except for China (measured using total monthly reserves because the SDDS data are not available until 2015). Negative numbers indicate net purchases of reserves, which are capital outflows from the perspective of the EM.

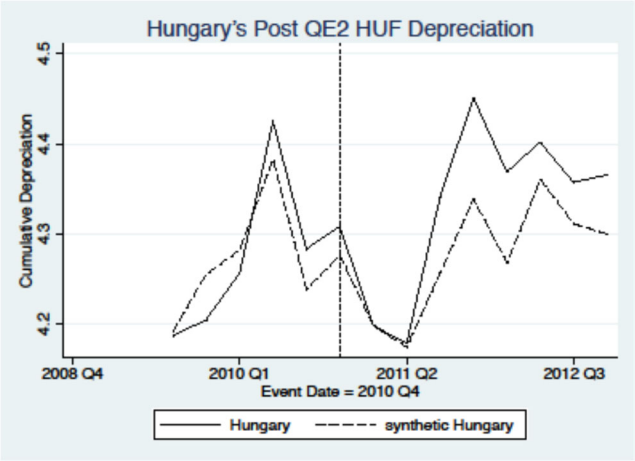
Figure 4 Net Private EM Flows, Fed Balance Sheet, and QE and Taper Announcements

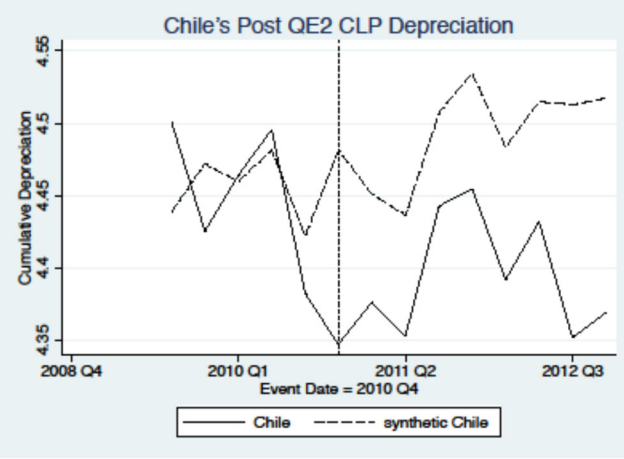


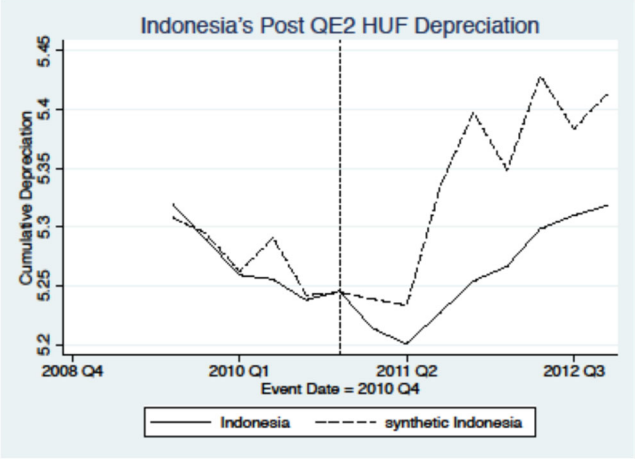
Sources and Notes: Private capital inflow data are from IMF BOP, Fed Balance Sheet data are total assets of Federal Reserve Banks from FRB. Net private inflows include: net FDI, net portfolio inflows, net other inflows, and exclude: IMF net lending and other exceptional financing; the data are 4-quarter averages. Countries include: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey.

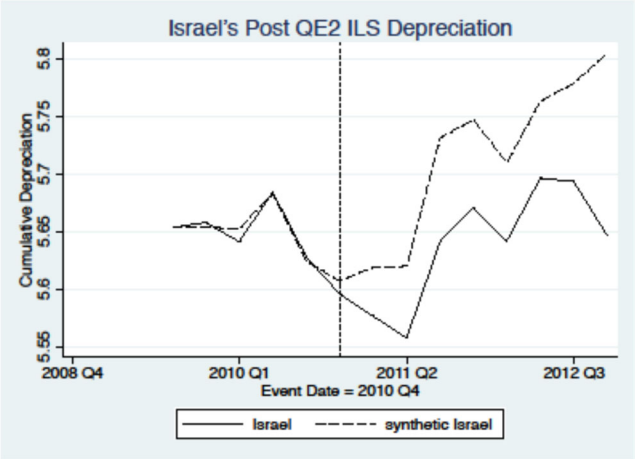
Figures 5 Synthetic Control Comparisons (QE2)

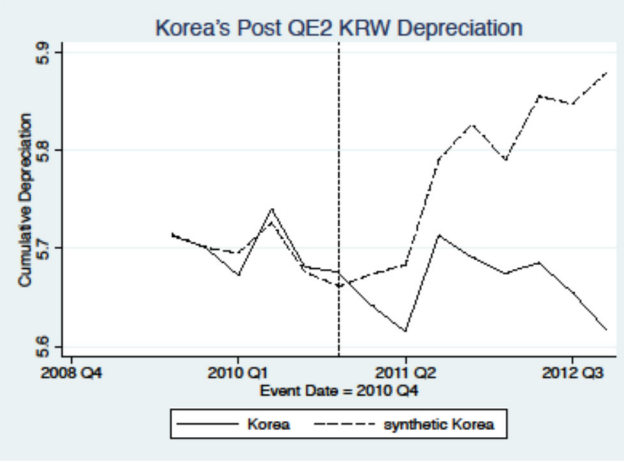


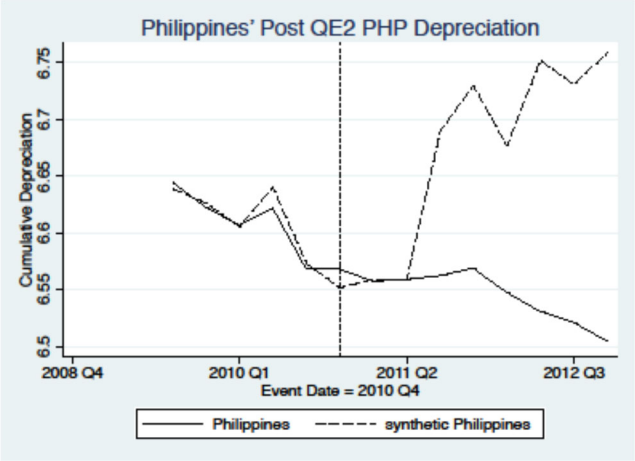


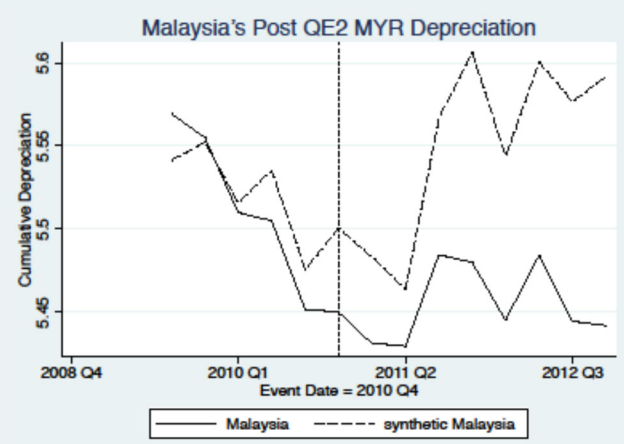


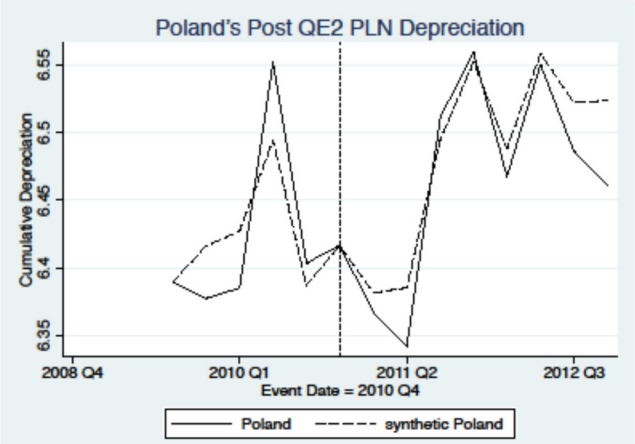


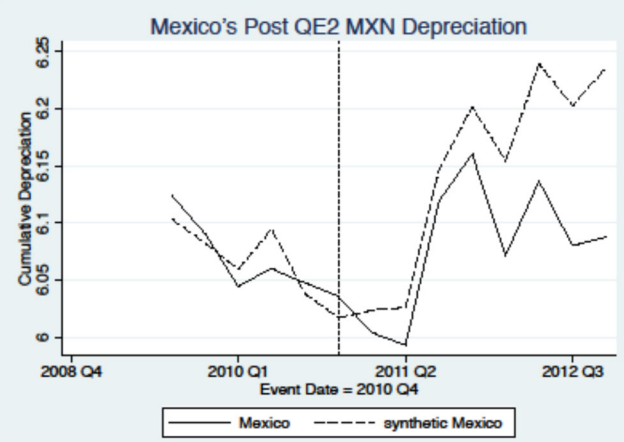


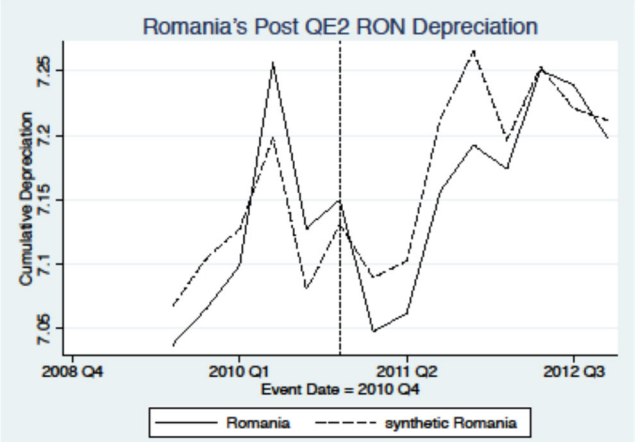

Korea's Post QE2 KRW Depreciation
Cumulative Depreciation
5.6
5.7
5.8
5.9
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Korea
synthetic Korea

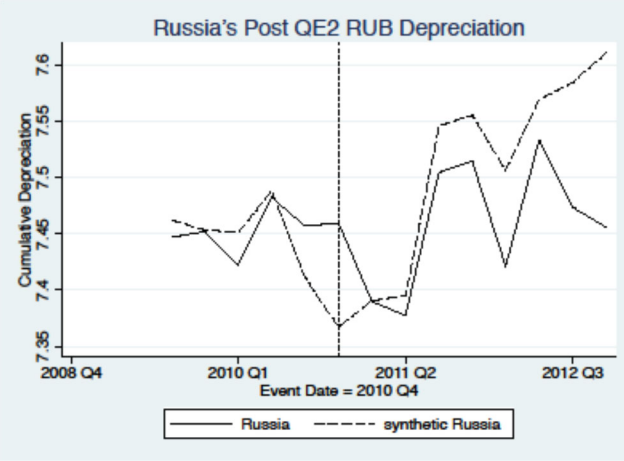

Philippines' Post QE2 PHP Depreciation
Cumulative Depreciation
6.5
6.55
6.6
6.65
6.7
6.75
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Philippines
synthetic Philippines


Malaysia's Post QE2 MYR Depreciation
Cumulative Depreciation
5.45
5.5
5.55
5.6
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Malaysia
synthetic Malaysia


Poland's Post QE2 PLN Depreciation
Cumulative Depreciation
6.35
6.4
6.45
6.5
6.55
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Poland
synthetic Poland


Mexico's Post QE2 MXN Depreciation
Cumulative Depreciation
6
6.05
6.1
6.15
6.2
6.25
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Mexico
synthetic Mexico


Romania's Post QE2 RON Depreciation
Cumulative Depreciation
7.05
7.1
7.15
7.2
7.25
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Romania
synthetic Romania


Russia's Post QE2 RUB Depreciation
Cumulative Depreciation
7.35
7.4
7.45
7.5
7.55
7.6
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Russia
synthetic Russia

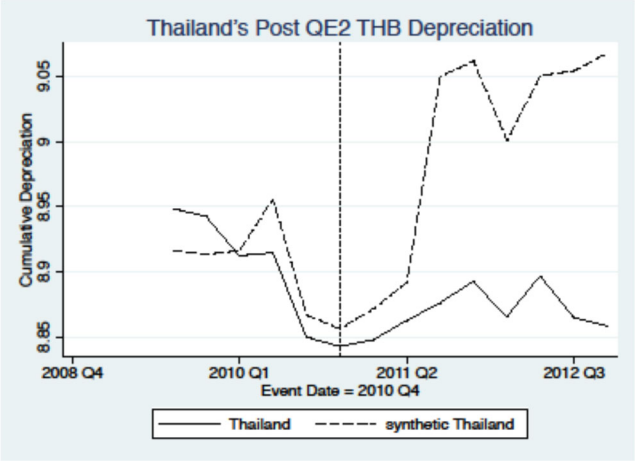
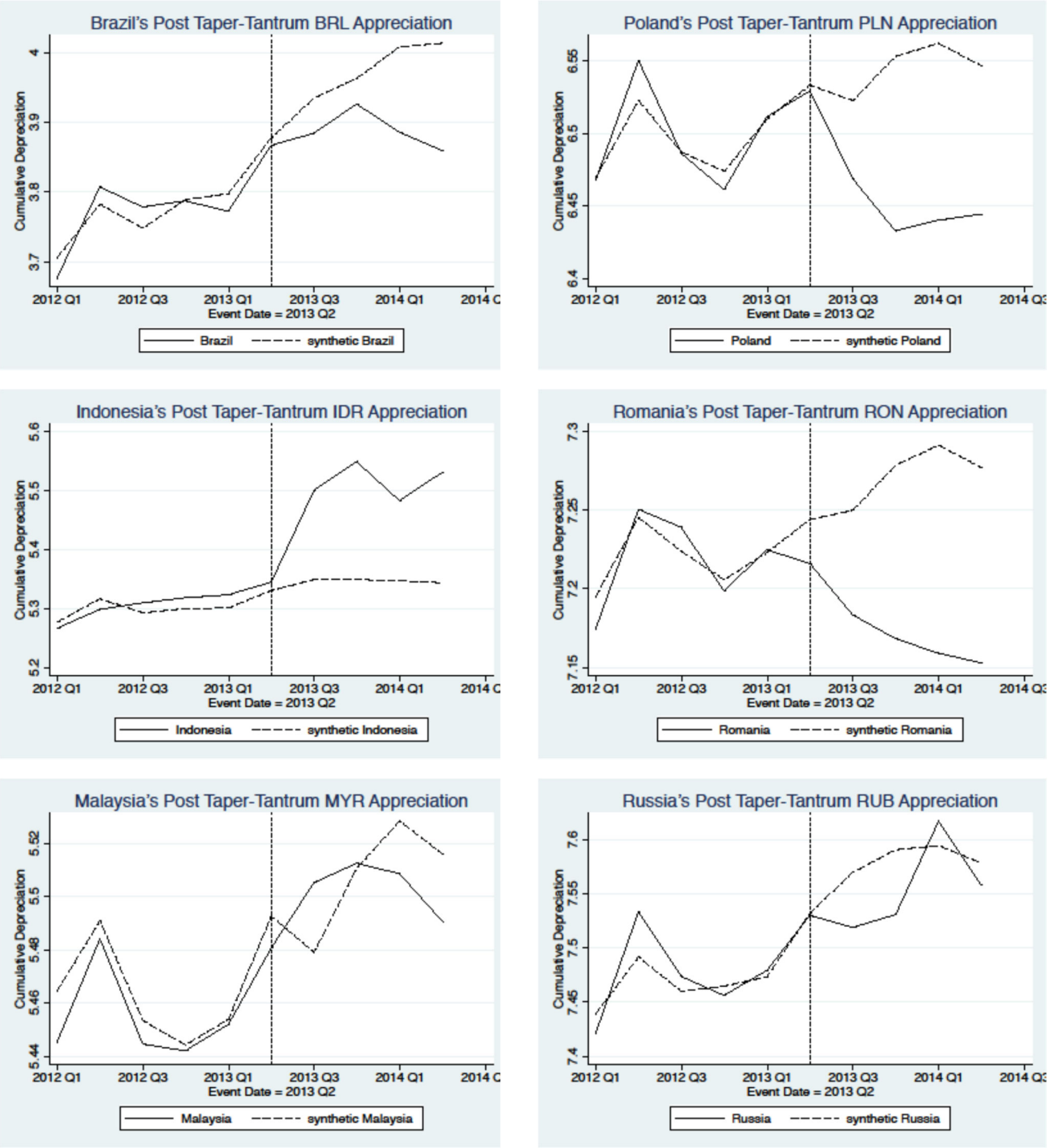
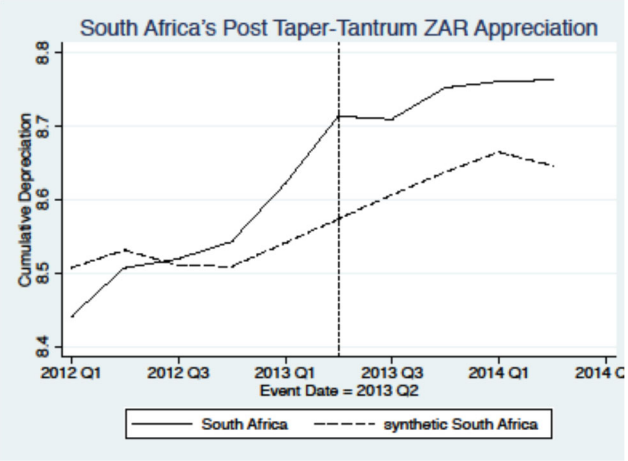

Thailand's Post QE2 THB Depreciation
Cumulative Depreciation
8.85
8.9
8.95
9
9.05
2008 Q4
2010 Q1
2011 Q2
2012 Q3
Event Date = 2010 Q4
Thailand
synthetic Thailand

Figure 6 Synthetic Control Comparisons (Taper Tantrum)




South Africa's Post Taper-Tantrum ZAR Appreciation
Cumulative Depreciation
8.4
8.5
8.6
8.7
8.8
2012 Q1
2012 Q3
2013 Q1
2013 Q3
2014 Q1
Event Date = 2013 Q2
South Africa
synthetic South Africa

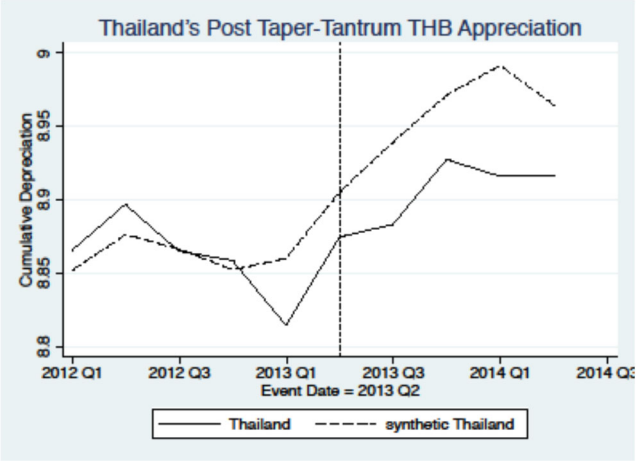
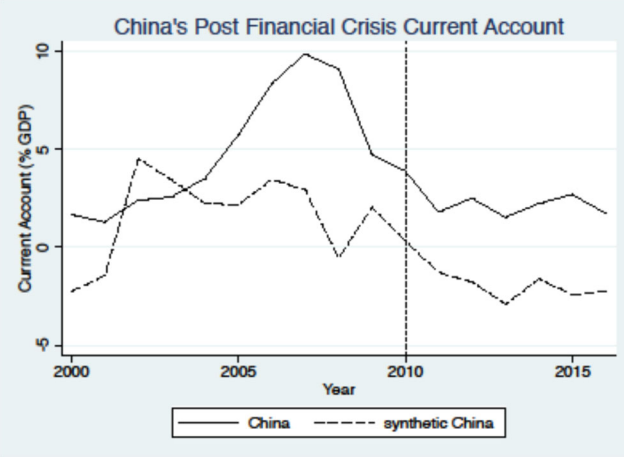
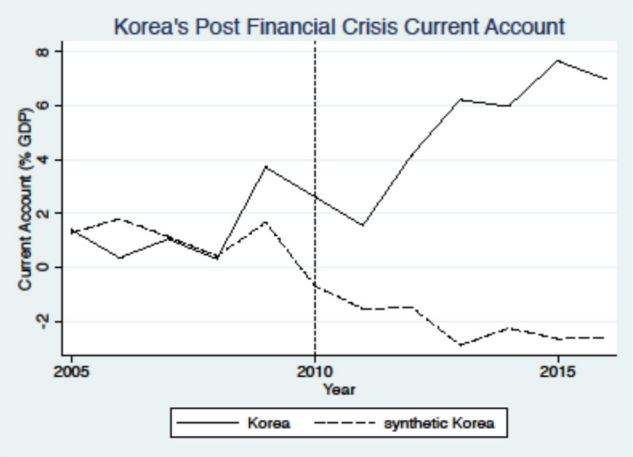
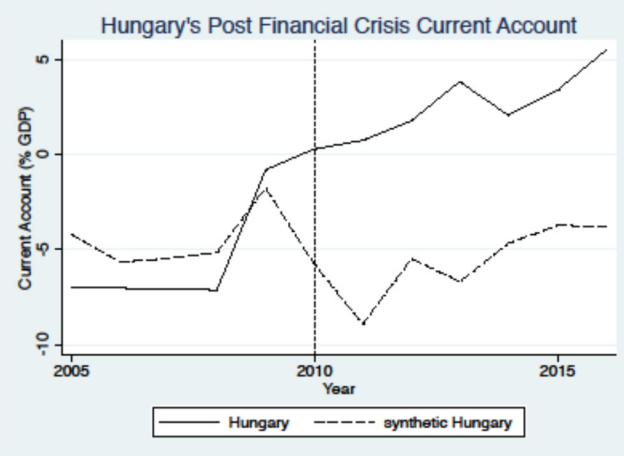
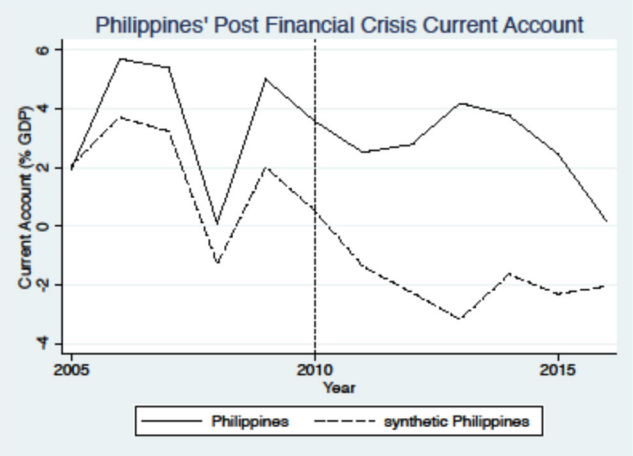

Thailand's Post Taper-Tantrum THB Appreciation
Cumulative Depreciation
8.8
8.85
8.9
8.95
9
2012 Q1
2012 Q3
2013 Q1
2013 Q3
2014 Q1
Event Date = 2013 Q2
Thailand
synthetic Thailand

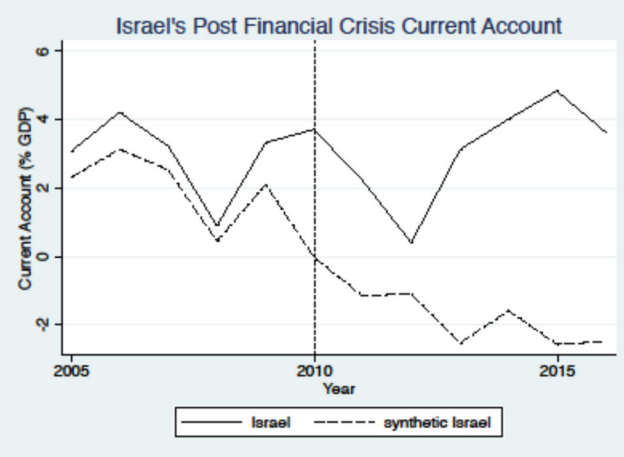
Figure 7 Current Account Synthetic Control Comparisons

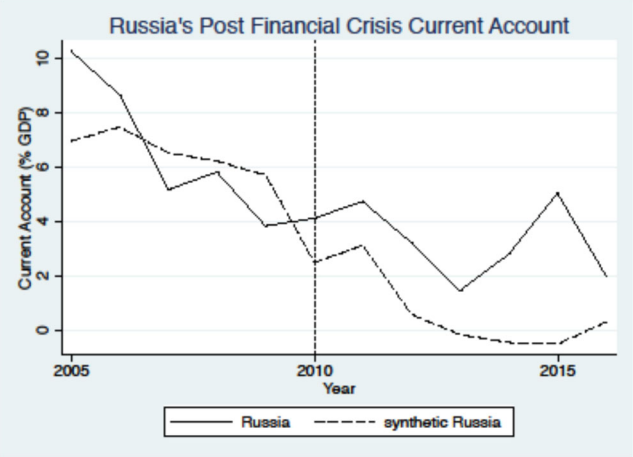


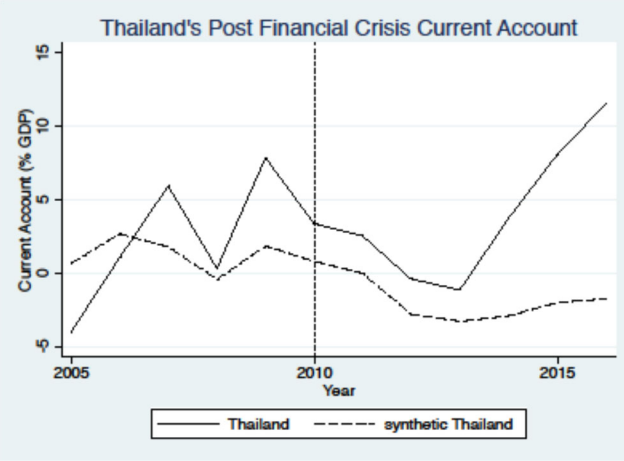











Thailand's Post Financial Crisis Current Account
Current Account (% GDP)
-5
0
5
10
15
2005
2010
2015
Year
Thailand
synthetic Thailand

Data Appendix

20 EME countries: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey

Net Private Capital Flows: IMF BOP statistics (net FDI + net portfolio inflows + net other inflows – IMF net lending – other official exceptional financing)

Capital Controls: Pasricha et al. (2018) covers 18 EMEs quarterly from 2001-2015; provides changes in the number of capital flow management policies to measure the time-varying intensity of restrictions (missing Czech Rep, Hungary, Israel, Poland and Romania).

IMF IFS Quarterly Data: bilateral nominal exchange rate (against dollar, end of period), current account balance (in dollars), exports (in dollars), imports (in dollars), GDP (domestic currency). Quarterly GDP data for China and South Africa are from FRED.

EME long term yields: FRED and Bloomberg

EME credit growth: BIS (change in total credit to the non-financial private sector)

EME Global Spread: JP Morgan (country-specific EMBI Global Spreads)

EME Output growth: Haver (real GDP growth, year on year)

Commodity Price Index: FRED (IMF index of commodity prices)

EME Policy Rates: Haver (Central Bank policy rates)

VIX: FRED (implied volatility of S&P Options)

Fed Policy: Effective Federal Funds rate, Shadow Federal Funds Rate: using Xia and Wu (2015) method, Fed Balance Sheet (total assets of Federal Reserve Banks), US 10-year Treasury yield (FRED)

Reserve Data: monthly SDDS foreign exchange reserves, except China prior to 2015.

Exchange Rate Regime Classification data: Ilzetzki et al. (2017)

Annual GDP and Current Account data from WEO database

Annual EBA data from https://www.imf.org/external/np/res/eba/data.htm