

October 26, 2018

Effects of U.S. Monetary and Fiscal Policies on Emerging Market Economies¹

The sharp deterioration in financial conditions in Argentina and Turkey in recent months, as well as the more broad-based decline in EME asset prices and reversal of capital inflows, have drawn heightened attention to the question of how ongoing policy tightening by the Federal Reserve will affect emerging market economies (EMEs). Our memo explores this question by drawing on case studies of U.S. monetary policy tightenings, empirical analysis of how U.S. monetary policy changes affect EME financial markets and real activity, and model simulations.

Many observers take it as a given that U.S. policy tightening will lead to significant volatility and even crises in emerging markets. As detailed in our case-study analysis of U.S. policy tightenings in Section 2, in the 1980s and 1990s, policy tightening was indeed associated with considerable EME distress.² These episodes also importantly reflected profound EME vulnerabilities such as large fiscal deficits, high levels of dollar-denominated debt, rigid exchange rates, and poorly anchored-inflation expectations – which forced EMEs to raise policy rates sharply to support their currencies when the U.S. tightened. Improvements in monetary and fiscal policy frameworks in many EMEs, including a shift to inflation targeting and more flexible exchange rates in the 1990s, contributed to generally more benign outcomes for EMEs

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² This was particularly evident in the tightening episodes of the early 1980s and in 1994.

during U.S. tightening cycles that began in 1999, 2004, and 2015. However, some EMEs still face significant vulnerabilities, and we cannot discount the possibility that future U.S. tightening may lead to more significant problems.

In Section 3, we examine potential spillovers to EMEs of U.S. monetary policy tightening. Consistent with an extensive literature, upward surprises to the path of U.S. policy rates – as measured following FOMC announcements – tend to tighten financial conditions globally, as well as induce the dollar to appreciate. Importantly, responses of EME bond yields and risk spreads tend to be closely aligned with country vulnerabilities: Less vulnerable Asian EMEs, such as Korea, exhibit muted responses to U.S. monetary policy surprises similar to those of the advanced foreign economies (AFEs), whereas interest rates rise much more sharply in vulnerable economies such as Turkey or Brazil.

We judge the effects on EMEs of U.S. monetary tightening during the current cycle to have been relatively small so far. Section 4 addresses how EMEs are likely to be affected going forward by the fairly rapid pace of future policy tightening envisioned in the staff forecast. To do this, we use simulations of a multi-country general equilibrium model that embeds channels aimed at capturing key vulnerabilities in some EMEs. Such channels include poorly anchored inflation expectations and dollar denominated debt, both of which exacerbate the effects of capital flow reversals and currency depreciations. Assuming, as we do, that policy tightening in the staff forecast is driven by strong U.S. aggregate demand, adverse effects on the less vulnerable EMEs – which include major U.S. Asian trading partners – should be quite muted as the boost to their net exports largely offsets a modest tightening of financial conditions.

By contrast, the output growth of Latin American economies (weighted by U.S. exports) slows in response to rising borrowing spreads and adverse balance sheet effects of currency

depreciation. Even so, this slowing is fairly modest, consistent with the relatively benign staff outlook for growth and financial stability in the region. However, as we show in a second scenario, were strong U.S. aggregate demand to be accompanied by unexpectedly high inflation, requiring much more U.S. policy tightening, the probability of widespread financial distress and economic downturns in the EMEs, possibly even crises – especially in Latin America – would rise significantly.

Our memo concludes (Section 5) with a discussion of spillovers from two developments that should boost the supply of U.S. Treasuries in the hands of the private sector: large U.S. fiscal deficits and the contraction of the Fed's balance sheet. Some observers have argued that vulnerable EMEs would be better off if the Fed slowed the pace of its balance sheet contraction given the upward pressure on interest rates arising from fiscal expansion.³ However, such a strategy would require faster increases in the policy rate in order to achieve our dual mandate, and such increases are likely to exert somewhat greater adverse spillovers to vulnerable EMEs than increases in term premiums stemming from balance sheet contraction. More generally, while we see U.S. fiscal expansion as likely to provide a modest initial boost to most EMEs in the near term (as well as AFEs), the more vulnerable EMEs may be hurt by the associated tightening of global financial conditions.

2. Past Episodes of U.S. Tightening

How did EMEs fare during U.S. policy tightenings?⁴ We consider six major episodes with the starting quarters of the tightenings being 1980Q3, 1988Q2, 1994Q1, 1999Q2, 2004Q2,

³ See, for example, Patel (2018).

⁴ A substantial literature has examined the effects of U.S. monetary policy changes on EMEs (e.g., Canova (2005), Georgiadis (2016), Dedola, Rivolta, and Stracca (2017), Iacoviello and Navarro (forthcoming), IMF (2013), and Maćkowiak (2007)). But this literature typically isolates the effects of identified exogenous U.S. monetary policy shocks and hence does not consider the factors prompting the U.S. tightening.

and 2015Q4 (Figure 1). Looking at real GDP growth around a two-year window on either side of the start of U.S. tightenings, relatively more vulnerable Latin American economies were hit hard during the 1980s and 1990s (Figure 2). The Volcker tightening, which was quite aggressive in its bid to reduce high inflation and was accompanied by a contraction in U.S. demand and a plunge in global commodity prices, stands out, with a fall in aggregate Latin American growth of 4 percentage points. In more-recent tightenings, especially those which took place in the mid-2000s, both Latin America and emerging Asia have fared much better.⁵

The number of EMEs experiencing currency, banking, or sovereign debt crises also increased notably during or shortly after periods of tightenings in the 1980s and 1994 (Figure 3).⁶ The spike in crises following the 1994 tightening (including the so-called Mexican “Tequila crisis”) underscores how even growth-driven U.S. tightenings may pose challenges for highly vulnerable economies. In contrast, there have been few EME crises since the early 2000s, although several countries have experienced flareups in recent years (including Argentina and Turkey) that appear mainly attributable to domestic factors.

Finally, the improved response of EMEs to more recent U.S. monetary tightenings also can be seen in the behavior of capital flows. As shown in Figure 4, gross private capital flows to EMEs moved down after the Volcker disinflation and again (briefly, in Latin America) during the Tequila crisis following the 1994 tightening.⁷ Conversely, capital flows to EMEs surged

⁵China is included in the less vulnerable Asian economies, despite its pronounced financial system risks, for several reasons. First, China has ample resources at its disposal in the event of adverse shocks. Second, vulnerabilities here are measured by the dimensions listed in the explanatory footnote to Figure 5: By these metrics, our relative ranking for China is at the lower end, 12 of 16 countries. Third, for much of the historical period we examine, China’s financial system was relatively closed, rendering the Chinese economy less susceptible to U.S. tightening shocks. A broader assessment of China’s vulnerabilities is provided in the July 2018 staff Quantitative Surveillance (QS) Report.

⁶ The crises data are from Laeven and Valencia (2018).

⁷ U.S. monetary policy has been found to be one of many important determinants of capital flows. See, for example, Ahmed and Zlate (2014), Clark, Converse, Coulibaly, and Kamin (2016), and Ghosh, Qureshi, Kim, and Zalduendo

during and following the Fed's tightening in the mid-2000's. Ironically, during the 2011-2015 period, when U.S. monetary policy was becoming increasingly expansionary through unconventional policies, EME capital inflows were trending downward, but they picked up again in 2016, coincident with the most recent upswing in Fed funds rates.⁸

What accounts for the more benign response of EMEs to recent U.S. tightenings compared with earlier episodes? First, earlier U.S. tightenings were more pronounced, as they were driven by higher U.S. inflation, and they tended to subdue U.S. activity and thus imports, as in the Volcker disinflation. More recent U.S. tightenings have been driven by higher U.S. economic growth, which has been a plus for EME exports and activity.

Second, EMEs' own economic fundamentals improved over time, reducing their vulnerability to tightenings (Figure 5, top panel).⁹ During the 1980s and 1990s, EMEs ran high fiscal and/or current account deficits and had pronounced levels of external and public debt, much of it short term and denominated in U.S. dollars, exposing borrowers to exchange rate risk. They often relied on fixed exchange rates or crawling pegs as a nominal anchor, but poor policies meant these pegs were not credible, inflation ran high, and inflation expectations were not well anchored. Moreover, they typically had low levels of international reserves, further limiting their ability to defend their pegs and backstop troubled banks. According to our index,

(2014). Brauning and Ivashina (2017) argue that there is a close connection between U.S. monetary policy and credit cycles in EMEs through foreign banks' dollar credit. However, they do not control for other push and pull factors.

⁸ There appears to be a fairly strong link, however, between dollar movements and EME capital flows. That said, the dollar appears to follow much longer cycles (lower panel of Figure 4) that are not closely correlated with U.S. monetary policy tightening episodes.

⁹ The 13 EMEs in the figure are chosen based on availability of data going back to 1980. An index based on more EMEs, but beginning later, shows the same overall picture over the period.

EME vulnerabilities declined progressively between the late 1990s and the GFC (though they have risen more recently).¹⁰

The above considerations suggest that adverse spillovers from U.S. policy tightening are not pre-ordained, especially if U.S. inflation remains well-behaved and the EMEs pursue good policies. So far, in the present tightening, inflation has been quiescent and EME vulnerabilities somewhat contained. However, there is some risk that U.S. inflation may move higher than expected, leading to more rapid tightening. Moreover, since 2008, vulnerabilities have crept up. The decomposition of changes in our aggregate EME vulnerability index, shown in Figure 6, suggests that the increase primarily reflected renewed increases in government debt, external debt, and credit to the private sector (Figure 6).

The increase in vulnerabilities since 2008 have generally been more pronounced in economies that have long been regarded as fragile. Argentina, Brazil, South Africa and Turkey are among the countries that have seen the largest increases in external debt-to-exports (Figure 7, top panel), while Brazil has experienced a substantial increase in government debt from an already elevated level (bottom panel). EME corporate debt has also risen on net over the past several years, and along with it debt-at-risk (DAR)—the debt of firms with limited debt-service capacity (Figure 8, left panel).¹¹ This is a potential source of concern because, at a global level, increases in DAR are associated with corporate defaults (right panel). The bulk of the increase comes from China.¹² In addition, some highly vulnerable countries such as Turkey have also seen notable increases in corporate DAR. Thus, the interaction of U.S. monetary policy

¹⁰ According to our cross-country vulnerability rankings, Latin American countries remain more vulnerable than many of the Asian economies (Figure 5, lower panel).

¹¹ Debt at risk is measured as the debt of firms with ratios of earnings before interest, tax, depreciation, and amortization to interest expense less than 2. The charts have been updated from Beltran and Collins (2018).

¹² An important mitigating factor is that China has considerable resources to deal with corporate debt problems; even so, circumstances could develop in which the country suffers a financial crisis (see the special chapter on China in the July 2018 Quantitative Surveillance report).

tightening, especially if inflation driven, with EME vulnerabilities could well prove problematic for some EMEs.

Section 3. Empirical Estimates of Monetary Spillovers

The case-study approach of the previous section does not separate the effects of U.S. policy tightening on the EMEs from those of other factors. For example, the 2004-2006 U.S. tightening cycle, which was associated with benign outcomes for the EMEs, also coincided with rapid growth in China and a related boom in oil and commodity prices. Here, we try to gauge the effects of U.S. monetary surprises more directly on EME financial markets and real activity.

Our first approach is to use an event study. We examine the sensitivity of EME currencies and bond yields to U.S. monetary policy “path surprises.” Path surprises are measured as changes in the two-year Eurodollar futures rate in narrow (one hour) event windows around FOMC announcements from 2010 to 2018. The focus on this period allows us to examine the effects of policy tightening expectations in the context of the recent level of EME vulnerabilities.

Our basic methodology is illustrated in Figure 9, which plots changes in the value of the dollar – measured relative to an equally weighted average of eight EME currencies – against the policy path surprise. The estimated relationship implies that a 100 basis point policy path surprise leads to about 6 percent depreciation in EME currencies, on average. The 100 basis point surprise is close to the upward shift in the policy path – as proxied by the rise in the expected level of the policy rate at end-2019 (bottom panel) – of about 110 basis points since October of last year.

Using this methodology, Figure 10 shows the predicted changes in EME financial variables in response to the 110 basis point rise in market expectations of U.S. interest rates over the past year. The estimates suggest that the recent U.S. policy tightening has had sizable and similar effects on EME and AFE currencies (panel A) as well as bond yields (panel B). However, it has induced much more widening in EME sovereign risk spreads (proxied by 5-year CDS spreads in panel E) than in the AFEs. The country estimates show that the responses of sovereign bond and CDS spreads are much higher for relatively vulnerable EMEs, such as Brazil and Turkey (panels D and F), than for less vulnerable EMEs, such as Korea. The larger predicted effects on bond yields and CDS spreads for more vulnerable EMEs may in part reflect that currency depreciation significantly weakens public and private balance sheets and that these economies must tighten more aggressively to forestall inflationary pressures.¹³

Given the rise financial stresses in recent months, especially in more vulnerable EMEs, an open question is the extent to which recent U.S. monetary tightening is responsible. Figure 11 compares actual changes in exchange rates, bond yields, and credit spreads to those predicted based on the upward shift in the policy path during the past year (taken from the previous figure). For many EMEs with moderate to low vulnerabilities, such as South Korea, realized currency depreciation – and increases in yields and spreads – are close to their predicted values. However, realized changes in currencies and bond yields dwarf the predicted changes for Turkey and Brazil, suggesting that their own vulnerabilities and homegrown risk factors have played a much larger role than U.S. policy tightening. Overall, these results suggest that the shift in market

¹³ The literature generally finds that pass-through from exchange rate depreciation has been higher in Latin America than in Asia (e.g., Kamin (1998) and Ito and Sato (2007)) but has fallen in both regions over time (e.g., IMF (2016)). The fall in Latin America can partly be attributed in part to better-anchored inflation expectations (see De Pooter, Robitaille, and Znick (2014)).

expectations for the Federal Reserve's policy path contributed to somewhat tighter financial conditions in EMEs, but can account for only a modest fraction of the significant stress experienced by a few highly vulnerable economies.

The above analysis does not provide insight into how U.S. policy hikes are likely to affect foreign output.¹⁴ Accordingly, we estimate a structural VAR (SVAR) following the basic approach of Christiano, Eichenbaum, and Evans (1999) over the 1965:1-2007:4 period. The usual suite of variables – U.S. GDP, U.S. core PCE inflation, and the federal funds rate – is augmented to include AFE and EME GDP, the broad real dollar, and U.S. credit spreads.

Figure 12 shows the effects of a surprise hike in the policy rate of 100 basis points. U.S. GDP (panel A) falls around 0.4 percent after 10 quarters (broadly consistent with estimates in the literature), U.S. inflation declines, and the broad real dollar appreciates. EME GDP falls almost twice as much as U.S. GDP – about 0.8 percent over the same 10-quarter horizon – while the effects on AFE GDP are also negative, but more muted.¹⁵ Of course, to the extent that the surprise hike in policy rates is driven by good news about U.S. economic activity (as considered in the next section) rather than news about higher inflation or a change in the Fed's reaction function, this should reduce to some extent the adverse effect of the rate hike on EMEs.^{16 17}

¹⁴ Moreover, while there are some advantages of focusing on a recent window to account for changes in EME policy frameworks and vulnerabilities, the sample used in our event study includes only one U.S. tightening cycle. In addition, the sample covers a period (the post-GFC) in which the Federal Reserve relied heavily on unconventional tools and communication strategies, and hence might not be entirely representative of how U.S. monetary policy surprises would play out on the EMEs going forward.

¹⁵ The SVAR does not account for structural changes in EMEs, including the shift toward more flexible exchange rates in the 1990s, that would be likely to damp the estimated effects on EMEs.

¹⁶ Iacoviello and Navarro (forthcoming) find evidence that U.S. monetary policy tightening has somewhat larger contractionary effects on more vulnerable EMEs.

¹⁷ We also used the SVAR to investigate responses to a U.S. GDP shock, as a proxy for an aggregate demand shock. The effects on foreign economies were not robust across subsamples, likely reflecting changing contemporaneous

Section 4: Implications of Future U.S. Policy Tightening

An important issue facing policymakers is the impact on EMEs if U.S. policy rates rise substantially. Private market participants and most FOMC SEP contributors expect relatively modest hikes over the next few years; the Blue Chip forecast has the Fed funds rate plateauing around 3 percent by next year, while the median SEP has the Fed funds rate reaching 3.4 percent. If either path is realized, pressures on EMEs should be fairly contained; interest rates end up at historically low levels, and they are already discounted in asset prices. In contrast, the staff forecast, in which the Fed funds rate reaches 5 percent by 2020, would significantly surprise markets. In this section, we address how much this interest rate surprise could affect EMEs, and also discuss how the source of faster U.S. tightening – higher U.S. growth or inflation – should influence spillovers to EMEs.

To do so, we use an open economy general equilibrium model that includes Asian and Latin American EME blocks (in addition to the U.S. and AFEs). The Asian block is a proxy for less vulnerable EMEs, while the Latin American block proxies for somewhat more vulnerable economies.^{18 19}

correlation between U.S. GDP and foreign activity. For example, given the high correlation during the GFC period, a shock that increases U.S. GDP shocks has large and positive effects on foreign economies, including EMEs, but has more muted effects if the GFC is excluded. In any event, this approach did not seem to provide a reliable way of identifying idiosyncratic shocks to U.S. demand that would complement the model-based analysis in the next section.

¹⁸ The four country blocks are linked through standard trade channels, calibrated based on bilateral merchandise trade flows from the IMF's Direction of Trade statistics using data for 2017. The Latin American and Asian blocks correspond to the countries included in the staff forecast (the major countries in Latin America include Mexico and Brazil, and in Asia include China, South Korea, and Taiwan). Because Mexico has a large weight in our Latin American block (as it accounts for roughly two-thirds of U.S. trade with Latin America), the region as a whole has much lower vulnerabilities than many member countries.

¹⁹ Expectations in the model are assumed to be formed adaptively. Compared to DSGE models, such as SIGMA, the model tends to imply somewhat larger transmission of U.S. shocks to other countries.

The model captures key features of EME economies that make their responses to U.S. policy rate changes potentially quite different from the advanced economies. First, our model allows currency depreciation against the dollar to adversely affect private-sector balance sheets and boost borrowing costs (by raising the domestic currency value of FX-denominated loans), consistent with BIS research.²⁰ The overall stimulus to EME output from currency depreciation thus depends on whether the boost to net exports outweighs the drag coming from corporate balance sheets.²¹ Second, our model also allows currency movements to affect long-run inflation expectations. In consequence, a currency depreciation may persistently increase EME inflation and induce an aggressive response by many EME central banks, especially in Latin America, that weighs on economic activity.

Our baseline is constructed to match current Blue Chip forecasts for key U.S. variables, which as noted above, can be regarded as roughly capturing the expectations of financial market participants. The black solid lines in Figure 13 show this “Blue Chip” baseline for the U.S. variables used in this matching exercise, including the unemployment rate, output, inflation, and the federal funds rate. The blue dashed lines show the staff forecast to facilitate comparison. The Blue Chip projection implies a smaller and much less persistent decline in the unemployment rate (panel A) below its long-run level than in the staff projection, as well as a much flatter path for the policy rate (panel C).

Scenario 1: Stronger U.S. Demand

²⁰ See, for example, Hoffman, Shim, and Shin (2017), and Avdijiev, Bruno, Koch, and Shin (2018). The latter paper argues that a stronger dollar has real macroeconomic effects that operate in the opposite direction to the standard trade channel because the financial channels dominate.

²¹ Boz, Gopinath, and Plagborg-Møller (2017) have recently argued that when invoicing is prevalent in dollars and dollar prices are sticky, the conventional trade effects of currency movements against the dollar may not apply.

Our scenario simply incorporates U.S. demand shocks – built on top of the Blue Chip baseline – to match the staff projection for U.S. unemployment. Thus, markets are surprised to see the U.S. economy evolve roughly in line with the staff projection; we then examine the consequences for foreign economies. As seen by the red dashed lines in Figure 13, the paths for other key variables based on this simple matching exercise come quite close to matching the staff baseline. Notably, the inertial Taylor rule has the federal funds rate reaching nearly 4½ percent by 2021 – about 150 basis points above the Blue Chip baseline – leading to a 5 percent appreciation of the dollar.

We next turn to the implications of stronger-than-expected U.S. aggregate demand for the foreign economies. The stronger demand and associated rise in U.S. policy rates causes the currencies of all three country blocks to depreciate sharply against the dollar (panel A of Figure 14; note that the effects are reported in “deviations from baseline”). Net exports in all three blocks (panel C) are boosted, albeit to different extents, by stronger U.S. activity and currency depreciation.

However, the paths of real GDP (panel B) diverge considerably. In the AFEs, policy rates, long-term interest rates, and bond spreads are little affected, so stronger net exports show through to stronger GDP. In EME-Asia, financial conditions tighten a bit, but net exports rise strongly, given their closer trade linkages with the United States and higher sensitivity to exchange rate changes. All told, EME-Asia GDP rises above baseline.²² By contrast, output in EME-LA falls slightly. While net exports get a big boost from the expansion of U.S. demand and currency depreciation, domestic absorption declines markedly (panel D). The contraction in

²² Mehrotra and Yetman (2014) provide evidence that inflation expectations of Asian EMEs have been well anchored near central bank inflation targets using survey evidence from professional forecasters.

domestic absorption reflects that policy rates increase as EME-LA central banks react aggressively to inflation, while borrowing spreads widen as balance sheets weaken (including due to currency depreciation).

These results suggest that even the rapid U.S. policy tightening in the staff forecast should not unduly harm the EMEs provided that tightening reflects strong U.S. demand. Accordingly, these results provide support for the staff forecast for EMEs, which entails some downward pressure on growth from tightening financial conditions but not substantial distress. Nevertheless, our aggregate analysis does not capture the worse outcomes that particular EMEs with higher vulnerabilities – such as Indonesia, Brazil, Argentina, and Turkey, the last two of which are already in crisis – could well experience.

While many have pointed to the vulnerable corporate sectors in many EMEs, given the fairly modest changes in EME output, exchange rates, and interest rates implied by this exercise, the effects on corporate debt-at-risk would be quite small. If we introduce shocks to EME borrowing costs, currencies, and corporate earnings that are consistent with this scenario, China does show some increase in DAR – as higher interest rates on its massive debt push many firms into this risky category of debt – as do some other EMEs (Figure 15). But most countries are little affected, which reinforces our view that a largely demand-driven U.S. policy tightening should be manageable for EMEs as a whole.²³

The relatively modest effects of the U.S. activity-driven tightening on EMEs are underscored by Figure 16, which compares the staff baseline forecast for EME-Asia and EME-LA GDP growth (black lines) to the paths that the model would imply if there was no pickup in

²³ Admittedly, market reactions are difficult to predict, and it is possible that U.S. tightening could induce considerably larger deteriorations in EME financial conditions than in our scenario.

U.S. demand (red lines). Given that stronger U.S. demand boosts EME-Asian GDP, our staff forecast would be a bit weaker for those economies in the absence of the U.S. demand pickup; conversely, given that stronger U.S. demand weakens EME-LA by causing financial conditions to tighten in those economies, Latin American growth would run a tad stronger.

Scenario 2: Stronger U.S. Demand with Higher Inflation

We next consider a scenario in which the more prolonged undershooting of the natural rate of unemployment in the staff baseline generates significantly more upward pressure on U.S. inflation, and prompts the Federal Reserve to tighten more rapidly than the staff baseline.

Specifically, we assume the slope of the U.S. Phillips Curve steepens beginning in the second half of 2019 to nearly its value in the 1980s and that long-run inflation expectations become more responsive to realized inflation. These developments precipitate a jump in the term premium on 10 year Treasury bonds (assumed to be 25 basis points, with spillovers half as large to the foreign economies). The pickup in inflation to around 2¾ percent (panel B, figure 17) causes policy rates (panel C) to rise to about 5½ percent by late 2020. U.S. domestic demand still moves well above baseline for a time, but the expansion is tempered by higher interest rates. These rates also fuel a 7 percent appreciation of the broad dollar. U.S. unemployment eventually rises well above the Blue Chip baseline, which reduces inflationary pressure.

Figure 18 shows the effects on foreign economies of the “Stronger U.S. demand with higher inflation” scenario. Output in the AFEs and in EME-Asia is essentially unchanged from the Blue Chip baseline (though a bit lower than when the Phillips Curve was stable, the “Stronger U.S. demand” scenario). However, EME-LA experiences more contractionary effects. EME net exports are still boosted by the expansion in U.S. domestic demand and the

large depreciation of their currencies. Currency weakness induces central banks to raise interest rates considerably, and corporate risk spreads rise (as well as term premiums on sovereign debt). As noted in our previous discussion, particularly vulnerable EMEs could experience much sharper contractions than implied by the EME-LA aggregate.

Section 5. Fiscal and Balance Sheet Spillovers to EMEs

Some observers have argued that the highly expansionary stance of U.S. fiscal policy over the next few years will markedly tighten financial conditions in EMEs. This view seems corroborated by our analysis of an aggregate demand shock, which indeed tightens EME financial conditions even while boosting their output through trade. To address this issue more directly, we use our model to assess how the U.S. fiscal stimulus programs initiated during the past year will play out for EMEs. The stimulus is calibrated to roughly match staff projections of the effects of the program on U.S. GDP through 2021 – by which point the fiscal stimulus has raised GDP nearly 1½ percent above baseline. Abstracting from any term premium effects, foreign responses to the fiscal expansion (blue solid lines of Figure 19) closely parallel those of the stronger U.S. demand scenario: AFE and EME-Asian GDP rise noticeably relative to baseline, while EME-LA contracts.

However, the long-lived nature of the U.S. fiscal expansion and large expected rise in U.S. debt will likely boost term premiums on both U.S. and thus foreign bonds. Board staff estimate that the U.S. fiscal stimulus programs will raise term premiums on 10 year Treasuries 25 basis points by the end of 2021, and 50 basis points in the long-run. The red dotted lines in Figure 19 show the “all-in” effects of U.S. fiscal expansion, incorporating the higher U.S. term

premium, as well as spillovers to foreign term premiums that are assumed to be half as large.²⁴ Given that the U.S. fiscal expansion tightens global financial conditions, the boost to AFEs and EME-Asia is noticeably smaller (eventually turning negative as term premiums rise), and EME-LA GDP is depressed even more.

The ongoing unwinding of the Fed's balance sheet, as with the deficit-financed fiscal expansion, should raise term premiums, given that both policies increase the supply of Treasuries in the hands of the public. Board staff estimate that the gradual reduction in the Fed's balance sheet over the next few years will boost term premiums on U.S. Treasuries by around 35 basis points by end-2025, which comes on top of the upward pressure on the term premium caused by higher fiscal deficits.²⁵ The green dashed lines in Figure 19 show that the balance sheet contraction, by boosting term premiums abroad, has a further depressing effect on foreign output in both AFEs and EMEs. Even so, this drag takes place over many years and implies only a slight reduction in annual growth rates.

Concerns that fiscal expansion plus Fed balance sheet contraction will cause a sharp tightening of global financial conditions has led some observers – notably Governor Patel of the Reserve Bank of India – to argue that vulnerable EMEs would be better off if the Federal Reserve slowed the pace of balance sheet contraction to offset the additional Treasury issuance²⁶. However, Patel's argument fails to account for the fact that the Fed would have to boost the federal funds rate to offset the effects of more expansive balance sheet policy (assuming that the FOMC wanted to keep activity on a similar path). Given research indicating

²⁴ These spillovers to foreign term premiums are broadly consistent with the estimates of Curcuru et al. (2018).

²⁵ The estimated effects of the Fed's balance sheet reduction for the term premium on 10 year Treasuries are reported in the balance sheet projections section of Tealbook B.

²⁶ See Patel (2018).

that the exchange rate is much more sensitive to the path of policy rates than to balance sheet actions, the dollar would likely appreciate more sharply under this alternative strategy.²⁷ Such an outcome would likely hurt vulnerable economies that are adversely affected by dollar appreciation and whose interest rates tend to move closely with U.S. short interest rates.

²⁷ Curcuru, Kamin, Li, and Rodriguez (2018) show that U.S. monetary policy actions that affect the path of the federal funds rate tend to have much larger effects on the dollar and on foreign bond yields than unconventional policy actions that operate mainly through the term premium. More specifically, the authors focus on the change in the U.S. 10-year Treasury yields during one-day windows around FOMC policy announcements and use term structure models to decompose those changes into changes in expected short-term interest rates and changes in term premiums. The effect on the exchange rate of a policy announcement that moves the average expected short rate by a given amount is several times as large as a policy announcement driving a comparably sized rise in term premiums. Also see related research by Gali (2018).

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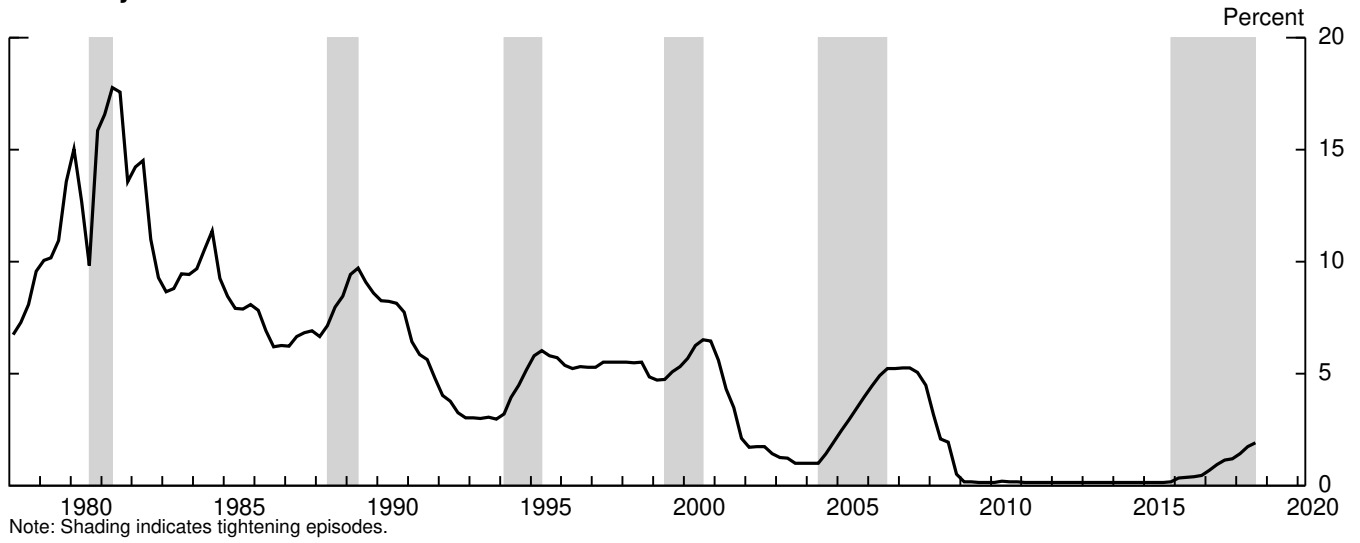
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Figure 1

US Policy Rate



US Real Policy Rate*

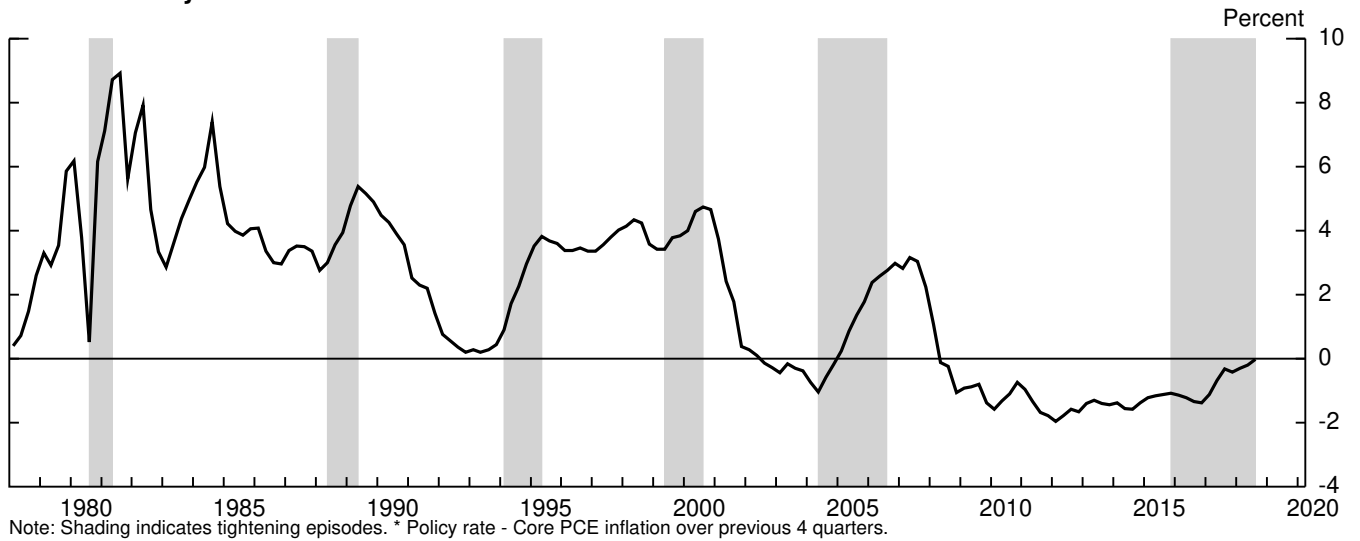
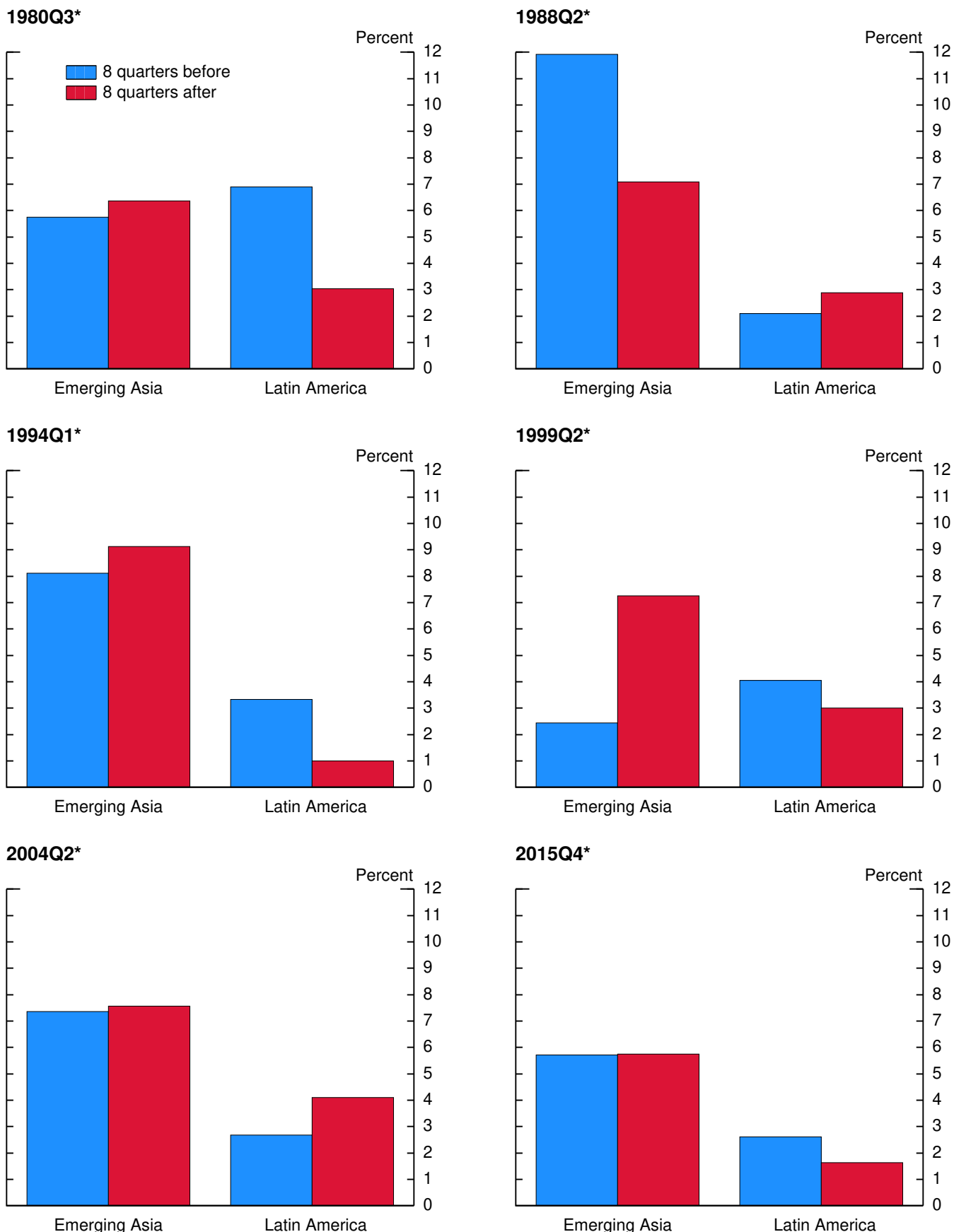


Figure 2: Average Real GDP Growth Around U.S. Tightenings

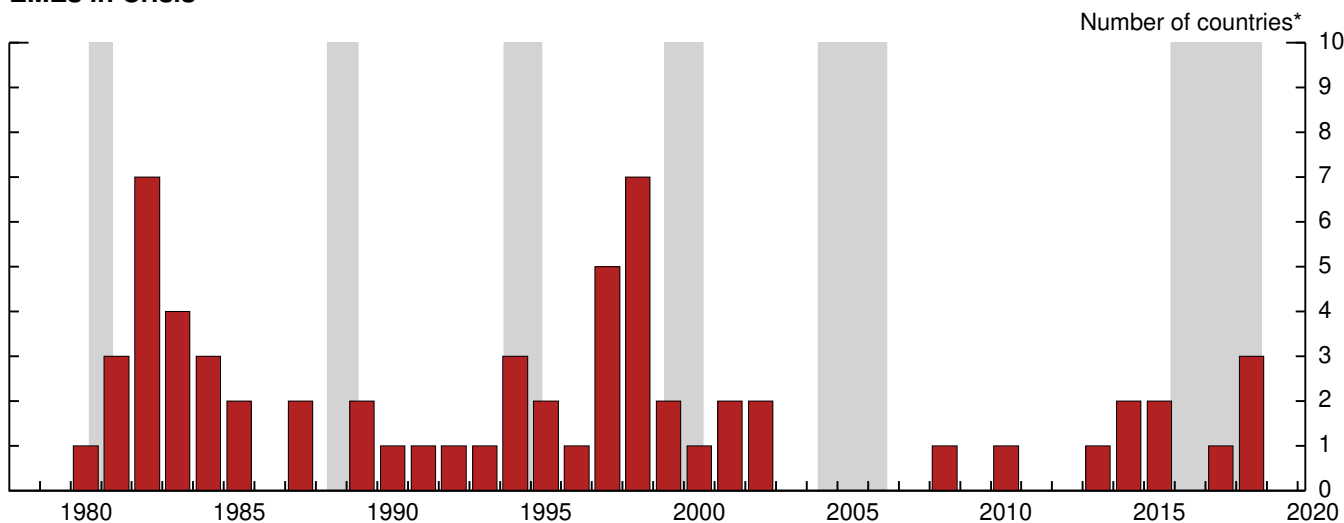


* Date represents start of tightening.
Aggregates are weighted by US export weights.

Emerging Asia consists of China, Korea, Malaysia, Philippines, and Thailand.
Latin America consists of Argentina, Brazil, Chile, Colombia, and Mexico.

Figure 3

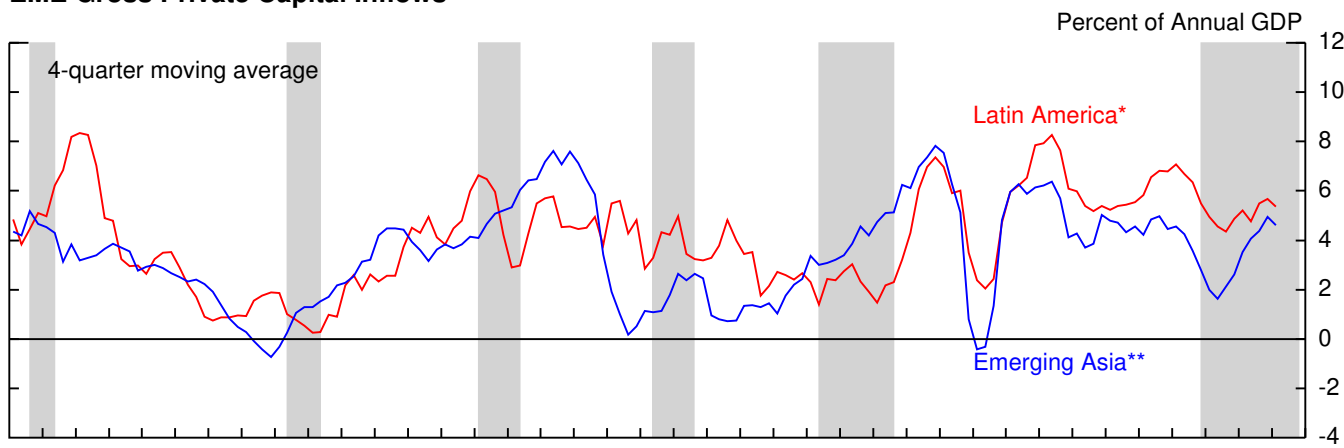
EMEs in Crisis



Note: Shading indicates tightening episodes.
 * Number of countries experiencing a bank crisis, currency crisis, or sovereign debt crisis. Based on data from 18 EMEs.
 Source: Laeven and Valencia (2018); staff estimates for 2018.

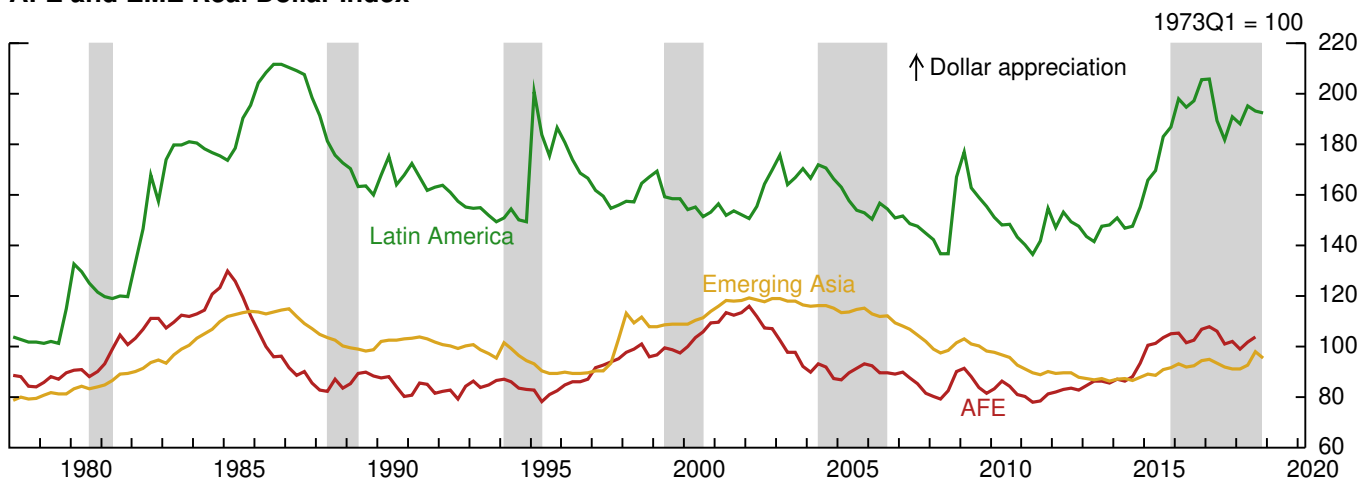
Figure 4

EME Gross Private Capital Inflows



Note: Shading indicates tightening episodes.
 * Includes Argentina, Brazil, and Mexico.
 ** Includes India, Korea, Philippines, and Thailand.

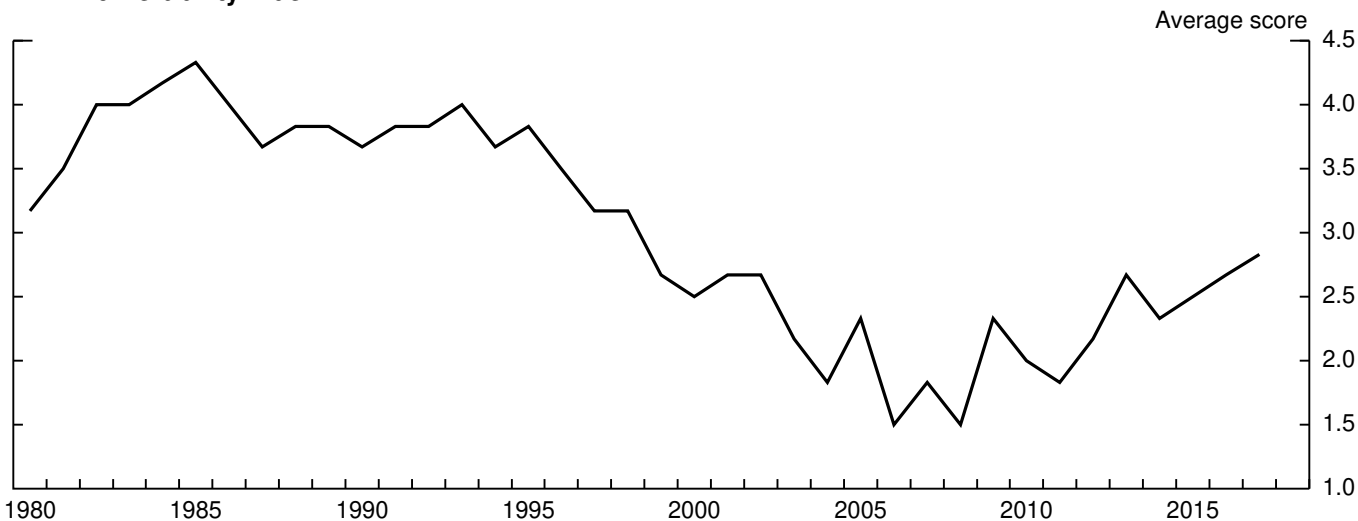
AFE and EME Real Dollar Index



Note: Shading indicates tightening episodes.

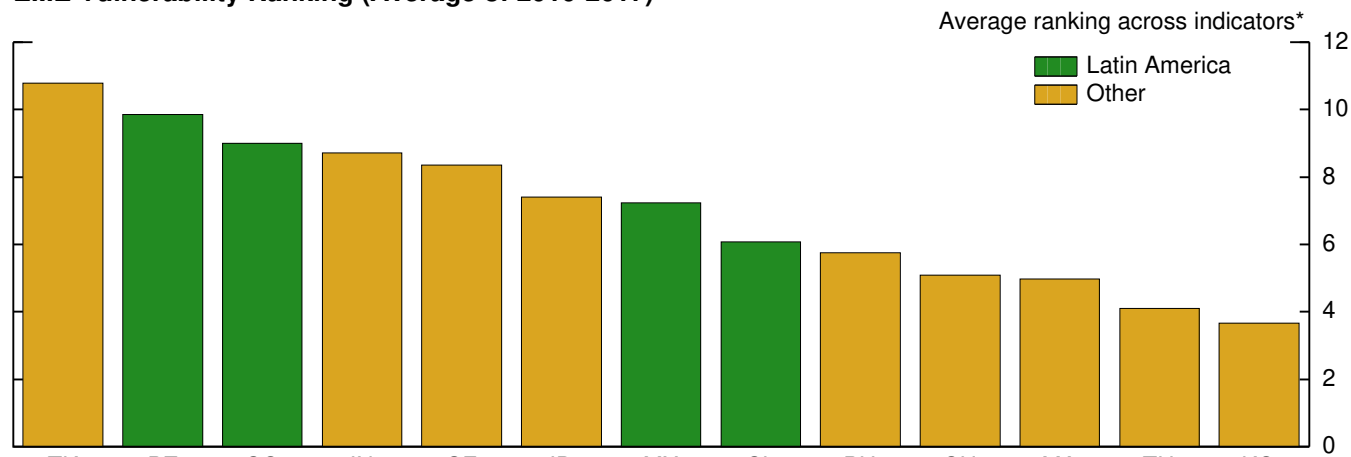
Figure 5

EME Vulnerability Index*



* Federal Reserve Board staff calculations: Based on 6 indicators for 13 EMEs: CA/GDP, gross government debt/GDP, average inflation, increase in bank credit to the private sector/GDP, reserves/GDP, and total external debt/exports. Vulnerability score can range from a low of 1 (all variables for all countries falling in bottom 5th percentile of historical experience) to a high of 5 (all variables for all countries falling in the top 5th percentile). Countries include Brazil, Chile, China, Colombia, India, Indonesia, Korea, Malaysia, Mexico, Philippines, South Africa, Thailand, and Turkey.

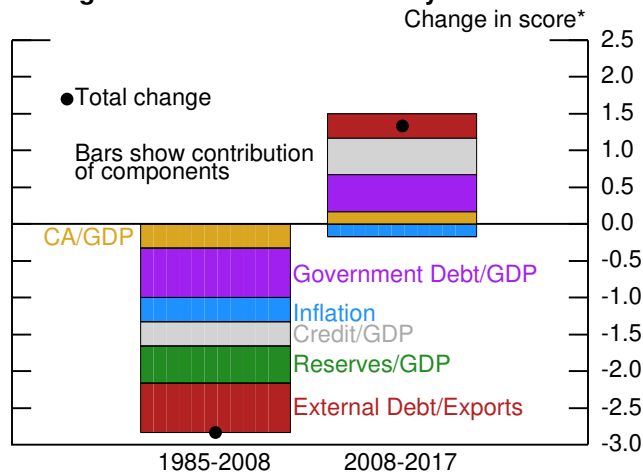
EME Vulnerability Ranking (Average of 2010-2017)



* Countries are sorted from most vulnerable to least vulnerable. BZ=Brazil, CH=China, CL=Chile, CO=Colombia, ID=Indonesia, IN=India, KO=Korea, MA=Malaysia, MX=Mexico, PH=Philippines, SF=South Africa, TH=Thailand, and TK=Turkey

Figure 6

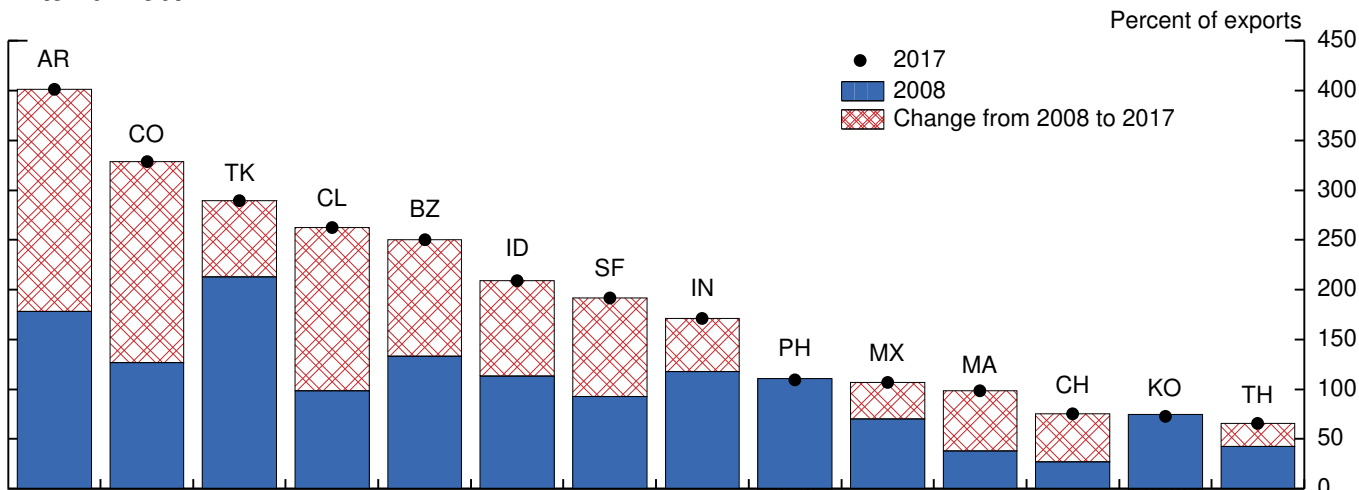
Changes in the EME Vulnerability Index



* Between 1985-2008, EME vulnerabilities declined due to improvements in all components of the index. Since 2008, vulnerabilities have increased, mostly due to increases in gov. debt/GDP, external debt/exports, and private sector credit/GDP run-up.

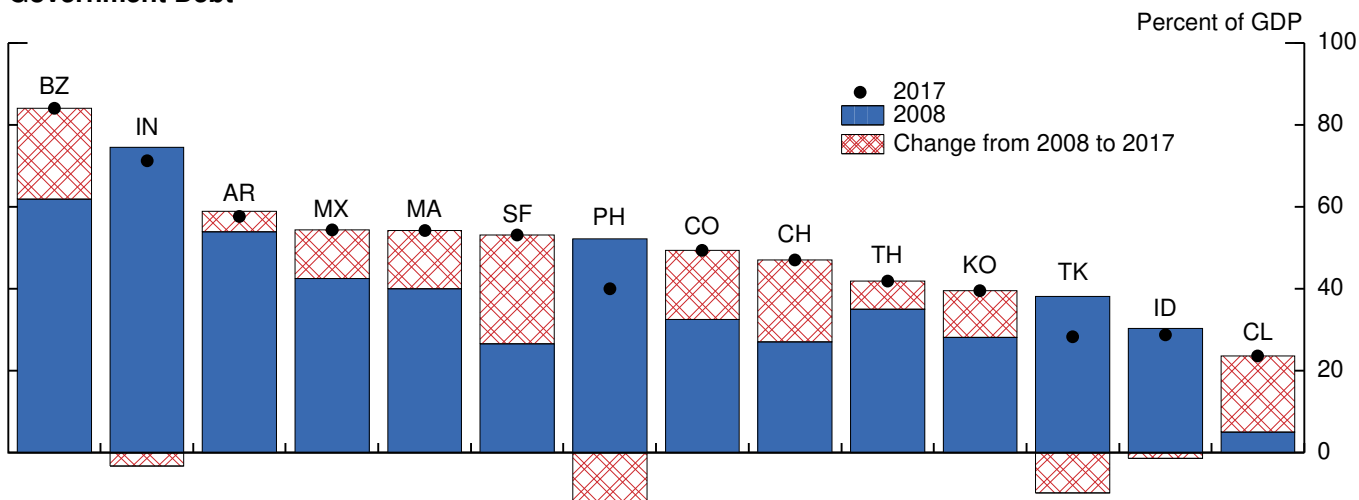
Figure 7

External Debt



Note: AR=Argentina, BZ=Brazil, CH=China, CL=Chile, CO=Colombia, ID=Indonesia, IN=India, KO=Korea, MA=Malaysia, MX=Mexico, PH=Philippines, SF=South Africa, TH=Thailand, and TK=Turkey

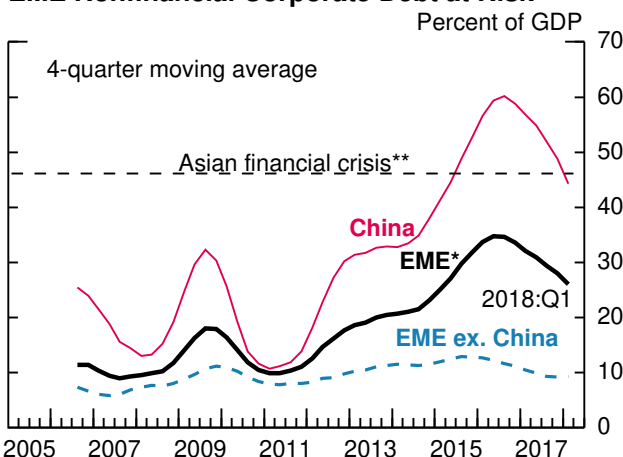
Government Debt



Note: AR=Argentina, BZ=Brazil, CH=China, CL=Chile, CO=Colombia, ID=Indonesia, IN=India, KO=Korea, MA=Malaysia, MX=Mexico, PH=Philippines, SF=South Africa, TH=Thailand, and TK=Turkey

Figure 8

EME Nonfinancial Corporate Debt at Risk



Note: Debt at risk is debt of firms with ratio of earnings before interest, tax, depreciation, and amortization to interest expense less than 2.

* EMEs include Argentina, Brazil, Chile, China (including Hong Kong), Hungary, India, Indonesia, Malaysia, Mexico, Poland, Russia, South Africa, South Korea, Thailand, and Turkey.

** Asian financial crisis is GDP-weighted average of Hong Kong, Singapore, South Korea, and Thailand in 1996.

Sources: Bank for International Settlements; Standard & Poor's Global Market Intelligence (left panel); Moody's Investors Service, Inc. (right panel); Federal Reserve Board staff estimates (both panels).

Global Debt and Corporate Defaults

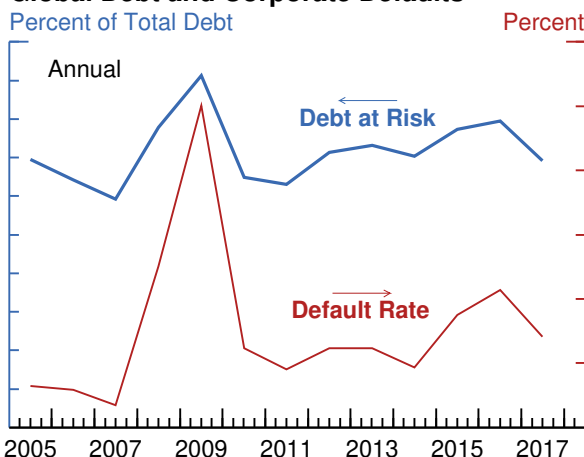
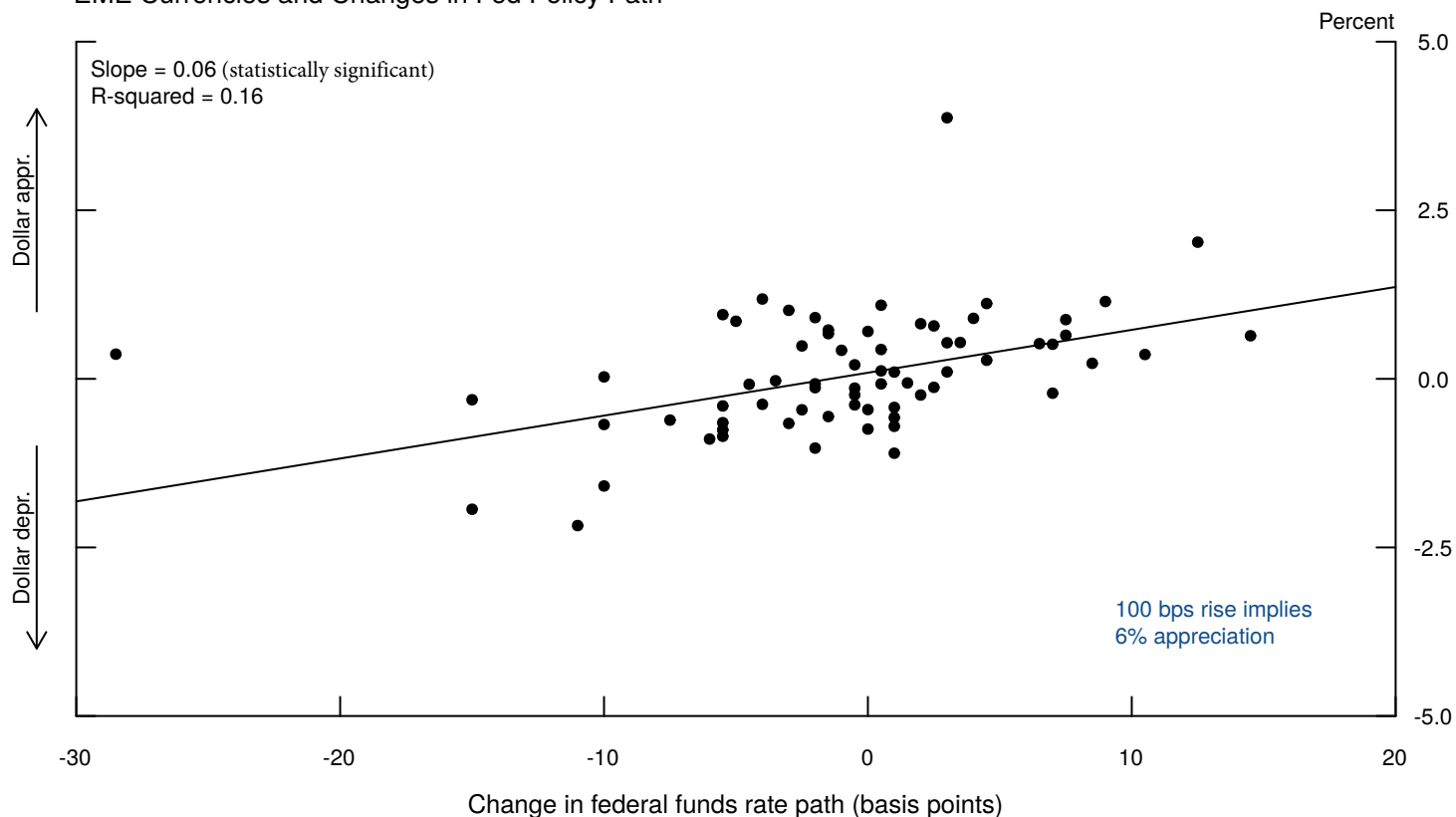


Figure 9

EME Currencies and U.S. Monetary Policy

EME Currencies and Changes in Fed Policy Path

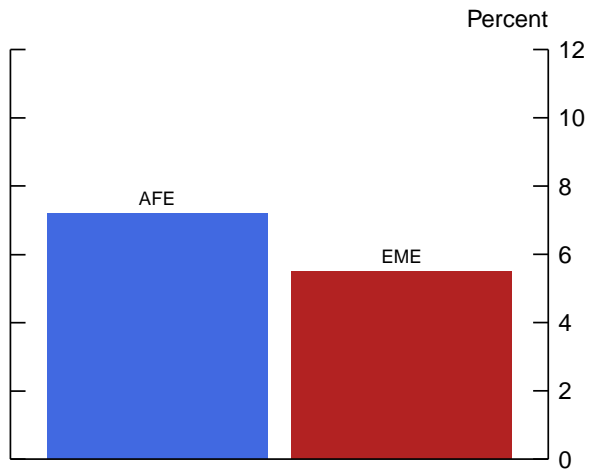


U.S. Policy Expectations for Year-end 2019

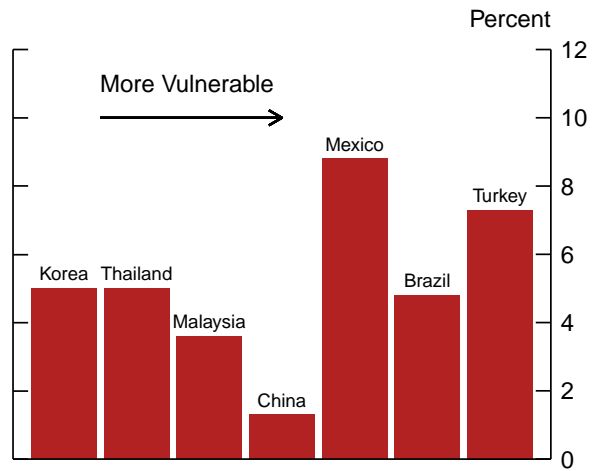


Figure 10
Empirical Estimates of Monetary and Fiscal Spillovers

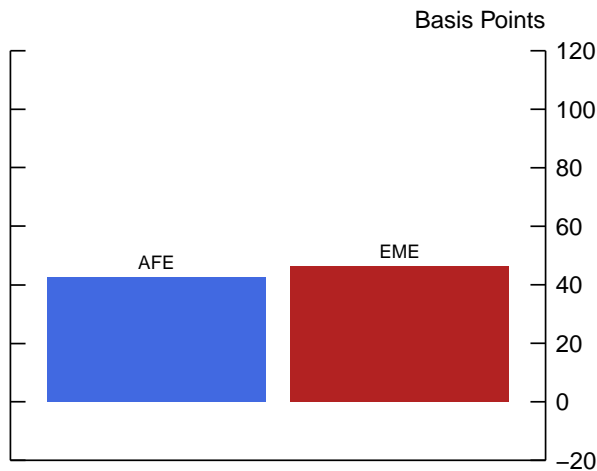
A. Foreign Currencies (Dollar Appreciation)



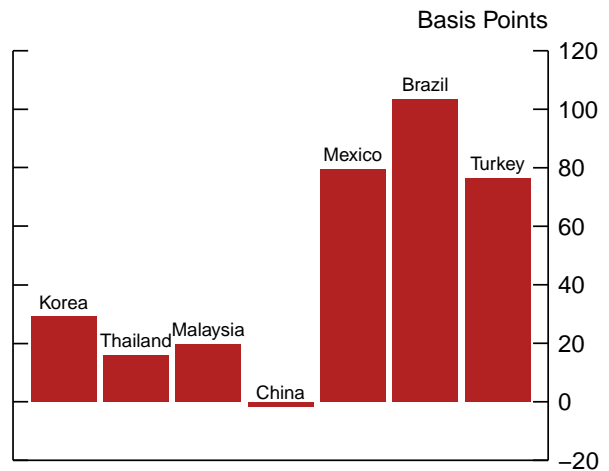
B. EME Currencies (Dollar Appreciation)



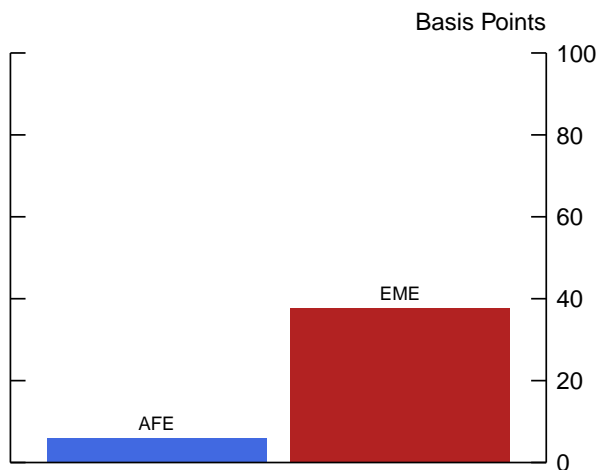
C. Foreign 10-Year Yields



D. EME 10-Year Yields



E. Foreign CDS Spreads



F. EME CDS Spreads

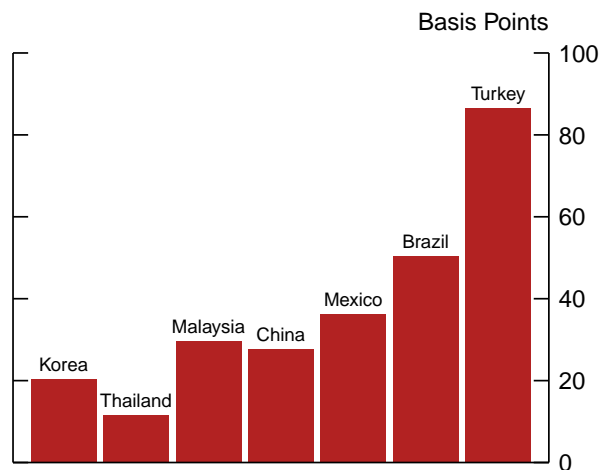
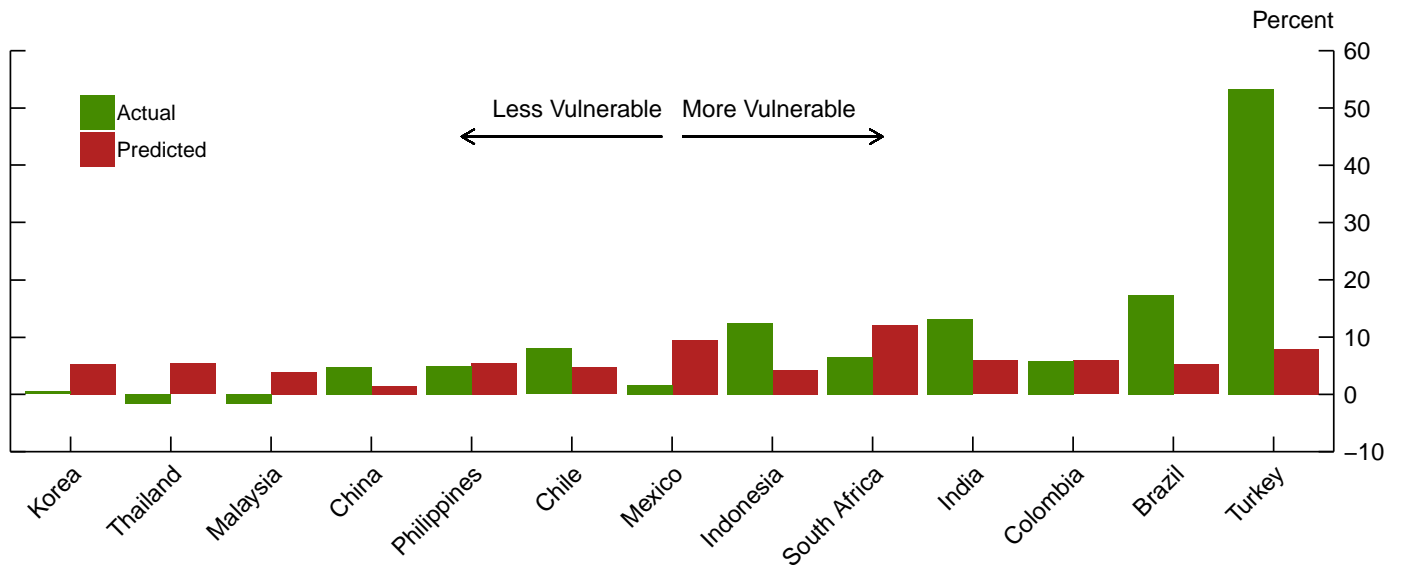
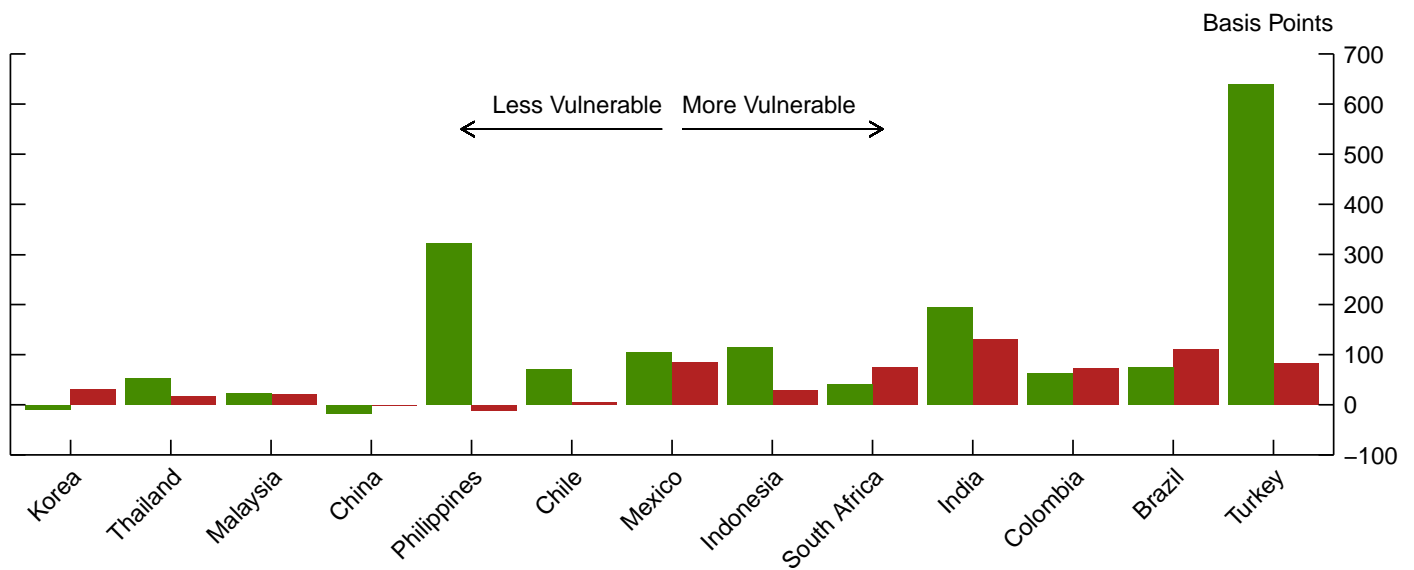


Figure 11
Predicted Effects of Policy Tightening on EMEs

A. Currencies



B. 10-Year Bond Yields



C. 5-Year CDS Spreads

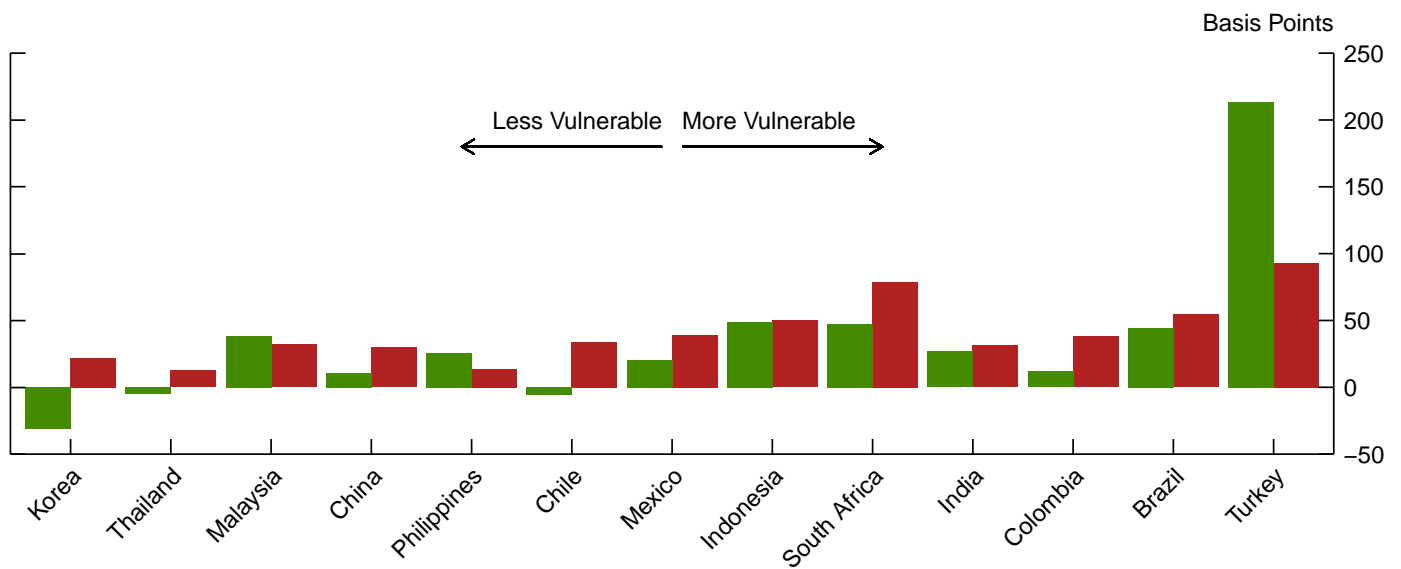
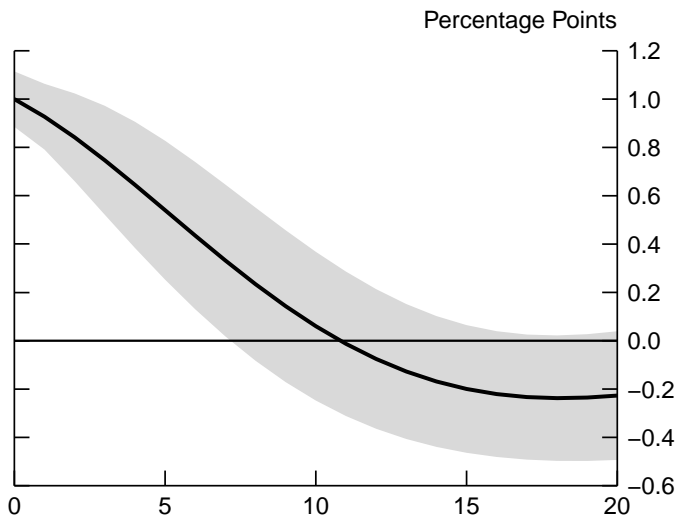


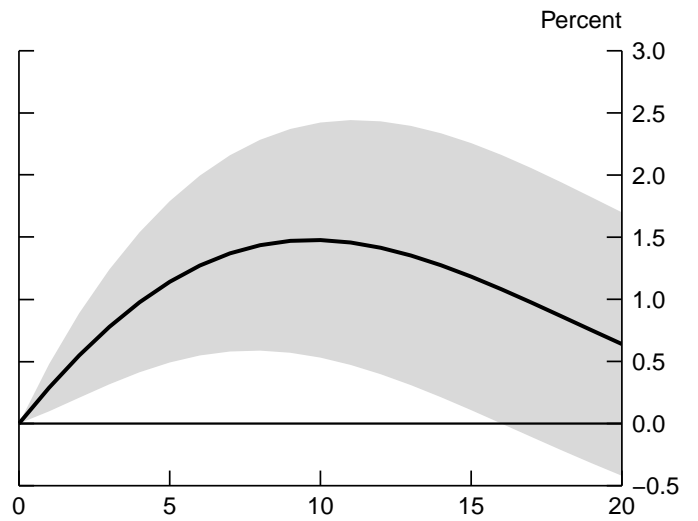
Figure 12

Structural VAR Predictions of the Effects of a 100 Basis Point Rise in Fed Funds Rate

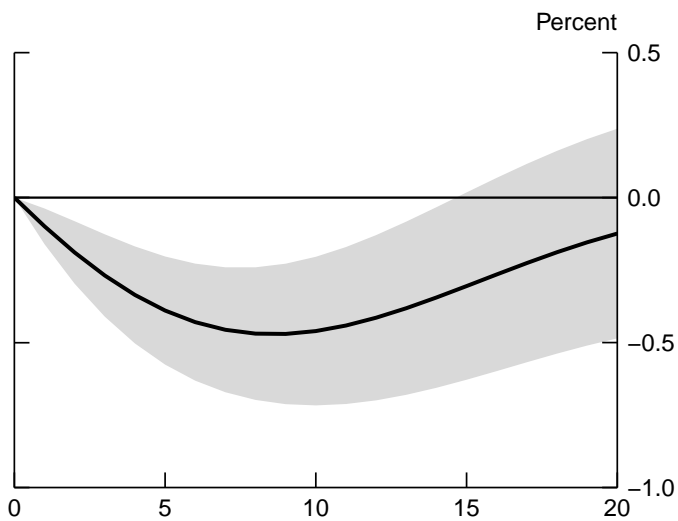
A. Policy Rate



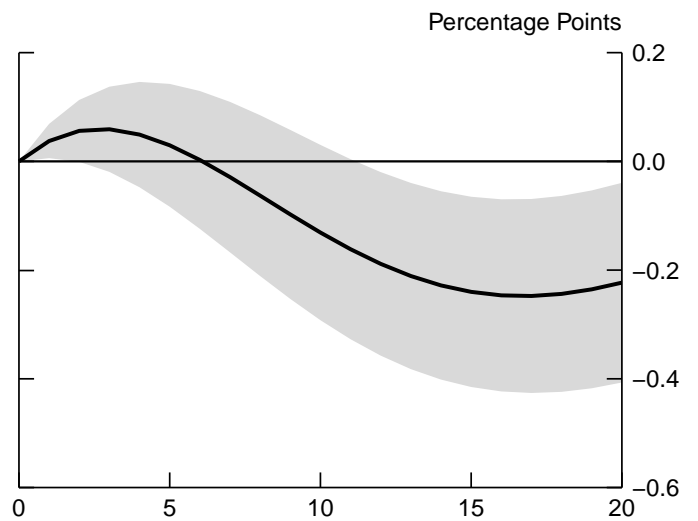
B. Broad Dollar



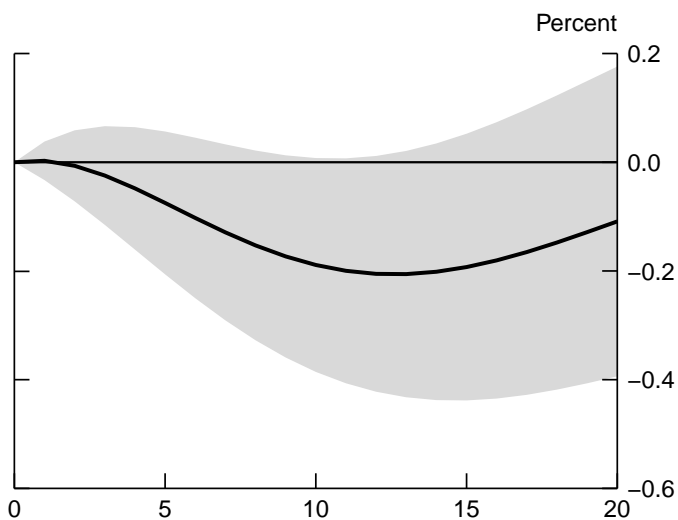
C. U.S. GDP



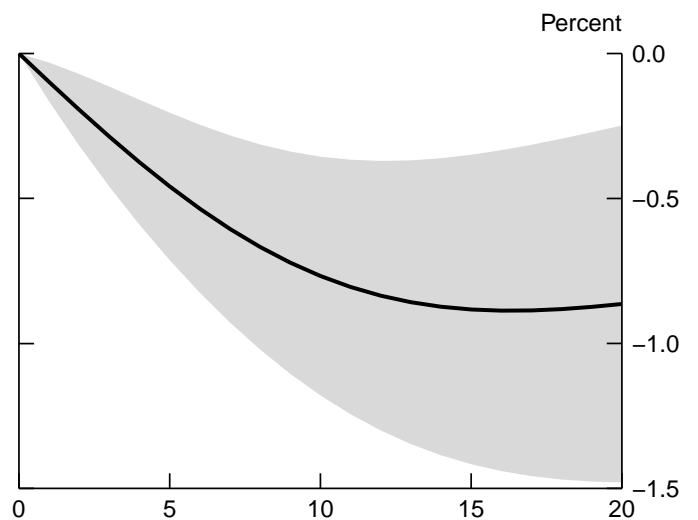
D. U.S. Inflation



E. AFE GDP



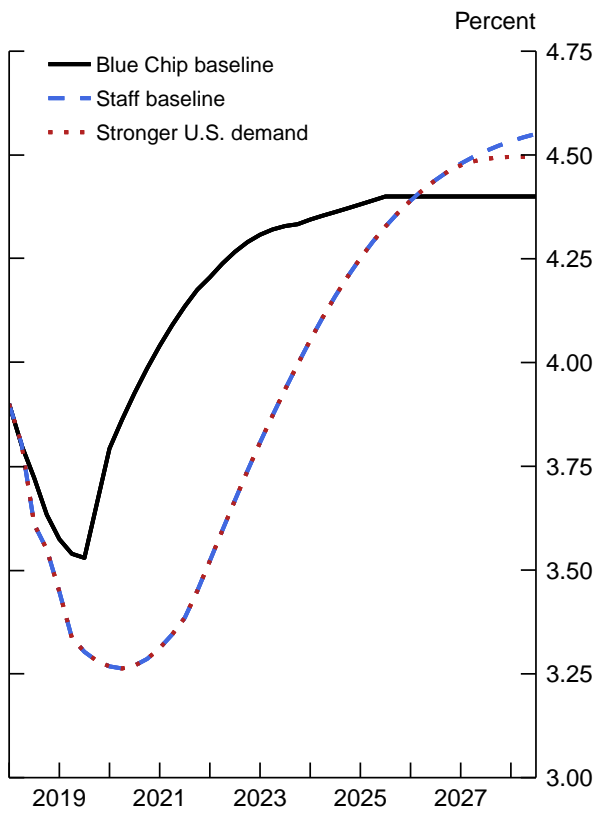
F. EME GDP



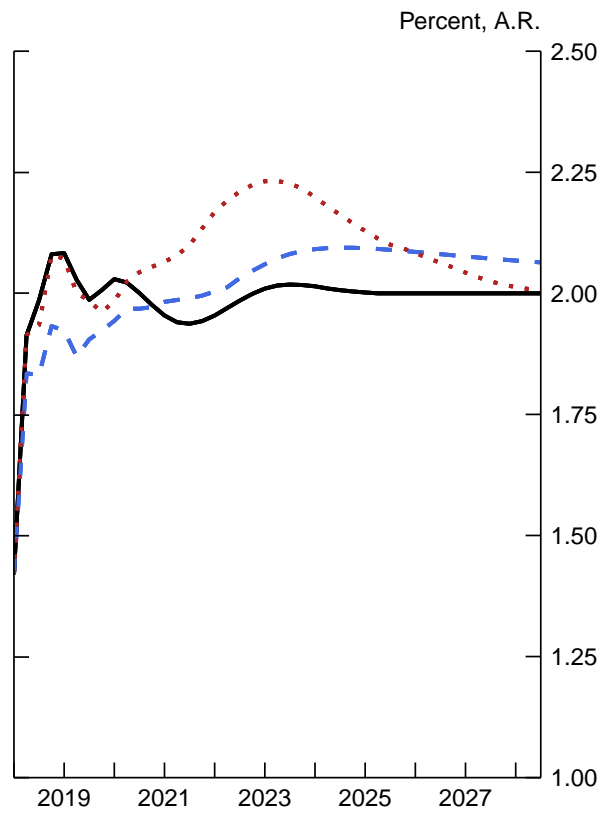
Note: Shaded areas represent 95% confidence bands.

Figure 13
Stronger U.S. Demand Scenario

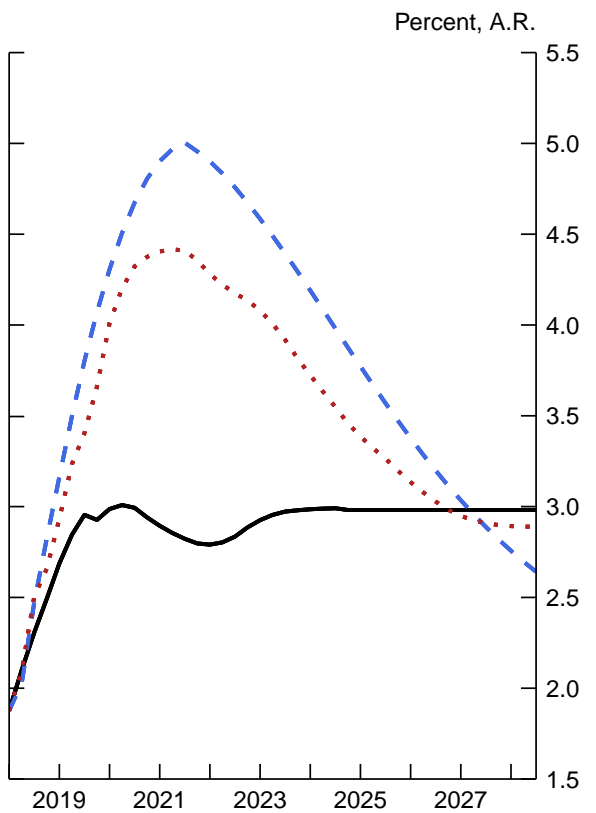
A. U.S. Unemployment



B. U.S. CPI Inflation Rate



C. U.S. Policy Rate



D. Broad Real Dollar

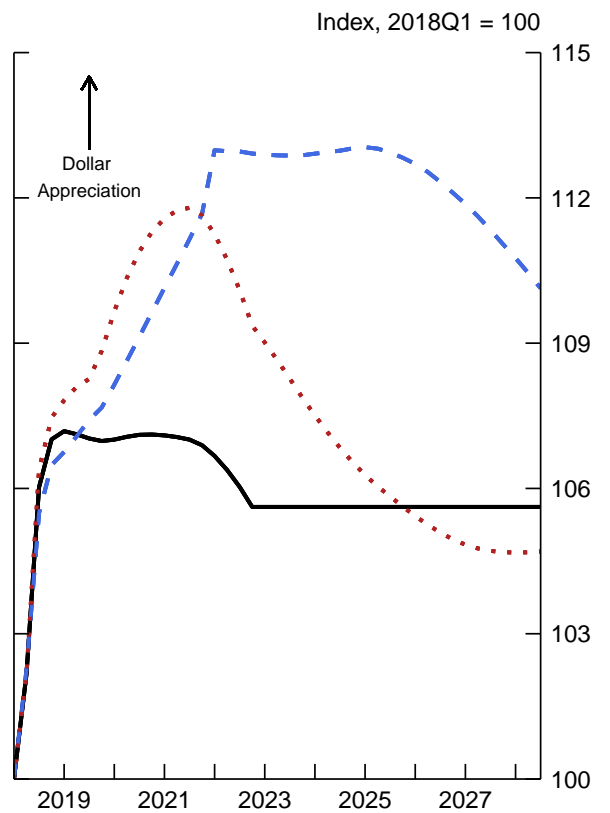
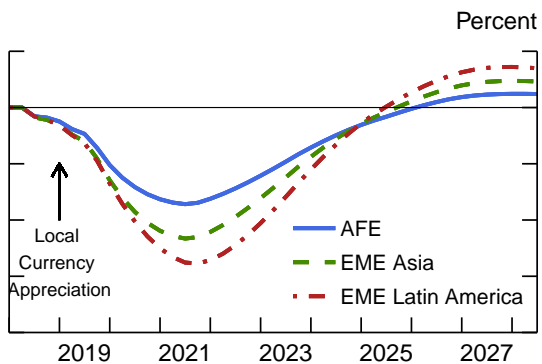
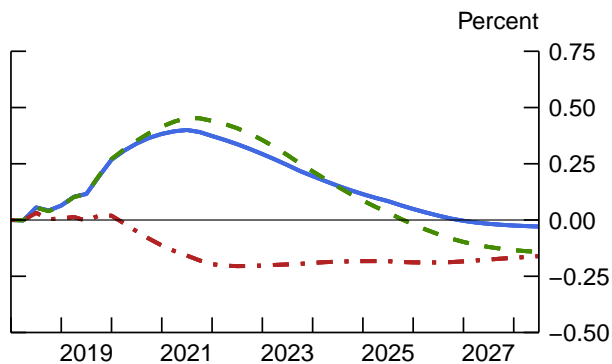


Figure 14
Foreign Economies: Stronger U.S. Demand Scenario
 (deviations from baseline)

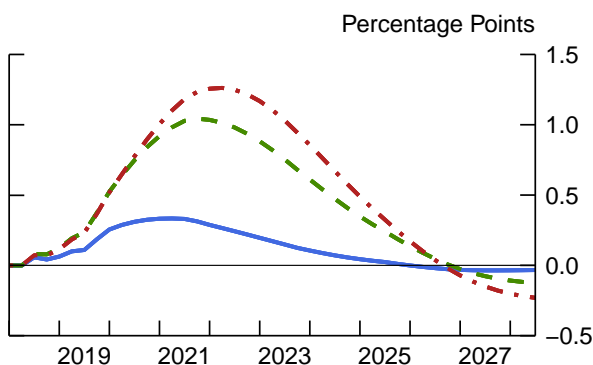
A. Real Exchange Rate (USD per LCU)



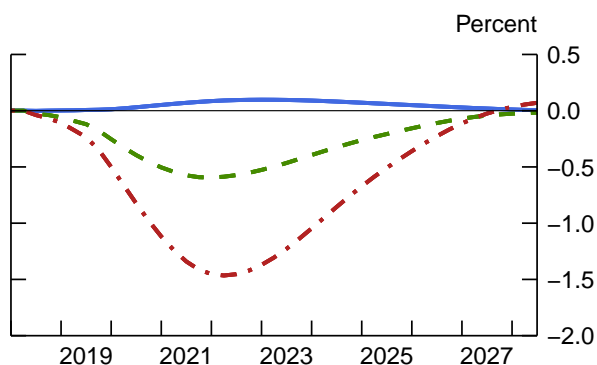
B. Gross Domestic Product



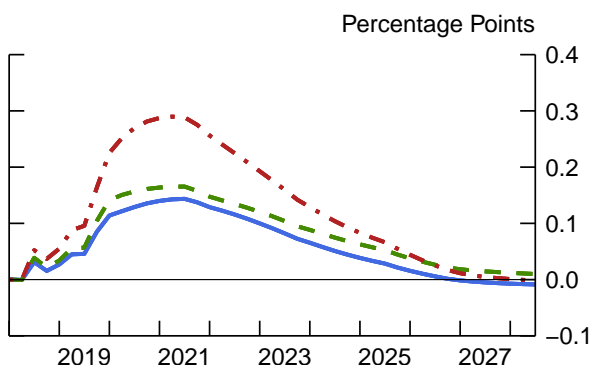
C. Net Exports/GDP



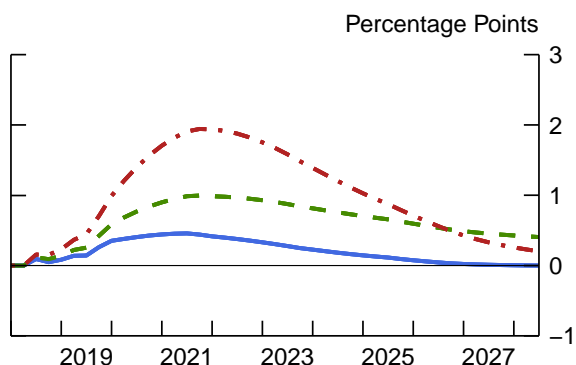
D. Domestic Absorption



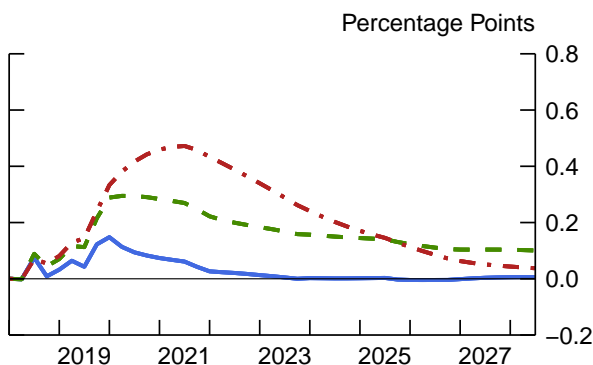
E. Long Term Real Interest Rate



F. Policy Rate



G. CPI Inflation Rate



H. Corporate Bond Spread

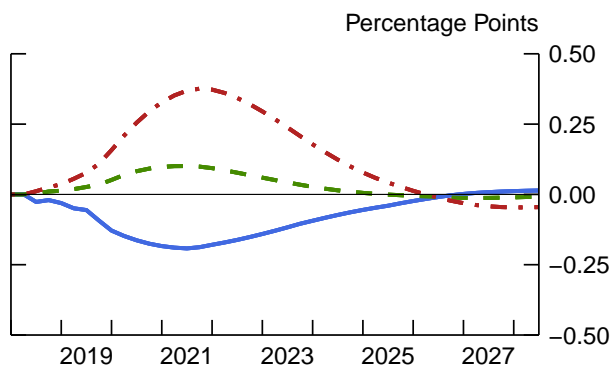
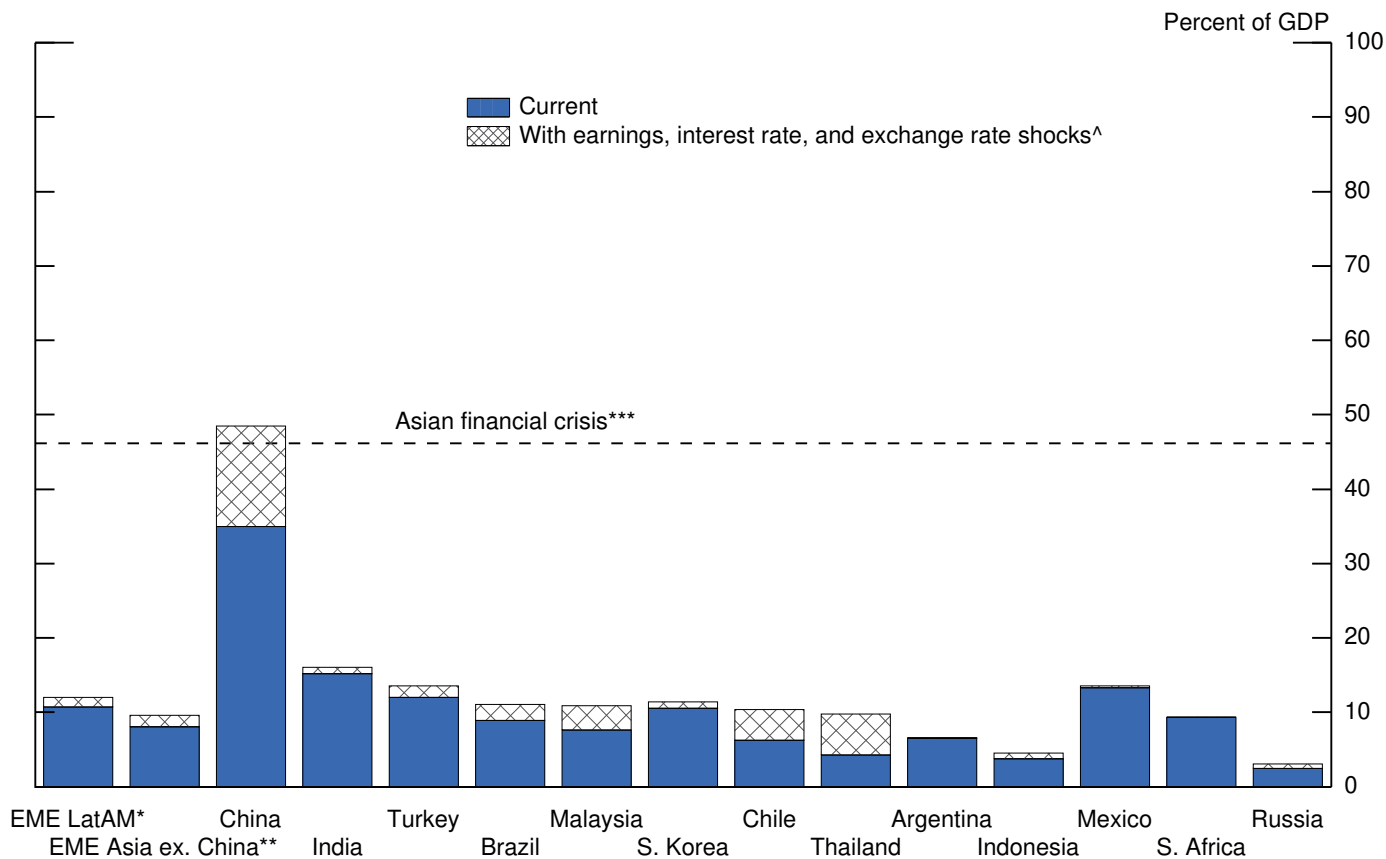


Figure 15
Emerging Market Nonfinancial Corporate Debt at Risk, 2018:Q1



Note: Debt at risk is debt of firms with ratio of earnings before interest, tax, depreciation, and amortization to interest expense less than 2. GDP is gross domestic product.

* EME LatAM includes Argentina, Brazil, Chile, Mexico, and South Africa.

** EME Asia ex China includes India, Turkey, Malaysia, South Korea, Thailand, Indonesia, and Russia.

*** Asian financial crisis is GDP-weighted average of Hong Kong, Singapore, South Korea, and Thailand in 1996.

^ Asia shocks include a 1.08% increase in earnings, 4.57% depreciation of the local currency, and a 84 bps increase in borrowing costs.

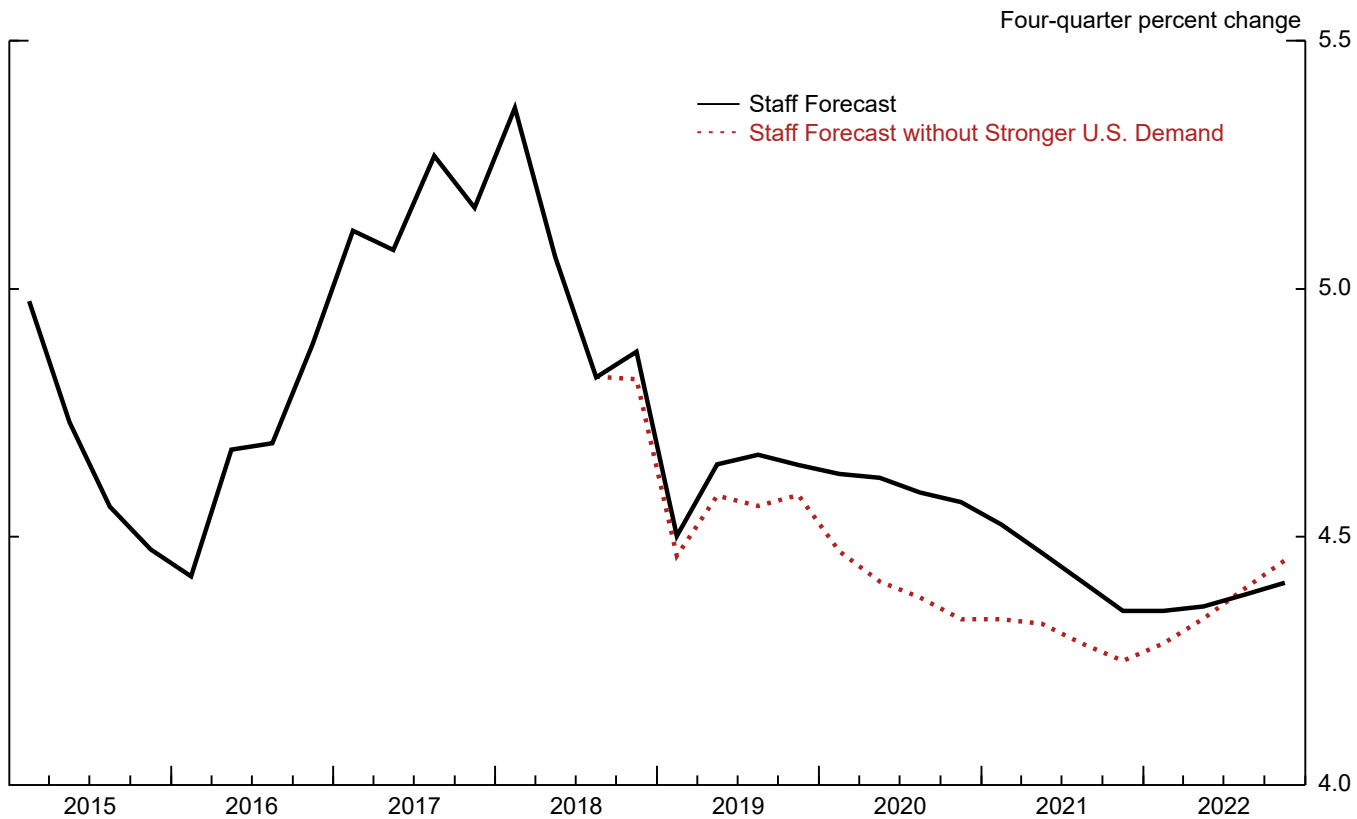
Latin America shocks include a .23% fall in earnings, 5.17% depreciation of the local currency, and a 157 bps increase in borrowing costs.

Source: Ayala, Nedeljkovic, and Saborowski (2015); Bank for International Settlements; Standard & Poor's Global Market Intelligence; Federal Reserve Board staff estimates.

Figure 16
EME GDP: Baseline and Scenarios

10-25-2018

EME Asia



EME Latin America

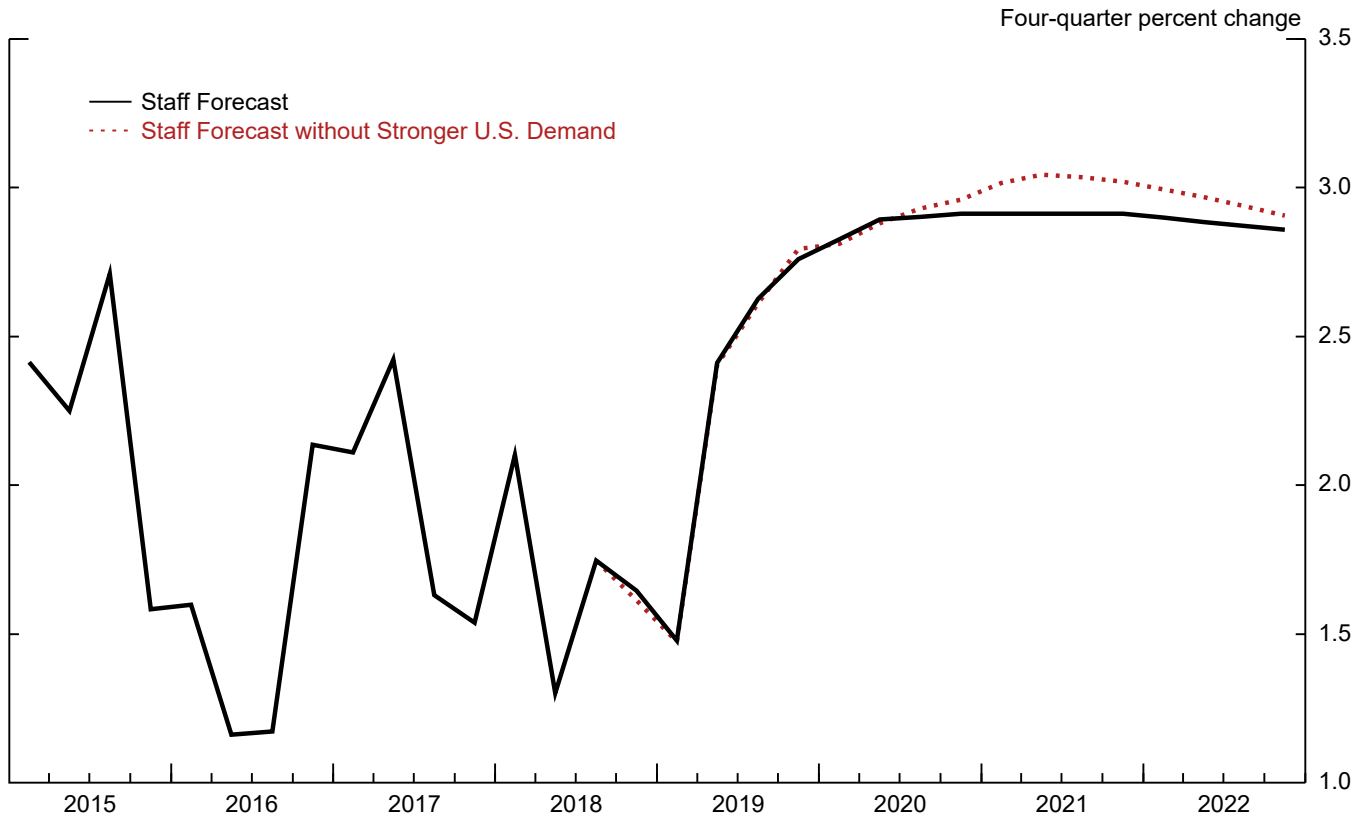
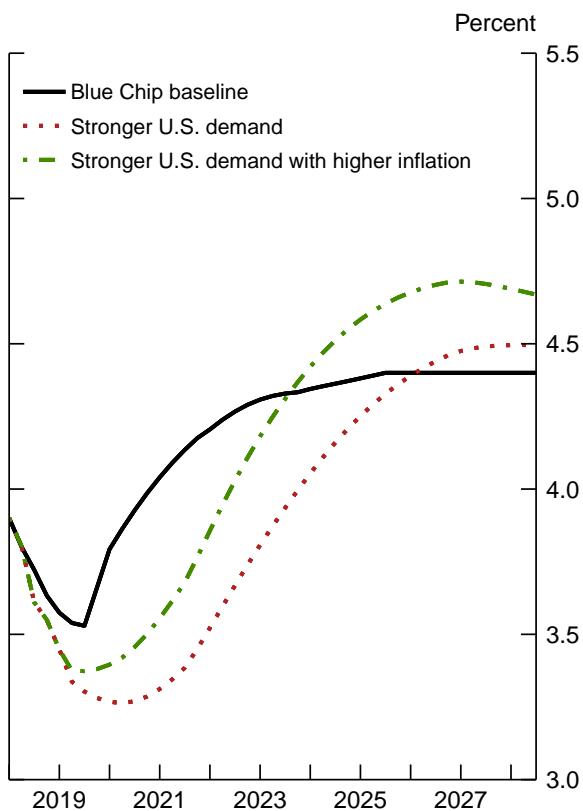
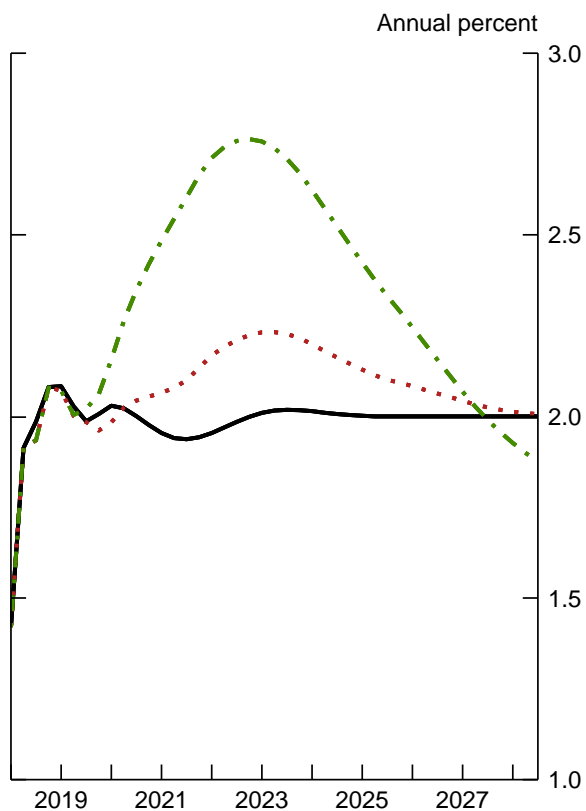


Figure 17
U.S.: Baseline and Scenarios

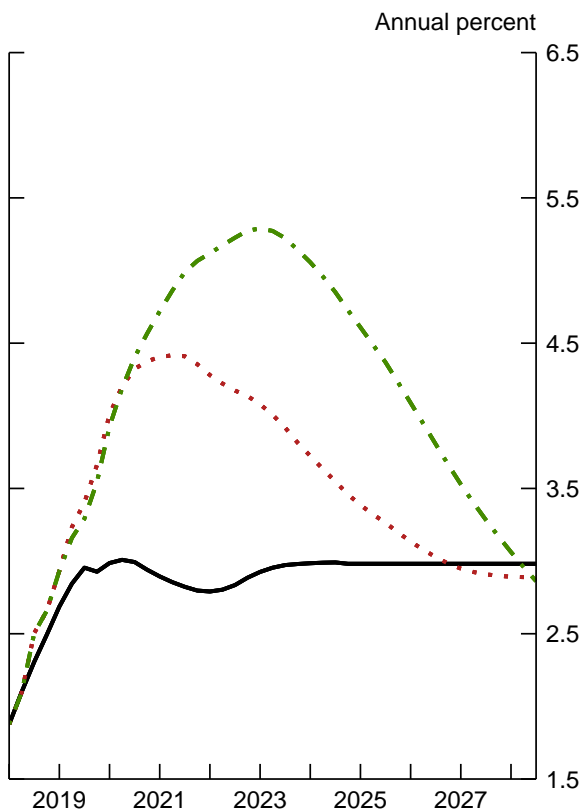
A. U.S. Unemployment



B. U.S. CPI Inflation Rate



C. U.S. Policy Rate



D. Broad Real Dollar

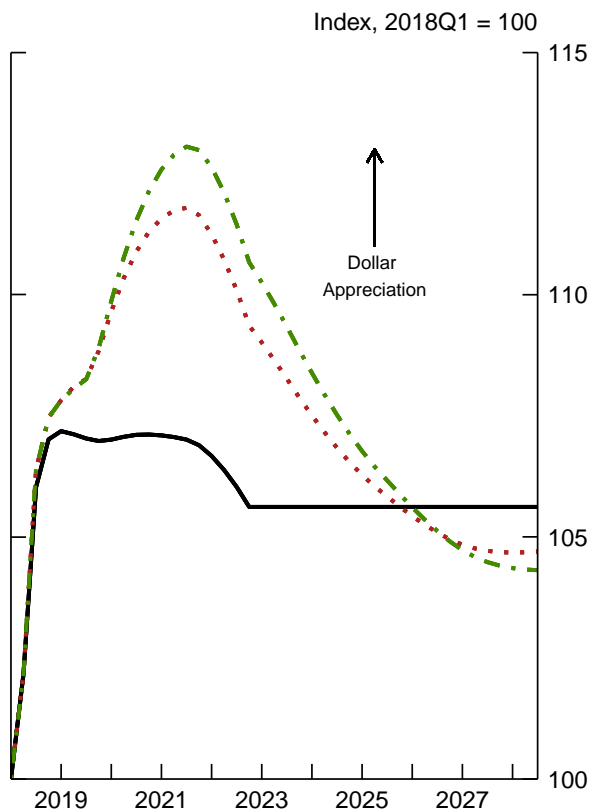
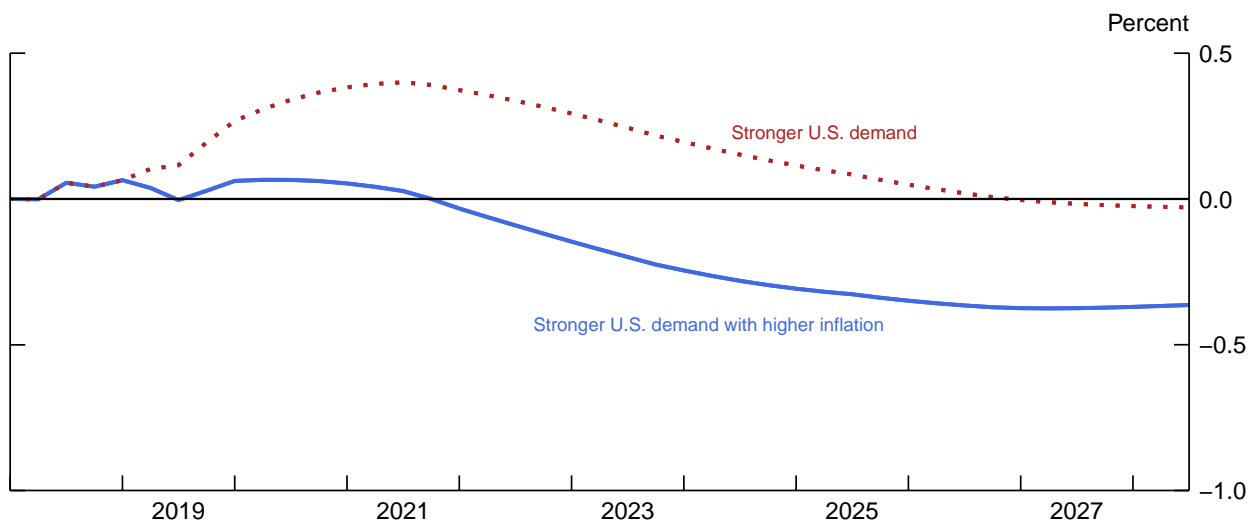
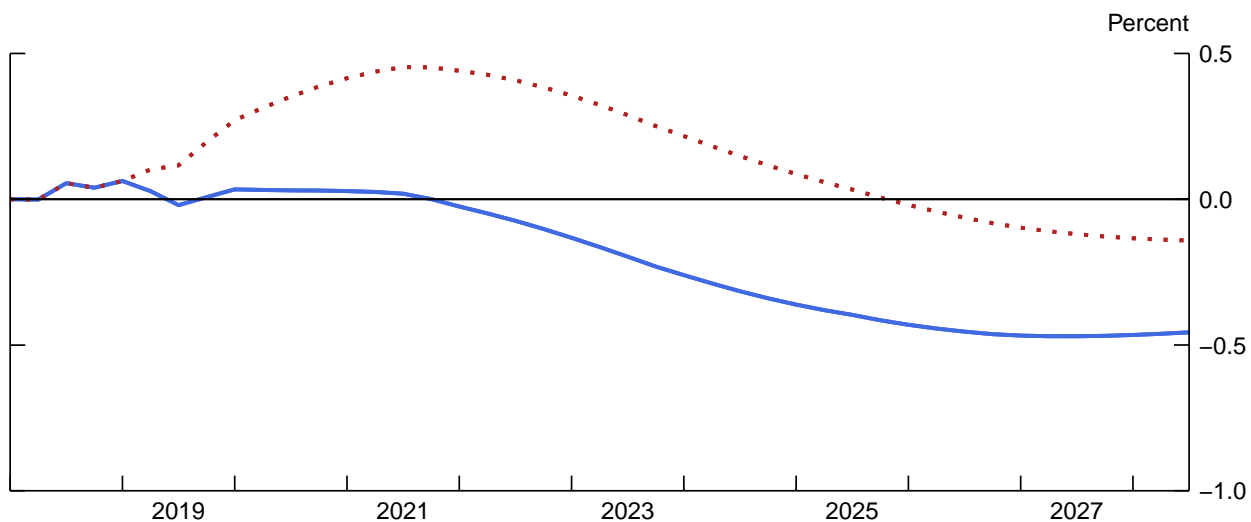


Figure 18
Effects of Stronger U.S. Demand and Higher Inflation on Foreign GDP
(deviations from baseline)

A. AFE GDP



B. EME Asia GDP



C. EME Latin America

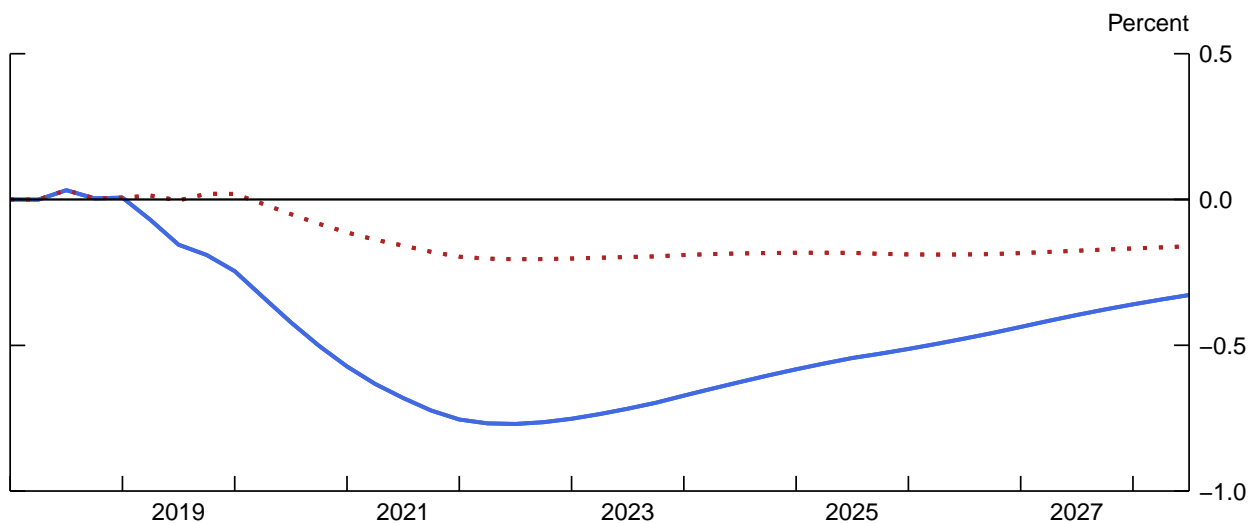
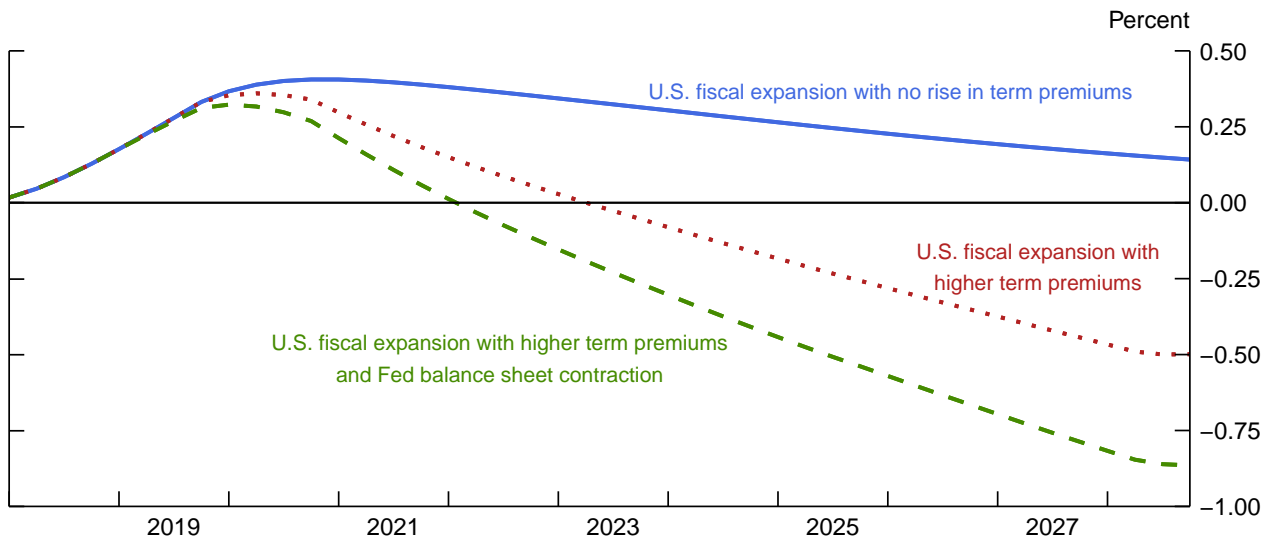
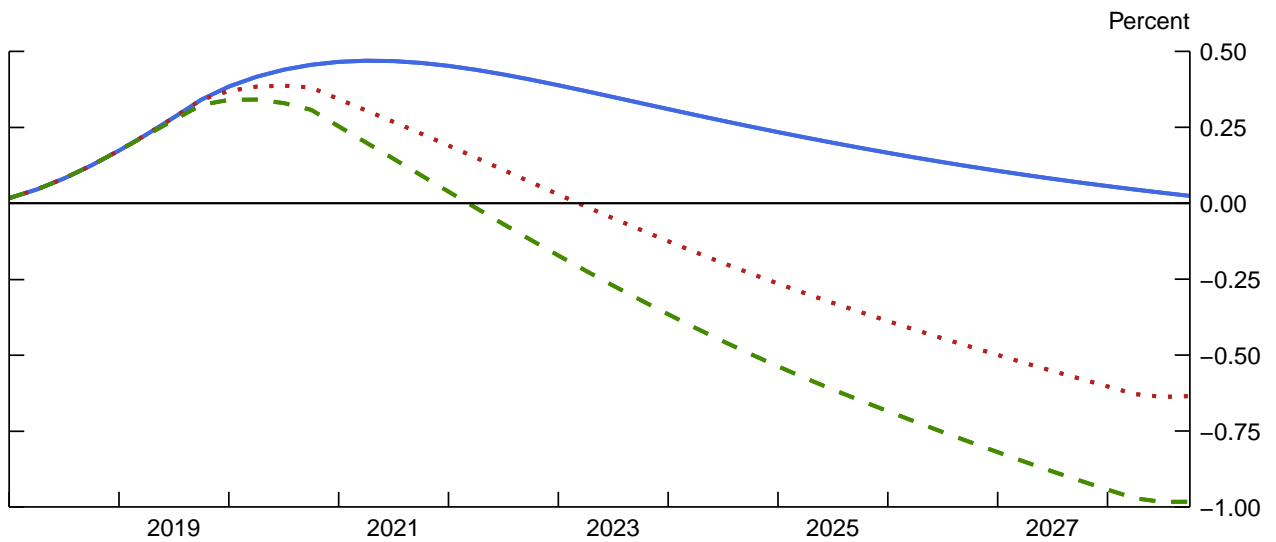


Figure 19
Effects of U.S. Fiscal Expansion on Foreign GDP
(deviations from baseline)

A. AFE GDP



B. EME Asia GDP



C. EME Latin America GDP

