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Federal Reserve Policy in an International Context

Ben S. Bernanke
Brookings Institution

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One of my great satisfactions during my time chairing the Fed was the opportunity to work closely with policymakers from around the world, including many from both developed and developing economies. Cooperation was especially close during the height of the financial crisis, when we scrambled to contain the panic and prevent the collapse of the global economic system, and in the immediate aftermath, when we faced the collective tasks of promoting recovery and reforming international financial regulation. I felt particularly close to other central bankers, who—as is often suggested—form a sort of club, bound together by common policy challenges as well as similar experiences in dealing with finance ministries, legislatures, and the media.

My personal relationships with other policymakers remained solid in the years following the crisis, but, along with economic conditions in our respective countries, our perceived interests began to diverge. In the United States, high unemployment, low inflation, and a slow recovery motivated me and my colleagues at the Fed to take strong policy measures, including holding short-term interest rates near zero for an extended period, providing forward guidance to market participants, and engaging in three rounds of quantitative easing. Of course, I would have preferred a better policy balance involving more fiscal and less monetary stimulus, but as that was not forthcoming I saw the measures we took as necessary and justified.

However, some of my foreign colleagues, especially but not only in emerging markets, were unhappy with the Fed's policy decisions. I heard two related complaints at international meetings and through the media: First, that the United States was engaging in “currency wars”—a phrase used most prominently by Brazilian finance minister Guido Mantega in 2010, following the Fed's introduction of a second round of quantitative easing—by choosing policies that would weaken the dollar and thereby unfairly increase US competitiveness at the expense of

trading partners.¹ Second, that the Fed's policies were creating spillovers—in the form of sharp swings in capital flows, for example—that were buffeting financial markets in emerging-market economies.² Concerns about financial stability spillovers seemed to apply to any significant policy change, including policy tightening as well as easing. In particular, often cited in this regard was the episode of the “taper tantrum” in 2013, when the Fed's intimations that its large-scale asset purchases might soon begin to slow were followed by global market turbulence.

Other industrialized countries were running aggressive monetary policies during this period, of course, but the United States received the bulk of the criticism, presumably because the dollar's dominant role in international finance, trade, and payments enhanced the perceived importance of the Fed's actions. Indeed, a commonly expressed view was that the dollar's status asymmetrically benefits the United States while severely limiting the policy options of its trading partners. Accordingly, in this view, the onus is on the Fed to take into account the effects of its decisions on other countries.

I had, and have, a great deal of sympathy for foreign policymakers trying to deal with the violent economic and financial cross-currents of the past few years. I should note also that criticism of the Fed's policies was far from universal, with many central bankers and others expressing both public and private support. That said, I think that some foreign policymakers were too willing, at least in public pronouncements, to accept the idea that countries other than the United States were the purely passive objects of the effects of Fed policy decisions, with little ability or responsibility to improve their own economic situations or to help make the international system work better. I'll explain today why I think the situation is more symmetric

¹ See Jonathan Wheatley and Peter Graham, “Brazil in ‘Currency War’ Alert,” *Financial Times*, September 27, 2010.

² Raghuram Rajan, governor of the Reserve Bank of India and former chief economist of the IMF, has been an important voice on this issue. See Shefali Anand and Jon Hilsenrath, “India's Central Banker Lobbies Fed,” *Wall Street Journal*, October 13, 2013.

than that, and why both the United States and other countries have important roles to play in achieving the best common outcomes.

The international effects of a given country's monetary (and fiscal) policies are, of course, among the central issues that the Mundell-Fleming model was developed to analyze, and so the international implications of Fed policy are a fitting topic for this lecture. I'll focus my remarks today on three aspects of the recent (and ongoing) controversies. First, I'll take up the question of "currency wars," also known as competitive depreciation. Does monetary easing in advanced economies unfairly reduce the trade competitiveness of other countries, especially developing economies? Did recent Fed policies constitute a currency war? Second, I'll discuss the issue of financial stability spillovers from US monetary policy to other economies, especially emerging markets. What is the evidence for destabilizing spillovers? What are the implications of such spillovers for monetary and regulatory policies in the United States and abroad? Finally, I'll briefly discuss some aspects of the US dollar's dominant role in global trade and finance. What are the costs and benefits of the dollar standard to the world? To the United States? Does the dollar's status effectively make the Fed the world's central bank? Should emerging market economies try to exert more control over the dollarization of their economies?

To foreshadow my conclusions: I don't think that US trading partners have much basis, either theoretical or empirical, to complain about currency wars being waged by the Fed. US growth during the recent recovery has certainly not been driven by exports, and, as I will explain, the "expenditure-augmenting" effects of US monetary policies (adding to global aggregate demand) tend to offset the "expenditure-switching" effects (adding to demand in one country at the expense of others). As I will show in the context of a simple model, concerns about currency wars on the part of emerging-market policymakers appear to be motivated in large part by those

policymakers having separate goals for their own exchange rates, over and above assuring the stability of domestic output and incomes. To the extent that they have additional exchange-rate objectives, foreign policymakers are constrained primarily by the Mundell-Fleming “trilemma”—the impossibility of combining free capital flows, independent monetary policy, and exchange rate targets—not by US policy per se.

Regarding financial stability spillovers: Research has documented the strong co-movement of asset prices, credit growth, and leverage across economies, but only limited progress has been made in determining the degree that this co-movement is in some sense excessive or in documenting the channels through which the putative spillovers operate. Importantly, the existence of financial stability spillovers does not appear to invalidate the basic implication of the Mundell-Fleming trilemma, that exchange-rate flexibility can help insulate domestic output from foreign monetary policies. Given that observation, I argue that monetary and exchange-rate policies should focus on macroeconomic objectives, with the problem of spillovers being tackled by regulatory and macroprudential measures, possibly including targeted capital controls, and through careful sequencing of market reforms. Financial regulation and supervision are areas in which the Fed and other central banks should cooperate (and to an important extent already do) to reduce financial risks, while emerging markets should continue to improve their regulatory frameworks and macroeconomic policies to enhance their financial resilience.

My short review of the dollar standard suggests that its benefits to the United States and to US trading partners are much better balanced than in the Bretton Woods era, the days of America’s “exorbitant privilege.”³ Monopoly rents enjoyed by the United States have been

³ The phrase was coined in 1965 by French finance minister Valéry Giscard d’Estaing to describe the gains to the United States from the central role of the dollar in the Bretton Woods system.

significantly eroded by the existence of competitor currencies and the decline in the global share of the US economy. Moreover, in recent years the United States has generally kept up its end of the bargain as a reserve currency country, for example, through the currency swaps that the Fed instituted with fourteen central banks during the financial crisis. Nevertheless, at some times and places, the private benefits from using the dollar may exceed the public benefits—for example, if currency mismatch or reliance on hot money increases financial stability risks. That divergence suggests a role for policymakers in overseeing dollarized borrowing by emerging-market banks and nonbank corporations.

To reiterate, as an emeritus member of the central banking club, I understand and appreciate the substantial challenges that still face policymakers in both emerging-market and industrialized economies. My goal today is not to win an argument but rather to encourage a more symmetric perspective and, thereby, to make the case for strengthening international cooperation. Needless to say, the views I express are my own and are not necessarily shared by my former colleagues at the Federal Reserve or my current colleagues at the Brookings Institution.

Consultation with foreign policymakers

Before getting to the economics, I'll say a few words about how the Federal Reserve consulted with foreign policymakers during my time as a governor and as chairman. Far from ignoring the concerns of trading partners, Fed officials—together with officials of the Treasury and other US agencies—interacted with counterparts abroad extensively and more or less continuously. Admittedly, consultation is not the same as active coordination of policies. But Fed decisions were certainly informed by what my colleagues and I heard from colleagues around the world.

For central bankers, the meeting place of choice is Basel, Switzerland, at the Bank for International Settlements (BIS). Established in 1930 to manage German reparations, over the years the BIS has successfully repurposed itself as both a provider of services to central banks (investing reserves, for example) and as a clearinghouse for policy-relevant discussions and research. Among the BIS's most important activities are the six meetings each year that it hosts for the governors of its sixty member central banks. Either the Fed chair or the vice chair attends each of these meetings, usually along with the president of the New York Fed and a number of senior Fed staffers from Washington and New York. Indicating the importance the Fed ascribes to these gatherings, the dates of meetings of the Federal Open Market Committee (FOMC), the Fed's monetary policy committee, have always been routinely set so as not to interfere with the leadership's regular participation in the BIS conclaves.⁴

The centerpiece of the bimonthly gatherings in Basel is the Global Economy Meeting (GEM), attended regularly by central bank governors from thirty countries—accounting for four-fifths of global GDP, according to the BIS—as well as “observing” governors from nineteen additional countries, attending on a rotating basis. The GEM is chaired by a senior governor—either Jean-Claude Trichet or Mervyn King during most of my tenure, currently Agustin Carstens of the Bank of Mexico. After a few preliminary items, the first portion of each GEM agenda is always a presentation by the Fed chair or vice chair on the US economic and policy outlook, followed by questions and comments from the attending governors. (Presentations on the outlooks for other major countries and regional groupings follow.) In my experience, the US portion of the meeting sometimes lasted as much as ninety minutes, providing an extended opportunity for the governors of other central banks to hear, question, and respond to the most

⁴ For the BIS's own overview of the meetings, see http://www.bis.org/about/bimonthly_meetings.htm.

senior Fed officials. I always found those discussions to be cordial and professional, but it was understood that no issue was off the table.

Besides the GEM, the bimonthly BIS meetings routinely include a number of smaller sessions, allowing for further discussion of monetary and regulatory issues among various groupings of BIS members. Among these are meetings of the GEM steering committee, also known as the Economic Consultative Committee (ECC). The ECC has eighteen members, including the central bank governors from the major industrial economies and four large emerging-market economies (Brazil, China, India, and Mexico). The New York Fed president also regularly joins ECC meetings. In addition to the more formal gatherings in Basel, ECC members share an elegant private dinner, usually around a circular table on the eighteenth floor of the BIS headquarters. The dinner provides an intimate setting that allows for friendly but frank conversations. A number of cooperative efforts among central banks had their origins at ECC meetings, especially during the crisis.

While meetings in Basel (other than on regulatory topics) usually involved only central bank governors, other international conferences generally included finance ministers as well. Among these were meetings of the Group of Seven (G7) major industrial countries, the Group of Twenty (G20) assemblage of industrial and emerging-market economies, the general meetings of the member countries of the International Monetary Fund (IMF), and others. The venues for these convocations, especially G20 gatherings, were diverse, including during my term Mexico City, Moscow, Sao Paulo, Cape Town, and Melbourne among others. Smaller meetings among senior officials of the United States, Europe, Japan, and (with increasing frequency) China were held on the margins of the larger events. As at Basel, at the top of the agenda of virtually all these meetings was a presentation by the Fed chair or vice chair on US economic and policy

prospects, followed by questions and comments. I remember a (shall we say) lively discussion at the G20 meeting in Gyeongju, South Korea, in October 2010, where I laid out the circumstances under which the Federal Reserve would consider undertaking another round of quantitative easing, a step that we did in fact take a few weeks later. Attending central bankers and finance ministers were given ample opportunity to raise concerns and to ask questions. The Fed ultimately chose to embark on what became known as QE2, for what we believed to be good reasons, but it was not without hearing the perspectives of international colleagues.

Of course, regular international meetings were supplemented by a variety of less formal contacts, including conference calls as well as frequent one-on-one conversations by phone or on the margins of other meetings or events. At general meetings of the IMF membership, for example, I would normally spend most of a day in bilateral conferences with various foreign officials. Other senior Fed officials also regularly attended international meetings and consulted with foreign policymakers, and senior Fed staff maintained close ties to their counterparts abroad as well. The personal relationships established during these frequent contacts and calls proved to be very valuable, especially during the crisis. For example, after many phone calls and a few in-person discussions, in October 2008 we were able to coordinate simultaneous interest-rate cuts among the Fed, the Bank of Canada, the European Central Bank, the Bank of England, the Swiss National Bank, and the Bank of Sweden, with the Bank of Japan expressing strong support.⁵ The Federal Reserve was also able to negotiate currency swap agreements (of which more later) with central banks from fourteen jurisdictions, including four emerging-market countries.⁶ Cooperation on regulatory and supervisory matters was also extensive, including the sharing of intelligence about financial developments. In sum, even as it sought to fulfill its domestic

⁵ The joint statement is here: <http://www.federalreserve.gov/newsevents/press/monetary/20081008a.htm>

⁶ For an overview of the currency swap program, see http://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm

employment and inflation mandates, the Fed was (and remains) fully engaged with economic policymakers around the world.

Monetary policy and currency wars

Let me now turn to some areas of controversy, starting with the issue of so-called currency wars. “Currency wars” is a colorful synonym for the familiar concept of competitive depreciation of exchange rates, with the goal of diverting world demand toward one’s own exports while suppressing imports.⁷ In my discussion here, I will use the term to apply only to currency shifts related to changes in monetary policy (mercantilist trade policies and exchange-rate management through market interventions raise very different issues). As I’ve noted, I will focus first on the effects of monetary policy on trade competitiveness, deferring issues related to financial stability to the next section.

Does the currency depreciation that typically accompanies an easing of monetary policy unfairly disadvantage trading partners? The answer is generally no, for two reasons. First, changes in a country’s monetary stance affect other economies through multiple channels. Notably, although monetary easing usually leads to a weaker currency and thus greater trade competitiveness, it also tends to increase domestic incomes, which in turn raises home demand for foreign goods and services. The net effect of the policy easing on other countries’ trade positions and rates of economic growth consequently depends on the relative magnitudes of the expenditure-augmenting effects of monetary easing (through higher domestic income) and the expenditure-switching effects (through a weaker currency). In the case of the United States, as I

⁷ Competitive depreciation became a contentious issue during the Great Depression (Bernanke, 2013). At the time, some economists argued that the depreciations associated with countries’ abandoning of the gold standard were “beggar-thy-neighbor” policies (Robinson, 1947). Since the seminal work of Eichengreen and Sachs (1985), however, the profession has come to recognize that the primary effect of the collapse of the gold standard was to permit reflationary policies and higher national incomes, which had wide benefits.

will discuss, the available evidence suggests that these two effects of monetary policy largely offset, limiting the overall effect on US trading partners.

Second, even if these effects do not offset, in a world of flexible exchange rates trading partners have the means to compensate for shifts in their international competitiveness through policy adjustments of their own. In particular, as the Mundell-Fleming model teaches us, changes in monetary and fiscal policy can achieve domestic full employment and price stability irrespective of external developments, at least in the medium term.

Indeed, in retrospect, the data do not provide much support for the view that the US engaged in a currency war by implementing QE2 and other monetary measures. By definition, the object of a currency war is to improve the home nation's trade balance at the expense of other countries. Figure 1 shows the contribution of net exports to US real GDP growth for 2006-2014. In 2008-2009, in the context of a collapse of world trade, net exports did in fact cushion the US contraction a bit, as the severity of the downturn in the United States led the country's imports to shrink even more drastically than its exports. However, the increase in US net exports in those years occurred *despite* a sharp rise in the value of the dollar (Figure 2), the result of safe-haven demands from global investors. In contrast, as Figure 1 illustrates, during the era of the Fed's putative currency wars, from 2010 through 2014, the contributions of net exports to US growth were miniscule (and of varying sign). Neither does the behavior of the dollar suggest that a currency war was being prosecuted. Figure 2 shows trade-weighted indexes of the dollar for 2006-2014, including its valuation against both "major currencies" and "other important trading partners" (a reasonable proxy for emerging markets). As can be seen in the figure, the dollar

declined for several quarters after the initiation of QE2 in late 2010, but subsequently recovered. From mid-2011 the dollar was on a mild uptrend, until mid-2014, when it appreciated sharply.⁸

If changes in exchange rates induced by monetary policy shifts do in fact have limited international effects, then why the anxiety about currency wars, particularly in middle-income emerging markets like Brazil and Korea? I suspect that at least part of the explanation is related to the so-called “trilemma,” or impossible trinity, familiar to all students of international economics. As easily demonstrated in a Mundell-Fleming framework, it is generally not possible for a country to simultaneously enjoy (1) a fixed (or managed) exchange rate, (2) an independent monetary policy, and (3) free international capital mobility. Some emerging-market policymakers appear to chafe at this fundamental constraint: They see capital inflows as essential for economic development at home. They want independent monetary policies, which they believe help them to address financial asset mispricing as well as to pursue domestic inflation and growth objectives. But they also have soft (or sometimes not-so-soft) targets for their real exchange rates, in part because the promotion of exports (manufactures in particular) has become a linchpin of the growth strategies of many countries. Emerging-market policymakers therefore tend to resist currency appreciation, for fear of damaging their export sectors.⁹ Because of the trilemma, however, a consequence of avoiding unwanted appreciation may be the necessity of sacrificing other objectives, including monetary policy flexibility or openness to capital inflows. This outcome creates frustrations, but it is not the result of foreign

⁸ The absence of significant gains in the US trade balance or depreciation of the dollar in part reflects countervailing efforts by US trading partners to weaken their own currencies. However, as discussed in the text, the ability of trading partners to offset the effects of US monetary policy on their own economies mitigates potential spillover effects. Moreover, to the extent that US trading partners responded to Fed easing with easing policies of their own, the net effect of the US policy initiatives was to stimulate a global reflation of aggregate demand rather than to set off a competition for export markets. The situation bears some analogy to the 1930s, when the staggered abandonment of the gold standard resulted in a stronger global economy with little net change in trade positions; see footnote 7.

⁹ There are other motivations for “fear of floating” (Calvo and Reinhart, 2002) as well, such as concerns about the dollar liabilities of emerging-market banks and corporates. I return to this issue later.

monetary policies *per se*. Rather, it follows from emerging-market policymakers having more targets than instruments. In the remainder of this section, I introduce and analyze a simple model—very much in the spirit of Mundell-Fleming—to illustrate these issues in more detail.

A simple model of currency wars

The model of the rest of the section shows that, at least in the medium term, the concerns of emerging-market policymakers about US monetary easing are the product of their objectives for exchange rates and exports, separate from the effects of those variables on domestic output and incomes. Given those objectives, the actual or perceived effect of US monetary easing on emerging markets depends on the relative magnitudes of the expenditure-augmenting and expenditure-switching effects of Fed policies. In the short run, emerging-market policymakers will also take into account whether US policies help or hinder their efforts to restore full employment.

For an emerging-market economy, EME for short, let e , i , X , and Y be the exchange rate, the interest rate, real exports, and real output, respectively. I define the exchange rate as dollars per unit of EME currency, so that an increase in e corresponds to an appreciation of the EME currency. Also, for simplicity, I take the current price level and the expected inflation rate both in EME and abroad as given, implying that the exchange rate e and the interest rate i can be taken as representing either real or nominal quantities. Suppressing constant terms, I assume that

$$(1) \quad i = i_{US} + e$$

$$(2) \quad Y = -ai + bX + \epsilon$$

$$(3) \quad X = -ce + fY_{US}$$

where the subscript “US” refers to the corresponding variables for the United States and a, b, c, f are positive constants.

Equation (1) is an interest-rate parity condition. It holds that, with free capital flows, EME's domestic interest rate equals the US interest rate plus a term that reflects the expected depreciation of the EME's currency.¹⁰ Equation (1) captures in a simple way the constraint that, in choosing the exchange rate and domestic interest rate, policymakers in an emerging-market economy have only one degree of freedom, not two. In particular, if US monetary policy eases (i.e., i_{US} falls), then the EME currency must appreciate, its domestic interest rate must fall, or both.

Equation (2) is a standard IS curve, augmented to include the influence of exports X on domestic aggregate demand. It says that demand and output in EME rise when either the domestic interest rate falls or the country's exports increase. The term ϵ represents a shock to EME aggregate demand, such as an unexpected increase in domestic household or business spending. Equation (3), an export demand equation, implies that EME's exports rise if the exchange rate falls (a real depreciation) or if there is an increase in foreign demand (proxied for here by US output).

I assume that EME's policymakers dislike deviations of domestic output from its full-employment level (normalized to zero). Importantly, they also care about exports—over and above the impetus they provide to domestic demand—because a strong export sector is believed to be essential for economic development (or, possibly, because of the political influence of the sector). Specifically, I assume that the loss function of EME's policymakers is quadratic in deviations of output from its full-employment level and linearly declining in exports:

¹⁰ The second term on the right side of equation (1) is the current level of the exchange rate. In general, expected depreciation depends also on the expected future exchange rate. However, we have assumed that the future price level is given. The additional assumption that future output is expected to be at its steady-state level pins down the future real exchange rate at the level consistent with the steady state. These conditions determine the expected future exchange rate, allowing it to be ignored for the purposes of this analysis. Alternatively, if exchange rates have a temporary component, then a “high” current exchange rate implies that depreciation is expected, and vice versa.

$$(4) L = \frac{Y^2}{2} - \theta X$$

where L is the loss to be minimized and θ is a non-negative parameter that reflects the relative importance that EME's policymakers put on export promotion. If $\theta > 0$, this loss function gives EME policymakers a reason to care about the level of the exchange rate independent of its contribution to maintaining stability in domestic output.¹¹

I'll treat EME's exchange rate e as the policy control variable, though expressing policy in terms of the domestic interest rate or some combination of the exchange rate and the interest rate yields identical results (because of the interest-rate parity condition, equation (1)). I assume that US policy sets i_{US} and Y_{US} and that EME takes US policy as given—think of the Fed as a Stackelberg leader. Expressing the loss function (4) in terms of the exchange rate plus exogenous factors yields:

$$(5) L = [-ai_{US} + bfY_{US} - (a + bc)e + \epsilon]^2/2 - \theta(-ce + fY_{US})$$

Loss minimization yields the optimal level of EME output, Y^* :

$$(6) Y^* = \theta c / (a + bc) > 0$$

The optimal exchange rate is the exchange rate e^* that sets output equal to Y^* :

$$(7) e^* = -k_0 - k_1 i_{US} + k_2 Y_{US} + k_3 \epsilon$$

where the k_i are positive constants: $k_0 = \theta c / (a + bc)^2$, $k_1 = a / (a + bc)$, $k_2 = bf / (a + bc)$, $k_3 = 1 / (a + bc)$.

We can take as a baseline the case in which EME policymakers care only about domestic stabilization and not about exports or the exchange rate ($\theta = 0$). In this case, as we can see from equation (6), policymakers act to set output at potential ($Y^* = 0$). The corresponding

¹¹ As alternative formulation, consistent with EME targeting a specific level of the exchange rate, would be to include the square of the exchange rate in the loss function in lieu of exports. With that loss function, EME policymakers would equally dislike policy easing or tightening abroad. In the case analyzed here, they particularly dislike foreign policy easing.

exchange rate is given by equation (7), with $k_0 = 0$. In particular, as in the standard Mundell-Fleming analysis, if the exchange rate is fully flexible then EME policymakers can offset the effect on output of any demand shock, whether of foreign or domestic origin.

Suppose instead, however, that EME policymakers have objectives for exports and the exchange rate over and above the stabilization of domestic output ($\theta > 0$). Then equation (6) implies, interestingly, that EME's policymakers have an incentive to push output above its full-employment level ($Y^* > 0$). They do so by undervaluing the exchange rate, relative to the level consistent with full employment. This incentive arises because, when output is close to full employment in EME, the marginal cost of overheating the domestic economy is small relative to the marginal benefit of stimulating the export sector through a lower exchange rate.¹² Not surprisingly, the smaller the relative weight that EME's policymakers put on export promotion relative to domestic stabilization (that is, the smaller is θ), the smaller the incentive to undervalue the exchange rate and accept economic overheating.

Equation (7) tells us, consistent with the usual presumptions, that either a decrease in foreign interest rates or a rise in foreign output will lead to appreciation of the EME's currency, all else equal. Intuitively, for a given level of the EME exchange rate, an easing of US monetary policy (which lowers the US interest rate and raises US output) will tend to push EME output above its desired level. Currency appreciation by EME offsets this effect by allowing for a larger spread between the domestic interest rate and the US interest rate (equation (1)) and by slowing the pace of exports (equation (3)). Note that, although the EME exchange rate unambiguously appreciates when US monetary policy eases, the EME interest rate can go either up or down (the effects of the decline in the US interest rate and the increase in US output have

¹² A similar incentive arises in the time consistency literature (Barro and Gordon, 1983), except that in that case policymakers have an incentive to try to engineer "surprise" inflation. As in that literature, policymakers' incentives to overheat the economy in the short run presumably would result in an upward inflation bias in the longer term.

opposite signs). In general, the sign of the change in the EME interest rate will be the opposite of the sign of the change in the country's exports (see equation (2)).

Equation (7) shows also that a positive shock to aggregate demand leads to exchange-rate appreciation. In this model at least, the need to use the exchange rate to adjust both to shifts in foreign monetary policy and to changes in domestic aggregate demand poses no problems or conflicts. Interestingly, a positive shock to aggregate demand is bad news for policymakers in this model, since the exchange-rate appreciation needed to offset higher aggregate demand at home also depresses exports.

According to this model, how will EME's policymakers and public feel about a decision by the Federal Reserve to ease monetary policy? If $\theta = 0$, so that EME policymakers have no objectives for exports and the exchange rate beyond achieving full employment domestically, then they will be indifferent to Fed policy, at least in the medium term to which this model applies. (I'll return to shorter-run considerations in a moment.) However, if $\theta > 0$, then EME policymakers will care about the effects of US easing on their exports, even if their economy is at full employment. This result is the basis for my claim that the concerns of EME policymakers about "currency wars" are motivated by their exchange-rate objectives, over and above the implications of exchange rates for domestic stability.

Even if $\theta > 0$, US monetary easing is not necessarily a problem for EME policymakers. In particular, if the positive effects of a stronger US economy on the demand for EME's exports outweigh the depressing impact of the higher EME exchange rate, so that exports rise on net, then EME is made better off by Fed easing.

The troubling case, from EME's point of view, occurs when the income effect of US policy easing on the demand for EME exports is very small, which in turn could reflect either a

weak response of US output to lower US interest rates or a small direct effect of US output on the demand for EME exports ($f \approx 0$). In either case there is minimal offset to the negative effect on EME exports of the stronger exchange rate. Alternatively—and importantly in practice, I think—the direct effects of higher US output on EME’s exports could be *perceived* to be small, even if they are not so in reality, because they become apparent only with a lag or are hard to disentangle from other factors. (In contrast, the effects of US monetary policy on EME’s interest rates and exchange rates are rapid and presumably obvious to the public.) If the income effects of higher US output on EME exports are small, or even if they are only perceived to be small, EME citizens and policymakers will see the Fed’s easing as damaging.

Another case of interest occurs when EME’s exports are very sensitive to the exchange rate (c large). From equation (7), if c is large, EME will not let the exchange rate respond as much to given changes in US output or interest rates. That in turn may require larger movements in the EME interest rate to keep output near its desired level.¹³ Arguably, this case describes the perceptions of EME policymakers in an international environment complicated by the exchange-rate policies of other emerging-market economies, as well as by Fed policy. Suppose EME’s emerging-market competitors maintain fixed (or highly managed) exchange rates. Then, if buyers can switch their orders to suppliers in other emerging markets, the perceived elasticity of EME’s exports to changes in the real value of its currency will be high, and appreciation will accordingly be a costly policy option. My conversations with colleagues abroad persuaded me that concerns about Fed policy in emerging-market countries with some exchange-rate flexibility, like Brazil, Korea, or Mexico, were enhanced by the sense that those countries were

¹³ From equation (1), if the exchange rate moves little, then the domestic interest rate must fall by nearly as much as the US interest rate.

caught between the easing policies of the United States and the strategies of exchange rate management traditionally practiced by competitors like China.

The model considers the time frame in which EME policymakers achieve their output objective and thus might be best thought of as pertaining to the medium run. What about the shorter run, during which output has not yet reached equilibrium? As a rough-and-ready way of capturing that aspect of reality, let's imagine that changes in external conditions (US interest rates and output) occur at the same time as the realization of the domestic shock to aggregate demand, represented by the term ϵ in equation (2). Then, a measure of the total adjustment required by EME is the discrepancy between output Y and the initial equilibrium output Y^* at the current exchange rate:

$$(8) \Delta Y = -a\Delta i_{US} + bf\Delta Y_{US} + \epsilon$$

Equation (8) captures the simple intuition that EME's necessary adjustment will be greater when the influence of US monetary policy on the domestic economy (1) is large and (2) has the same sign as domestic shocks to aggregate demand. So, for example, monetary easing by the United States will be unwelcome in EME if domestic aggregate demand is already strong, because greater adjustment is required to return to full employment, and vice versa. Note that this effect depends not only on the magnitudes and signs of the changes in policy and aggregate demand but also on model coefficients (a , b , and f) that reflect the sensitivity of EME output to external influences. In particular, parameter configurations for which the effects of US policy on EME exports and welfare are strong (because the expenditure-switching and expenditure-augmenting effects do not balance) will also tend to imply greater need for adjustment.¹⁴

¹⁴ The short-run effects on EME output of a change in US monetary policy will depend also on how the two channels of effect manifest over time. One might guess that the expenditure-switching effect will be felt more quickly, because Fed policy changes affect the exchange rate nearly instantaneously. That conclusion is not

To summarize, this simple model illustrates a few basic points:

First, as we already knew, if policymakers in an emerging-market economy (EME) care primarily about output stabilization, then—at least in the Mundell-Fleming world of this model—a flexible exchange rate will largely insulate it from both internal and external shocks in the medium term, including monetary policy actions by other countries. However, if EME’s policymakers care about exports for reasons unrelated to the stabilization of domestic demand (or if, for any other reason, they have a target for the exchange rate), then they will face tradeoffs between stabilizing output and their objectives for exports and the exchange rate. In the model, EME policymakers have an incentive to undervalue the exchange rate to promote exports, even if it results in chronic overheating of the domestic economy.

Second, in the case in which EME policymakers have goals for exports or exchange rates as well as goals for output, then their perceived welfare will depend on choices by monetary policymakers abroad, even in the medium term. This is just an instance of the Mundell-Fleming trilemma: With free capital flows, a country cannot simultaneously target domestic demand and the exchange rate.¹⁵ In particular, if EME policymakers view exchange rate appreciation and any associated decline in exports as costly, even when output is at its full-employment level, then they may be unhappy about monetary easing in the United States, except when the direct effect of a stronger US economy on EME’s exports (the expenditure-augmenting effect) outweighs the drag from a stronger EME currency (the expenditure-switching effect). Even if the direct effects of US output are strong, those effects may be underestimated because of lags or because they are harder to identify than the effects of Fed actions on EME’s exchange rates and interest rates; in

necessarily right, though, because the effects of the exchange rate on exports and aggregate demand themselves take time to appear.

¹⁵ I am assuming that EME fiscal policy cannot be used flexibly for macroeconomic stabilization purposes. If that assumption is wrong, then EME has enough tools to manage both domestic output and its real exchange rate.

this case, EME citizens and policymakers may incorrectly hold the view that Fed easing makes them worse off.

Third, EME policymakers will be particularly aggressive in trying to stabilize the exchange rate in the face of Fed easing when its exports are perceived to be very price-sensitive. One situation in which that might be true is when other emerging markets manage their exchange rates for competitive purposes.

Fourth, in the short run, EME output will be affected by US monetary policy through the usual Keynesian channels, as shifts in the demand for EME exports affect aggregate spending on EME production. This effect will be helpful or not to EME policymakers, depending on whether EME's output gap is of the same sign as that of the United States.

Since the net effects of US monetary policy on the exports, exchange rates, and output of US trading partners depends on the relative importance of the expenditure-augmenting and expenditure-switching effects of policy changes, it would obviously be useful to have estimates of their magnitudes. Although the empirical evidence is limited, the view that the two effects roughly offset appears consistent with the data.¹⁶ For example, recent research at the Federal Reserve (Kamin, 2015; Ammer et al. (forthcoming); Fischer (2015b)) breaks the overall effect of a US monetary easing on foreign output and exports into three components: (1) the expenditure-switching effect operating through the lower dollar exchange rate (we might think of this as the “currency war” channel); (2) the expenditure-augmenting effect arising from higher US output (and, accordingly, higher US demand for foreign goods); and (3) a financial spillover effect, defined as the effect on EME output of any change in EME interest rates induced by the US

¹⁶ These effects are related but not identical to the exchange-rate and foreign output terms in the EME export equation, equation (3). As usually interpreted in the empirical literature, these effects include the endogenous responses of trading partners, whereas the terms in equation (3) are partial-equilibrium effects.

policy action.¹⁷ Broadly speaking, the Fed estimates show that, over a three-year horizon, a US monetary easing that lowers US Treasury yields by 25 basis points and, consequently, causes the dollar to fall 1 percent: (1) increases US net exports by about 0.15 percent of US GDP through the expenditure-switching channel, but (2) reduces US net exports by a nearly commensurate amount through the expenditure-augmenting channel. That is, in the data, the expenditure-switching and expenditure-augmenting effects of a change in US monetary policy essentially offset.¹⁸ As a result, the “currency war” effects of a US monetary easing are small in the medium term, even if we provisionally accept the premise that export promotion by emerging markets is desirable.

In addition, the Fed researchers also find that what they call the financial spillover effect is positive: A monetary easing in the United States results in interest rates falling in other economies as well (and by more in emerging markets), which raises demand and output abroad. Adding the three channels together, the Federal Reserve research implies that the effect of US monetary easing on foreign output is (modestly) positive. This overall result is consistent with the observation that US and foreign GDP growth are positively correlated, and with the findings of much though not all of the literature (see Kamin, 2015, or Ammer et al., forthcoming, for a review). For example, a recent study at the Bank of Japan found that easier US monetary policy had positive effects on growth in Latin American and Asian countries in both the 1990s and 2000s (Fukuda et al., 2013).¹⁹

¹⁷ I thank Steve Kamin and Chris Erceg of the Board of Governors staff for conversations and additional details. Note that the financial spillover effect discussed here is not the same as the financial stability spillovers that are the subject of the next section.

¹⁸ Ammer et al. (forthcoming) note that their results are consistent with the traditional literature on trade elasticities, see for example Hooper et al. (2000).

¹⁹ Interestingly, these authors found the spillover effect to be smaller (though of the same sign) in the 2000’s than in the 1990s.

Overall, I conclude that concerns about currency wars are overblown, at least in reference to the United States. The available evidence suggests that the negative effects of a weaker dollar on the exports of US trading partners are substantially offset by the positive effects of higher US incomes. Moreover, in a world of flexible exchange rates, US trading partners have the policy tools to maintain full employment at home even as relative currency values change. That they sometimes choose not to use those tools fully is the result of their having goals for the exchange rate and exports, over and above the implications of those variables for domestic output and employment. Finally, it is true that changes in US growth rates engendered by Fed policies affect demand and growth in trading partners in the short run. This particular spillover effect will be helpful to trading partners if they are in the same phase of the business cycle as the US, otherwise not. In any case, these effects appear relatively modest in magnitude and tend to wash out in the medium term.

Spillovers from Fed policies to financial stability abroad

Much recent discussion and analysis of the external effects of central bank actions has moved beyond competitiveness and currency war rhetoric to emphasize financial stability concerns. An often-cited example is the so-called “taper tantrum” of 2013. In May and June of that year, in my capacity as Fed chair, I raised in public the possibility that the central bank could begin “later this year” to slow the pace of its asset purchases (initiated in the round of quantitative easing known as QE3).²⁰ I tried to make clear that short-term interest rates would remain low for a long time even after the so-called “tapering” of asset purchases had begun. Our intention, I explained, was to maintain a highly accommodative policy overall, even as asset purchases slowed.

²⁰ See the June 19, 2013, press conference transcript, p. 5:
<http://www.federalreserve.gov/mediacenter/files/FOMCpresconf20130619.pdf>

However, notwithstanding our efforts, markets interpreted the communication by me and others at the Fed as signaling a possibly imminent rise in rates, as well as a slowing of asset purchases. Moreover, some market positions had apparently been put on based on the assumption that quantitative easing would continue indefinitely (“QEternity”), a perception that we had worked hard to end, apparently not successfully. When it dawned that the quantitative easing program was finite, those positions unwound, putting pressure on market liquidity. The market “tantrum” that followed my comments resulted in a general tightening in financial conditions, including a rise in longer-term interest rates, such as mortgage rates. Ultimately, these developments appeared to have little or no effect on the US economy, which grew and created jobs at a solid pace in the latter part of 2013 and in 2014. However, some emerging-market economies were subject to sharp capital outflows and significant market volatility, which led to complaints about US policy.²¹

There can be no doubt that important global financial linkages exist, including between advanced and emerging-market economies. Moreover, the most challenging issue facing central bankers today, I believe, is how best to maintain broad-based financial stability, without sacrificing the flexibility to use monetary policy to pursue macroeconomic objectives. An important aspect of that challenge is the need to achieve better understanding of the links between monetary policy and the buildup of financial risks. It’s not a connection that we understand very well, either in the domestic or international context. Precisely because our knowledge is limited, it’s an area in which considerable intellectual humility—as well as caution in policymaking—seems well-warranted.

²¹ In contrast to the currency war episode, these complaints were about a US policy tightening. Financial stability concerns have been voiced about any shift in US monetary policy, whether towards tightness or ease.

With that caveat, what does the research literature say about financial stability spillovers from monetary policy? In some particularly interesting and influential recent work, H el ene Rey (2013, 2014) has documented what she calls a “global financial cycle,” defined as the tendency for the prices of risky assets around the world, as well as other indicators of risk-taking like credit growth and leverage, to move together.²² For example, using principal components analysis, she and a coauthor found that a single “global factor” explains about a quarter of the variance of the prices of risky assets across countries and regions (Miranda-Agrippino and Rey, 2012). In addition, emerging-market economies in particular are subject to powerful gross capital inflows during “risk-on” periods of low market volatility and low risk premiums, and to corresponding sharp outflows during “risk-off” periods. Correlations among risky assets around the globe are, not surprisingly, particularly high during crisis periods, such as the 1998 Russian debt crisis, the 9/11 terrorist attacks, and the most recent financial crisis in 2008-2009.

Importantly, Rey shows that at least some part of the financial cycle is correlated with monetary conditions in the “center,” that is, in the United States. Specifically, she and others have found that monetary easing by the Federal Reserve tends to be followed by lower volatility and reduced risk-aversion in financial markets, while a US monetary tightening is associated subsequently with higher market volatility and increased risk-aversion.²³ The evidence also appears to suggest that US monetary easing is followed (albeit with a substantial lag) by increases in credit growth and leverage.²⁴ Rey concludes that, contrary to the usual Mundell-

²² See also Miranda-Agrippino and Rey (2015) and Passari and Rey (2015).

²³ It is sometimes asserted that unconventional monetary policies, like asset purchases, have different spillover effects than conventional policies. The literature doesn’t provide much clarity on this proposition. For example, Chen et al. (2014) find that unconventional monetary policy had relatively stronger effects, while Bowman et al. (2014) and Rogers et al. (2014) don’t find a significant difference between the effects of conventional and unconventional monetary policies.

²⁴ The estimated lags are sufficiently long that it may be better to interpret this research as reflecting long-run buildups of financial risk rather than short-run swings in risk appetite. For example, Rey (2013) finds that a decline in the fed funds rate is followed by a rise in gross credit flows and European bank leverage, but only after about

Fleming reasoning, flexible exchange rates do not insulate countries from the financial cycle and the spillovers from Fed policy actions—unless those countries are willing to impose capital controls or otherwise insulate themselves from rapid changes in capital flows (for example, through macroprudential policies).

What is the economic mechanism that generates the global financial cycle? Rey endorses ideas developed by Hyun Song Shin and several coauthors, who have argued that the financial cycle is at least in part the product of the behavior of financial intermediaries such as investment banks (Adrian and Shin, 2014; Bruno and Shin, 2015). In a number of papers, Shin and coauthors have shown empirically that the size of the balance sheets of investment banks and the amount they borrow is procyclical; in particular, during “quiet” periods these intermediaries leverage up and load up on risk (Adrian and Shin, 2014). This behavior raises the demand for risky assets during the boom. When risk and volatility increase, Shin and coauthors find, these institutions respond by shrinking their balance sheets and deleveraging, causing the supply of credit and the demand for risky assets to shrink. If this switch to more risk-averse behavior and lower leverage is sharp enough, failures and financial instability can follow, as risky borrowers who received credit in the boom cannot finance themselves and the highly leveraged positions put on in good times become a downward accelerant (Geanakoplos, 2010).

In their formal modeling, Shin and his coauthors attribute the observed procyclicality in leverage and risk-taking to myopia on the part of both risk managers and the suppliers of funds to intermediaries (Adrian and Shin, 2014; Bruno and Shin, 2013). For example, if investment banks, their funders, and their regulators judge the riskiness of assets by recent experience, as implied by some so-called Value at Risk risk-management methodologies, then they will under-

twelve quarters and fifteen quarters respectively (p. 306). Bruno and Shin (2013) similarly find that a change in the funds rate affects leverage at US broker-dealers in about ten quarters. The models of Shin and coauthors, discussed below, likewise seem to apply most directly to longer-term buildups of risk.

estimate underlying risks during quiet periods and over-estimate them in periods of high volatility. This myopic behavior leads to excessive swings in lending and risk-seeking.

Although various triggers can induce shifts in the risk environment, Shin and coauthors share Rey's view that US monetary policy is often an important factor. When the Fed eases (say), global intermediaries and other investors are reassured about the economic outlook. Consequently, volatility falls and risk appetite increases, leading in turn to higher leverage and rapid expansion of credit. When the Fed eventually tightens, in this story, the process is reversed, possibly violently.

I find this literature very interesting, and it's obviously getting at something important. I'll organize my reactions as three pairs of questions and answers.

What does the existence of a global financial cycle tell us about the importance of financial stability spillovers among countries? The relationship between the global financial cycle and destabilizing financial spillovers is a loose one, at best. Certainly, the fact that risky asset returns are correlated across countries *might* be the result of destabilizing swings in risk appetite, flowing from US monetary policy and other causes. But there are many reasons for financial conditions to be correlated across countries, some of which are more benign. The global economy is affected by a variety of shocks. Some shocks are inherently global in nature, but even a shock originating in one country can have global effects. A recent example is the perceived slowing in Chinese growth in August 2015, which seems to have had largely domestic origins but was seen by investors as having adverse implications for the prospects of countries that export to China as well as countries dependent on the production of globally traded commodities. The existence of global common shocks, or country-specific shocks that are transmitted internationally through trade and commodity markets, naturally implies the existence

of a global “factor” in asset prices—a factor whose importance we would expect to increase over time as the world becomes more integrated, both economically and financially.

It is also not surprising that policy shifts in large countries have global effects, even with flexible exchange rates. In particular, the standard Mundell-Fleming model does *not* imply that, with flexible exchange rates, emerging-market policymakers can insulate their financial markets from policy in the center—only that, by adjusting their exchange rate and interest rate, they can insulate domestic output from internal and external shocks. In the model of the previous section, for example, monetary policy decisions in the US affect EME’s interest rate and exchange rate even if EME policymakers have no separate goal for exports and choose only to stabilize domestic output. In general, strong financial correlations across countries are entirely compatible with the standard Mundell-Fleming model.

More subtly, financial integration itself can increase measured linkages in risk-taking and asset prices across countries, for example, by enhancing risk-sharing opportunities. Indeed, if financial markets are internationally integrated, even real shocks confined entirely to one country would have global financial effects, as investors rebalance portfolios and hedge the new configuration of risks. To illustrate this last point, I’ll provide another stylized example (verbally, to avoid yet more notation, but it could be elaborated). Readers who are already convinced of the point are welcome to skip ahead four paragraphs.

Imagine two countries—again, call them US and EME—whose economies are initially independent and autarkic, with no common fundamental shocks and no trade. Each country has domestic investment opportunities, which can be implemented by sacrificing part of households’ current endowments of consumption goods. Think of households in both countries as being endowed with apples (US apples are identical to EME apples) that can either be eaten or

converted into local apple trees at increasing marginal cost. At a future time, apple trees in each country mature, produce a random number of apples, then die. All trees in each country produce the same number of apples on maturity (trees in a given country experience the same weather), but the number of apples produced by EME trees is uncorrelated with the number produced by US trees (the weather in the two countries is different and unrelated). EME trees produce more apples in expectation but with higher variance than US trees. In autarky, the price of trees and the number of trees planted in each country are determined by local households' time preference and risk aversion, and by the curvature of the tree production function, in the manner familiar to all first-year economics graduate students.

Now suppose we allow US households to buy EME trees, in addition to US trees. (For simplicity, we don't allow EME households to invest abroad.) In this stylized model, foreign investment consists of US households shipping some of their endowments of apples to EME in the current period, in exchange for titles to trees and the corresponding rights to apples in the future. As a result, the US runs a trade surplus and a capital account deficit in the current period, and a corresponding trade deficit and capital account surplus in the future. (Note that, in this simple model, trade results entirely from consumption-smoothing motivations. With only one good, considerations of comparative advantage are irrelevant and the real exchange rate is fixed at one.) Let's assume the net demand for EME trees by US investors is positive. The (international) price and quantity of EME trees are now determined by the condition that the total demand for those trees by US and EME households equals their supply. Relative to autarky, more EME trees are produced and the price is higher, implying that the financial rate of return to owning EME trees is lower.

From this initial equilibrium with positive international capital flows, let's assume now that the riskiness of US trees exogenously rises, with no change in the riskiness of EME trees or in any other feature of either economy. (Monetary policy would not have much purchase in this economy, but in a more realistic example the increase in riskiness might be linked to a Fed tightening, as in the Rey-Shin literature.) In general, the change in the riskiness of one of the two types of assets they hold will lead US investors to re-optimize. We can't make general predictions, but for the sake of illustration let's assume that, at the initial equilibrium, US investors are on the margin very averse to risk. In that case, to offset some of the exogenous increase in the risk of their portfolios, they will respond by reducing their holdings of EME assets in favor of US assets (a "risk-off" shift). In the comparative statics, the price and production of EME trees will both fall, while more US trees are produced at a higher price. We can interpret the new equilibrium as reflecting a capital outflow from EME (because US households buy fewer EME trees), an increase in the rate of return to EME assets (because their price has fallen), and a lower return to US assets (whose price has risen).

To sum up, in the previous few paragraphs I have outlined a simple textbook model in which 1) the economies of two countries, US and EME, face no common shocks and would be entirely isolated in the absence of international financial flows; 2) international investors/households are rational with stable preferences; 3) there are no transactions costs, agency problems, or other market frictions; and, in a completely "real" economy, 4) exchange rates are irrelevant. We have considered a shock (an increase in riskiness of US assets) that, in a state of autarky with no financial integration, would have no effect on EME's economy or financial assets. Even so, in this example, under the assumption of international financial integration, a hypothetical principal components analysis would show that a "global factor"

explains *all* of the variation in the returns to risky assets, risk premiums, and capital flows in both countries. Moreover, this global factor is determined entirely by changing risk levels in the US. These conclusions illustrate that the finding of a “global financial cycle” does not itself tell us much about the importance of disruptive spillovers, as opposed to the normal and desired functioning of financial markets.

To be clear, I am not claiming that financial stability spillovers are unimportant, only that the finding of a global financial cycle does not itself tell us much about their empirical relevance. Nor am I claiming that financial markets work perfectly or even particularly well. As we saw during the taper tantrum, even developed-economy markets can suffer from low liquidity, speculative overshoots, and other misfires. Presumably problems of inadequate liquidity and stressed market functioning generally are greater in emerging markets, where markets are less deep and the overall frameworks of trading and regulation are less developed. But volatility in markets is not necessarily in itself a concern for policymakers, unless it is sufficiently severe as to create broader systemic risks

Do financial stability spillovers invalidate the Mundell-Fleming trilemma? In particular, does it matter whether emerging markets maintain fixed or flexible exchange rates?

The answers to these questions depend on how one conceptualizes these spillovers. A modeling approach that seems consistent with the interpretations by Rey and others, as well as with informal accounts, holds that the financial spillovers of monetary policy operate through variations in risk and liquidity premiums. In the context of the model of the previous section, suppose we replace the interest-rate parity condition, equation (1), with

$$(1') \quad i = i_{US} + e + \delta$$

where δ is a time-varying risk premium, exogenous to EME policymakers.²⁵ Equation (1) captures the idea that there will be “risk-off” periods (δ high) when the cost of credit for EME borrowers is high relative to what borrowers in developed economies must pay.²⁶ It also captures arguments that monetary policy works in part through the “credit channel,” by varying the “external finance premium,” or through the so-called risk-taking channel of monetary policy.²⁷

Formally, the model with equation (1') in place of (1) is identical to the original model, except that i_{US} is everywhere replaced by $i_{US} + \delta$. Accordingly, all the prior results still hold. In particular, the Mundell-Fleming trilemma remains valid with this modification. As before, EME policymakers can insulate domestic output from external policy shocks if and only if they have no separate goals for the exchange rate, that is, if the exchange rate is allowed to respond flexibly to economic and financial conditions. Allowing the risk premium to have additional effects on the EME economy, for example, by directly shifting the EME IS curve, would not change this conclusion.

Again, the finding that, with flexible exchange rates, EME policymakers can insulate domestic output from foreign monetary policy does *not* mean that all aspects of the economy can be insulated, either in the standard model or in this variant. For example, in the standard case, with no risk premium, the changes in the exchange rate and the interest rate needed to keep output at target will affect exports and other components of aggregate demand (i.e., changes to foreign monetary policy are not completely neutral). Similarly, in the model variant which

²⁵ I am indebted to Pierre-Olivier Gourinchas for suggesting this formulation and for several of the points made here.

²⁶ If i is interpreted as a shadow price of credit, rather than as the market interest rate, equation (1') might also reflect variation in credit terms or credit availability.

²⁷ The literature on the “risk-taking channel” of monetary policy find that monetary policy actions works in part by affecting investors’ risk preferences, although I am not aware of much theoretical analysis of the channel (Bruno and Shin, 2015). There is some connection to the financial accelerator/credit channel to which I contributed many years ago. See for example, Bernanke, Gertler, and Gilchrist (1999). In that framework, cuts in interest rates increase the net worth of borrowers and thus make them more creditworthy.

allows a positive and time-varying risk premium, changes in foreign monetary policy may affect risk-taking, credit growth, and similar variables in EME, possibly increasing financial stability risks over time. Is that a violation of the trilemma? I would argue no. The analogy to the standard case is exact: Even with positive risk premiums, if EME policymakers want to stabilize domestic output, they are able to do so, as the model shows.

Perhaps this is all just semantics, but it seems to me that real policy issues are at stake: Importantly, we have seen that the basic message of the Mundell-Fleming trilemma, that a flexible exchange rate provides an important extra degree of freedom for policymakers, still holds when monetary policy works through the propensity for risk-taking or other non-standard channels. In particular, a country that manages its exchange rate to meet export objectives (for example) will have less ability to insulate itself from foreign policy changes than a country that does not have a separate exchange-rate goal. By the same token, the use of monetary policy instruments to address financial stability concerns entails a very similar tradeoff to that faced by a country with export goals. If monetary and exchange-rate policy are dedicated, in whole or part, to financial stability objectives, then the ability of EME policymakers to stabilize domestic output in the medium term is compromised. These sorts of tradeoffs are the essence of the trilemma.²⁸

In short, one might get the (mistaken) impression from this literature and associated policy discussions that, because of financial stability spillovers, the exchange-rate regime “doesn’t matter,” or EME policymakers have no way to offset the direct economic effects of

²⁸ It is true that changes in the risk premium δ may affect broad financial conditions (e.g., leverage and risk-taking) in US trading partners and thus pose policy challenges in the longer run. But the existence of a time-varying risk premium, or of a risk-taking channel of US monetary policy, is neither necessary nor sufficient for that conclusion to hold. It’s not necessary, in that (at least according to some observers) the level of the nominal interest rate itself may affect leverage and risk-taking, even if risk premiums don’t vary. It’s not sufficient, since variation in risk premiums may be benign in some instances, as illustrated by my stylized example earlier in this section.

external monetary shocks. Neither statement is true—nor, I am sure, are these conclusions that Rey and others writing in this area would endorse.

If significant financial stability spillovers exist, what are the implications for US monetary policy? For other policies, both in the US and in emerging markets?

A discussion of policy implications should begin with the fact that considerable heterogeneity exists in the financial sensitivity of countries to policy actions at the “center,” a conclusion confirmed by a large and growing literature (Ahmed and Zlatei, 2014; Ahmed et al., 2015; Aizenman et al., 2015; Bowman et al., 2014; Fratzscher, 2012; Georgiadis, 2015; Mishra et al., 2014). Heterogeneity may reflect different initial conditions—the level of output in the country relative to potential, for example—a reality which implies that Fed easing, say, may be welcomed by some countries at a particular time and not by others (Chen et al., 2015). But heterogeneity in financial sensitivity also results from differences in structural factors, like openness and the quality of financial regulation, and in policy stances. During the taper tantrum period, commentators referred to the “fragile five” emerging markets—Turkey, Brazil, India, South Africa, Indonesia—whose initial conditions, structural weaknesses, and macroeconomic policies made them more vulnerable to global financial developments. Moreover, consistent with the relevance of the trilemma, at least some research has found that financial sensitivity and susceptibility to crises depend on the country’s exchange-rate regime (Aizenman et al., 2015; Ghosh et al., 2015).

The fact that emerging-market economies differ significantly in their responses to financial shocks suggests that policies specific to those economies should be part of the global policy response. Countries that are “fragile” because of flawed macroeconomic, structural, or regulatory policies would make an important contribution by working to improve their policies

and taking steps to increase their economic and financial resilience over time. Importantly, “improvement” in the financial sphere does not necessarily require continuous liberalization. As my “apple-trees” example earlier in this section showed, opening up to international financial flows is likely to induce greater sensitivity of emerging-market economies to decisions made by foreign investors. Such developments are probably beneficial to the investors who take advantage of them, but whether they improve growth and stability in the liberalizing economy as a whole is an empirical question. As the theory of the second-best tells us, adding a new market does not necessarily improve welfare if other, related markets remain unavailable. Consequently, care must be taken in the sequencing of reforms, particularly reforms that deregulate credit extension and open up the economy to short-term capital flows. As Rey has suggested, in some cases, macroprudential policies and even capital controls may be needed to manage credit and capital flows during the process of reform.

Strengthened financial regulation is particularly critical for reducing financial stability spillovers. That conclusion is in fact an implication of Shin’s work, which attributes spillovers to the risk-taking behavior of international financial institutions. Regulators are addressing these issues. For example, to tackle the problem of myopia in risk management, identified by Shin and coauthors, the Fed has greatly increased its emphasis on stress testing for institutions that it examines.²⁹ In contrast to Value at Risk methods, which may overemphasize recent performance in risk assessments, stress tests are intended to evaluate the ability of institutions to bear risks in the tails of the distribution. Financial regulation and supervision are also the obvious tools to use against other plausible sources of spillovers, including currency mismatches in the banking system, excessive cyclicality in lending standards, and opaque and illiquid markets.

²⁹ Stress testing is also required by the Dodd-Frank reforms.

It bears emphasizing that the improvement of financial regulation and supervision is not the responsibility of emerging-market economies alone. Because financial institutions and markets are global in scope, their regulation and supervision are inherently international responsibilities; indeed, excessive risk and instability in international capital flows should be as much a concern for the home countries of the investing financial entities as for the countries receiving the inflows. International cooperation in this sphere is already quite extensive. Bodies such as the Basel Committee on Banking Supervision, the Financial Stability Board, and the Committee on Global Financial Stability provide venues for collective analysis and standard-setting, and for cooperative supervision. However, much of the focus of these groups has been on financial regulation in advanced economies. Scope exists, I believe, to enhance international cooperation on issues related specifically to emerging-market economies, and I hope that will occur. The G20 is the obvious body to commission and review work on financial stability spillovers.

What about monetary policy? Notwithstanding the critical importance of maintaining financial stability, I don't at this point see a very strong case for diverting monetary policy, either in the United States or elsewhere, from the pursuit of its macroeconomic objectives (inflation and employment). My views on this issue are not dogmatic but follow from comparisons of likely costs and benefits (Svensson, 2014). Under most circumstances, monetary policy is just too blunt a tool for addressing financial stability risks, including international risks. Even in those rare cases where we think we have some understanding of the linkages between monetary policy and financial stability—the case of housing bubbles may be such an example—the change in monetary policy stance needed to address the problem would likely be very large, possibly resulting in costly deviations of output, employment, and inflation from policymakers' objectives

(Ajello et al., 2015; Jorda et al., 2015). More-targeted policies, such as financial regulation, should accordingly be the first line of defense under most circumstances (Bernanke, 2002).³⁰

What if targeted policies are inadequate to contain risks to financial stability, a possibility recently stressed by Fed officials (Fischer, 2015a)? In principle, this could be a reason to consider bringing monetary policy to bear. However, there are few if any examples of monetary policy being used successfully to defuse such risks (and multiple examples of failures), and the cost-benefit ratio of trying to do so is likely to remain highly unfavorable. Accordingly, if regulatory and macroprudential responses ultimately prove inadequate, policymakers should also consider whether structural changes in the financial system are ultimately necessary to avoid unmanageable risks.

Rey (2013) does not dispute these general conclusions, by the way, noting that achieving macroeconomic stability at the center is essential for the health of emerging markets as well as the United States. She does suggest that the US and other large countries do more to “internalize” the global effects of their monetary policies, and that there be more consultation among central banks. Consultation and communication between the Fed and other central banks are already extensive, as I discussed earlier—the Fed has recently made strenuous efforts to be as transparent as possible in its policy choices—but of course they can always be improved. It’s not clear what “internalizing” the effects of monetary policy means in this context. The Fed already takes into account the feedback effects of global developments on the US economy, and setting US monetary policy to achieve some set of global macroeconomic objectives seems both impractical and inconsistent with the Fed’s mandate. I think that, once again, the best way for the United States and other advanced economies to address the concerns of emerging markets is

³⁰ A recent (September 2015) IMF staff study, “Monetary Policy and Financial Stability,” reached a similar conclusion. See <http://www.imf.org/external/np/pp/eng/2015/082815a.pdf>.

through enhanced cooperation in regulation, supervision, and financial-market reform.

International bodies, including the IMF, should also redouble their efforts to identify reform strategies that minimize the adverse effects of financial liberalization.

The dollar standard and “exorbitant privilege”

Thus far I haven’t had much to say about the special role of the dollar or how that role plays into concerns about currency wars or spillovers from U.S. monetary policy. However, a common view among global policymakers, financial market participants, and businesspeople holds that—because the dollar is the de facto world reserve currency (making up about sixty percent of official reserves) and is a major vehicle for international trade, credit flows, and payments—movements in the dollar are exceptionally consequential (Prasad, 2014). As a result, they argue, the US has extra responsibilities to the world—both as a global citizen and also to compensate for its “exorbitant privilege” of being able to transact and borrow in the reserve currency. I can’t do full justice here to the many questions raised by these assertions, but I will briefly address two questions: First, are the benefits of the de facto “dollar standard” skewed to the United States, as sometimes claimed? Second, how does the dollar’s role change the nature of the spillovers from Fed policy to other economies?

On the question of who benefits from the dollar standard, attitudes are conditioned to some extent by the experience of the Bretton Woods system of the early postwar period. The Bretton Woods system operated in practice as a “fixed-rate dollar standard” (McKinnon, 1993). Effectively, under this system, the US dollar became the international numeraire, against which all other exchange rates would be set. The value of the dollar itself would be set in terms of gold, at least initially. The role of the United States in the system was to provide stability in the goods value of the dollar and to allow open trade and capital flows. The task of other

participants in the system was to maintain the fixed values of their currencies.³¹ To do that, they acquired dollar reserves, which they could use to buy and sell their own currencies as needed.

Importantly, the fixed-rate dollar standard did not eliminate the trilemma. Participants in the system opted for the perceived advantages of fixed exchange rates, but in doing so restricted their ability to use monetary policy for domestic stabilization. Consequently, much depended on the willingness of the center country, the United States, to ensure stability. Dollar inflation was low in the 1950s and early 1960s, but subsequently, rising US inflation forced trading partners to accumulate dollar reserves to offset the upward pressures on their own currencies. Ultimately, the United States broke the link of the dollar to gold, and the system devolved into the decentralized system of floating and managed exchange rates that has persisted since.

Dissatisfaction with US monetary policies during the Bretton Woods era, and resentment of the fact that trading partners had little choice but to accommodate those policies through accumulation of dollar reserves, seems quite understandable. The US was privileged by the Bretton Woods system and, in failing to maintain price stability, did not hold up its end of the bargain. I would argue, however, that today's de facto dollar standard operates very differently, and with a much better balance of costs and benefits for trading partners, than the dollar standard under Bretton Woods. The improvement reflects the end of the presumption that other countries will peg to the dollar, the lessened economic dominance of the United States and, I believe, more consultation and greater sense of shared responsibility among policymakers. The dollar's monopoly power has also been eroded over recent decades, in that assets denominated in euros, British pounds, and yen have become increasingly viable not only as reserve currencies but for other purposes, such as posting collateral.

³¹ To avoid persistent imbalances in trade or capital flows, the system envisioned occasional adjustments of parities.

Although the contemporary dollar standard is not the result of formal international agreements—indeed, its evolution has been largely unplanned, guided as much by market participants as by policymakers—in practice it has benefited the global economy in several ways. First, in contrast to the latter part of the Bretton Woods era, over the past three decades or so the Federal Reserve has been successful at keeping inflation low and stable. Consequently, the dollar has served its principal function as global numeraire, namely, to maintain a stable value in terms of goods and services.

Second, there is a strong and growing global demand for safe, liquid assets, which the United States—with its political stability and deep, liquid financial markets—has been generally successful in providing. The US also maintains open trade and capital accounts, preserving international access to US assets.

Third, dollar assets have proved to be a valuable hedge for foreign holders against downside geopolitical and financial risks (Gourinchas et al., 2010; Obstfeld, 2010). Broadly speaking, US international liabilities are in the form of relatively liquid, fixed-income assets, notably government bonds and government-backed mortgage securities, whereas US international assets tend to be riskier, e.g., equities. For this reason, and because the dollar is a “safe haven” currency that tends to appreciate when global risks increase, the US net asset position improves during tranquil times but worsens during periods of stress. Gourinchas et al. (2010) calculate that about \$2 trillion was transferred from the United States to other countries via valuation changes during the financial crisis. Obviously, the US role as provider of hedge assets is not the result of conscious policy. Instead, it reflects US comparative advantages in providing safe liquid liabilities and investing in riskier foreign assets, as well as the dollar’s role as a safe haven.

Fourth, the Federal Reserve has shown its willingness to serve as a lender of last resort to dollar-based lenders. In normal times, the Fed's discount window is open to the US subsidiaries of foreign banks. During the crisis, the Fed served as dollar lender of last resort by establishing currency swap arrangements with fourteen other central banks, including the central banks of four emerging market countries (Mexico, Brazil, Korea, and Singapore). Under these agreements, the Fed swapped dollars for foreign currency, giving the foreign central banks the ability to lend dollars to financial institutions in their own jurisdictions.

What "fee" does the United States require for providing these services? Being the issuer of the reserve currency has benefits, of course. A good deal of US currency is held abroad, on which the US earns the seigniorage. Of about \$1.4 trillion in US currency in circulation, as much as two-thirds may be held abroad. If \$1 trillion is held abroad and the alternative financing cost for the US government is 2 percent --- both quite high estimates -- then the value of that seigniorage is about \$20 billion annually, significant but not large compared to (say) US GDP. Moreover, the dollar's usefulness as a store of value is in some sense separate from its role as the international currency of trade and finance. Other currencies, notably the euro, can and do serve the store of value function, and the dollar would probably continue to be used in this way even if it were no longer the world's reserve currency.

An argument often heard is that the US, as the monopoly provider of dollars, is able to run a permanent trade deficit equal to the net supply of dollars to the world. That argument is not quite right: The US still pays interest on the debt it issues to finance its trade deficit. The question is whether the interest rate it pays is meaningfully lower than the rate paid by other countries. Real sovereign interest rates are in fact quite similar across major industrial countries with strong credit ratings (other than Japan, where they tend to be lower), as shown by the

returns to indexed government securities, for example. It would be more accurate to say that the US finances its trade deficit in large part through the risk premium it earns from issuing safe liabilities and investing in risky assets.

Overall, the dollar standard appears to provide a global public good, and the rents to the United States of providing that public good seem much diminished, at least relative to the Bretton Woods era. With the benefits to the users and provider of the dollar standard less asymmetric than they once were, we shouldn't be overly exercised over controversies about whether the dollar will retain its pre-eminence, the future of the renminbi as a reserve currency, and so on. These debates are more about symbolism than substance. In purely economic terms, the universal usage of English, say, is far more valuable to the United States than the broad use of the dollar.

Even if the dollar standard is broadly beneficial, however, it may not be beneficial in all aspects. How does the wide use of the dollar affect the issues considered in this lecture? In particular, in what ways, if any, does the use of the dollar exacerbate international spillovers from Fed policy? Probably the most important channel to be considered arises from the fact that a substantial amount of international borrowing, both through intermediaries and on open markets, is denominated in dollars. Dollarized markets tend to be more liquid, and the denomination of debts in dollars protects lenders against possible devaluation by borrowers.

The heavy reliance on dollarized credit by emerging-market borrowers has led some commentators to assert, loosely, that the Fed is the world's central bank, able to export US financial conditions abroad. There is some truth to this claim, obviously, but with caveats that should be mentioned. Notably, although emerging-market firms may borrow in dollars (either directly or through intermediaries), most presumably use the domestic currency in their home

operations and when paying for labor and other inputs. In a frictionless world, the all-in cost of borrowing, measured in the domestic currency, would not depend on the currency in which borrowing takes place, because (under uncovered interest parity) the expected depreciation or appreciation of the exchange rate would compensate for differences between currencies in nominal interest rates (see equation (1') above). So, for example, if the Fed eases, an emerging-market firm is able to borrow more cheaply in terms of dollars; but, measured in terms of the local currency, the decline in its borrowing cost is at least partially offset by the depreciation (and subsequent expected appreciation) of the dollar. Empirically, it is certainly the case that the effects of changes in the stance of US monetary policy on foreign interest rates are muted by the associated changes in the dollar exchange rate.³² Consequently, the common journalistic practice of comparing nominal interest rates across currencies to assess which borrowing vehicle is “cheapest” is sloppy and at a minimum needs qualification.

A response to this argument is to note, correctly, that the principle of uncovered interest parity often does poorly in the data. One likely explanation for this finding is that the effective cost of borrowing in emerging markets also includes a time-varying liquidity premium (see equation (1'), above). To the extent that Fed policy affects the liquidity premium in dollarized markets, it is likely also to affect the availability and all-in cost of credit in emerging-market economies. In this sense, the Fed does matter more to the global economy than other central banks.

If Fed policy influences the supply of dollarized credit, there are two potential implications for financial stability. First, if emerging-market policymakers employ monetary policy and flexible exchange rates to promote macroeconomic goals (as I recommend), then

³² For example, Rogers, Scotti, and Wright (2014) find that a US monetary easing that lowers the 10-year Treasury yield by 25 basis points reduces the yields on the UK gilt, the German 10-year bund, and the Japanese 10-year JGB by 13, 9, and 5 basis points respectively.

more-targeted instruments may be needed to manage possible excesses in borrowing or risk-taking. As I discussed in the previous section, examples of targeted policies include financial regulation and supervision, macroprudential policies, and structural policies including potentially capital controls. Second, borrowing in dollars, if not properly hedged, exposes emerging-market borrowers to exchange-rate risk (currency mismatch) after the fact. If hedging is incomplete, say because the requisite derivatives markets are underdeveloped, then “cheap” dollar-denominated borrowing can become very expensive after the fact, if the dollar strengthens unexpectedly. Currency mismatch and unhedged dollar obligations thereby pose the risk of systemic shocks to net worth and financial stability (Chow et al., 2015). An additional potential problem is that the responses of emerging-market policymakers to shocks can be constrained by pre-existing financial conditions; for example, monetary easing and depreciation may prove dangerous if currency mismatch is severe, as we saw in the Asian financial crisis.

The preservation of financial stability is a public good, in that no private individual or firm takes that objective into account in its own borrowing and investment decisions. The financial stability externality provides a basis for emerging-market governments to monitor and possibly constrain access to dollarized markets. The most natural place to do this is in the banking system, where balance sheets should be stress tested for currency risk arising either from banks’ dollar obligations or the dollar obligations of their borrowers. A strong and resilient banking system is an important bulwark against broad-based instability. In some circumstances, the authorities could consider restrictions on dollar borrowing (or impose hedging requirements) by corporates and households as well.

Conclusion

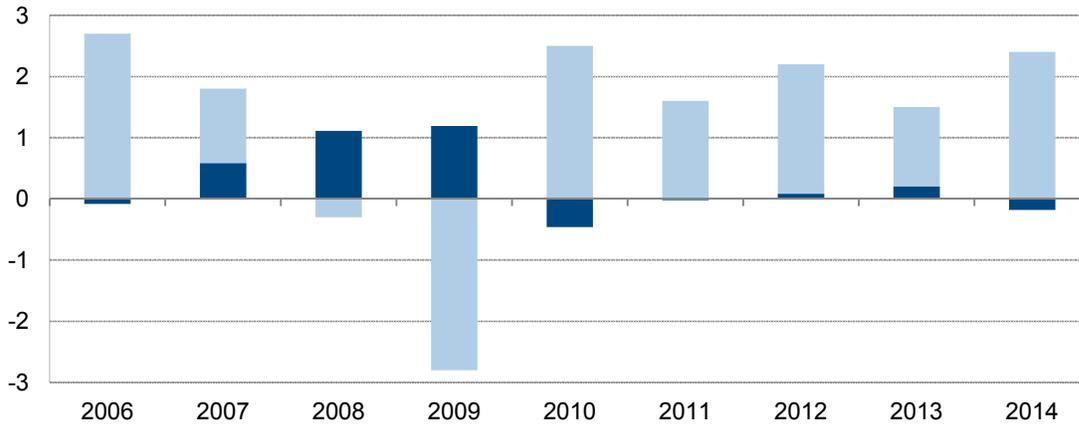
In this lecture I have considered channels through which US monetary policy may affect other economies. The Mundell-Fleming model provides a good starting point for the analysis. I use a variant of that model to show that complaints about currency wars may actually reflect the inexorable workings of the Mundell-Fleming trilemma: Policymakers find themselves frustrated by the inability to meet independent exchange-rate and export goals while simultaneously retaining monetary independence and free capital flows. Empirically, there is little evidence that the US has relied on net exports for growth, or that US monetary easing has an adverse effect on the exports of trading partners, once expenditure-augmenting effects of monetary ease are taken into account.

Financial stability spillovers pose more difficult issues. There are strong financial linkages across countries, as shown by the research on the global financial cycle, but we do not at this point know the extent to which those linkages reflect destabilizing spillovers, as opposed to more benign factors. More research is needed here. In the meantime, there is good reason to believe that financial stability is a public good, which private actors do not take into account in their decisions. Policymakers would thus be well-advised to be prepared to override market outcomes at times to defend financial stability. The significant extent of unhedged dollar borrowing by emerging-market firms may well be a case in point.

For now, monetary policy—enhanced by best practices in consultation and communication—should be reserved for macroeconomic objectives. There is plenty of scope for international cooperation to preserve financial stability, however, in areas that include financial regulation, financial supervision, macroprudential policies, and structural reform. A more stable system would benefit everyone and should be a collective enterprise.

Figure 1: Contribution of Net Exports to U.S. GDP

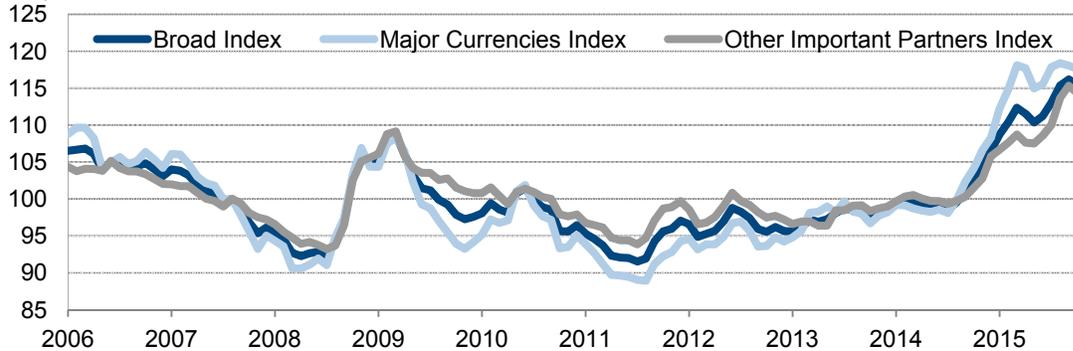
Percentage points



Source: BEA/Haver ■ % Change in Real GDP ■ Contribution of Net Exports to % Change in Real GDP

Figure 2: Trade-Weighted Exchange Value of the US\$

Aug-2007 = 100



Source: Federal Reserve Board/Haver

Note: The Broad Index is a weighted average of "Major Currencies" (Euro Area, Canada, Japan, United Kingdom, Switzerland, Australia, and Sweden) and "Other Important Partners" (Mexico, China, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Thailand, Philippines, Indonesia, India, Israel, Saudi Arabia, Russia, Argentina, Venezuela, Chile and Colombia).

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