

coefficients on either the federal funds rate or the real dollar exchange rate in Taylor rules for Germany and Japan, and there are many subsequent examples.

Suppose that all countries include foreign interest rates in their Taylor rules. Why is this a matter for concern? The basis for the concern comes from Taylor (2009). Suppose you have two countries, each of which responds to the other country's interest rate. In addition to equation (1), there would also be a policy rule for the foreign country:

$$r_p^* = \alpha^* + \beta^* r_p + \gamma^* x^* \quad (2)$$

where x^* are the variables that enter the foreign country's Taylor rule. Substituting equation (1) into equation (2), and vice versa, produces the following reaction functions:

$$r_p = \frac{\alpha + \beta\alpha^*}{1 - \beta\beta^*} + \left(\frac{\gamma}{1 - \beta\beta^*}\right)x + \left(\frac{\beta\gamma^*}{1 - \beta\beta^*}\right)x^* \quad (3)$$

$$r_p^* = \frac{\alpha^* + \beta^*\alpha}{1 - \beta\beta^*} + \left(\frac{\gamma^*}{1 - \beta\beta^*}\right)x^* + \left(\frac{\beta^*\gamma}{1 - \beta\beta^*}\right)x. \quad (4)$$

Assume that β and β^* are both between zero and one, so that each country raises its policy rate when the other country's policy rate increases, but less than point-for-point. Then $0 < \beta\beta^* < 1$ so that $1 - \beta\beta^* < 1$. The important characteristic of the reaction function is that the term that multiplies domestic variables is magnified for both countries. For the domestic country with a policy rule defined by equation (1), the coefficient γ is the desired response to the domestic variables x in the Taylor rule. Since $1 - \beta\beta^* < 1$, the actual response in equation (3) is larger than the desired response in equation (1). The same argument applies to the foreign country in equations (2) and (4). Because each country responds to the other country's interest rate, the policy responses are magnified.

The problem with this analysis, however, is that equations (1) and (2) can't possibly be the correct model for thinking about Latin American or Asian countries. When I think about the future path of the US federal funds rate, one thing that doesn't come to mind is what the interest rates in Chile, Colombia, or Mexico are going to be. Consider an alternative model, which is also discussed in Taylor (2009). What happens if the emerging market country responds to the US federal funds rate, but the United States doesn't respond to the emerging market country's policy rate? The policy rule for the emerging market country is still described by equation (1), but the policy rule for the United States is the standard Taylor rule:

$$r_p^* = \alpha^* + \gamma^* x^*. \quad (5)$$

Substitute equation (5) into equation (1):

$$r_p = \alpha + \beta(\alpha^* + \gamma^* x^*) + \gamma x. \quad (6)$$

The emerging market country responds to the US interest rate, which means that it responds to US macro variables, but there is no magnification effect. While concern about the exchange rate will affect monetary policy independence in the sense that it causes emerging market economies to respond to US variables, it does not affect monetary policy independence in the sense that it does not cause them to increase the policy response to their own inflation rates and output gaps.

In the context of flexible exchange rates and high capital mobility, I am not convinced that a policy response to the US federal funds rate based on concern about the exchange rate or capital flows is as important a problem as is represented by the paper because, since there is no magnification, emerging market economies do not have to increase the response to their own variables.

This assumes that the Fed follows its own policy rule. But what happens if the Fed deviates from its rule? While Sebastian talks about this at the end of the paper, saying it will create a more volatile macroeconomic environment, the paper is about “spillover” or contagion between policies. What I think is potentially more important is “spillover” or contagion between policy rule deviations. If the Fed deviates from its policy rule, does this create pressure on other countries to deviate from their policy rules? This is not an easy question to answer for developed economies, and I am doubtful that it can be answered with the span of data available for emerging market economies. But the question is worth asking. If flexible exchange rates do not insulate countries from US policy rule deviations, then monetary policy independence would truly be a mirage.

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GENERAL DISCUSSION

SEBASTIAN EDWARDS: Let me tackle two issues that David Papell raises. The first one—something that John Taylor and I have discussed over the years and that comes up every time I go to an emerging market and talk to central bankers either as an advisor or just in a conversation—is about what to do with the exchange rate in respect to monetary policy. So the exchange rate, even in the most simple Taylor rule, is already indirectly in the monetary policy, because, of course, what happens to the exchange rate affects inflation through some pass-through mechanism. It doesn't have to be one-to-one. And the pass-through, as John Taylor has documented, has been declining around the world in the last 30 years. But, of course, every time Argentina devalues its currency, and the exchange rate just went from nine pesos to 14 or 15 pesos to the dollar, domestic inflation in Argentina goes up, because they are wired for a number of historical reasons to react to changes in the exchange rate. So the question is, Should the exchange rates play a role over and above this indirect role in monetary policy, or should we allow the exchange rates to do whatever it has to do and react as a shock absorber to different shocks in the world economy? That's a big, big question, and I don't think we have time to solve it during my two minutes here. But the point that I want to make is that even in any of these models, exchange rates already are there once you have local inflation.

The second point I want to raise—and I will just leave it open—is, Why should we worry about this monetary policy “spillover”? Is this a concern? There are two different approaches to this at least. One is the welfare approach. The United States does not take into account what Colombia does. Many of you guys are or have been in the FOMC. I'm sure that you've never

spent even one millisecond talking about Colombia. And you haven't spent any time talking about what Chile does, a well-behaved country that is not about to go belly up, and even if it did, it is so small that no one would worry. And so in this case, as I point out in the paper, there is a one-way amplification effect, that only concerns the developing countries.

So why worry? One question is whether there are negative welfare implications by the way these central banks are behaving. And a related one is whether we should worry that, even if they are doing the right thing, because the exchange rate does truly belong in the augmented Taylor rule in order to minimize the volatility of nominal GDP, that is not what they are saying. And I think that it is important, and we should worry, because they are saying that they do something that they don't appear to be doing. And I think that for the markets to operate properly, the understanding of what central banks are doing is important, and we should match to some extent—and this has to do with, of course, transparency and communications—what central banks say with what they do. And what I think I'm doing here is unveiling the fact that indeed they say one thing while they do another thing. Now why would they say, "We don't pay attention to what the Fed does"? It's beyond me. There's no loss in dignity or honorability by saying, "Yeah, we look at what the Fed does." It's a big country, and it's very important.

HAROLD UHLIG: I have two questions. One is a conceptual one, the other is an econometric one. The conceptual one is this notion of independence here. So let me start with an analogy. When I was a child, my parents didn't really allow me to get drunk on weekends. And now that I'm an adult and independent from my parents, I still try not to get drunk on weekends. But it's not because I'm dependent on somebody else. It's because it's a good idea not to do that. And so you wonder if the central banks in these countries do what they do because it's a good idea or be-

cause they are dependent in some ways. The very essence of the Taylor rule in some ways is that central banks don't set interest rates arbitrarily. They set them according to economic circumstances, and maybe that's all that they're doing, and we just have to wrap our mind around why they're doing what they're doing. So I think the welfare question, to answer whether there's a lack of independence, is really at the heart of the whole discussion, and bringing that out more in the paper maybe would be nice, some theory.

The other one is the econometric question. It looks like you put the contemporaneous federal funds rate and the contemporaneous US policy stance on the right-hand side in the regression. But you have the lag policy rates in this regression. So for short horizons, it may not be all that surprising that news about monetary policy will result in news about domestic monetary policy. That's a little different from saying the stands of US monetary policy drive the stands of the monetary policy in the country. So the question is, What happens if you put in the stands of US monetary policy, say, with four lags? I notice there are a bunch of lag variables in there. But if it still shows up significantly there, you would have a much stronger case.

RICHARD CLARIDA: David Papell mentioned my 1998 paper with Gali and Gertler, and it actually addresses a couple of the issues here. So in that paper, we actually had a forward-looking Taylor rule. We were precisely interested in the issue of whether the real exchange rate enters into the Bundesbank's or the Bank of Japan's equations because it's useful in forecasting inflation, or whether it enters with an independent effect. And our generalized method of moments approach actually allowed us to test that hypothesis. And what we found is entering over and above its ability to forecast. So at least in our original work, we were directly focused on this issue of a reduced form of correlation from a forecasting role. But we found the independent role.

But the second point, I think, to Harold's observation: it's actually not hard to write down a model—as in my paper in this volume—where you can get a relationship between, say, Colombia's or Chile's interest rate and the US interest rate, because essentially there's a global dimension to the neutral policy rates. In the original Taylor formulation, the neutral rate's a constant, but you can write down models where not only is it time varying, but there's actually a global dimension to it, and then it's very easy for the foreign interest rate to enter, because it's essentially a proxy for that unobservable global factor. But nice paper.

SEBASTIAN EDWARDS: Harold Uhlig, Rich Clarida, and also David Papell raise the question of what really is independence here? And the answer is that I'm defining it in a particular way, which is very clear in the paper, which you may not agree with, but that's the way I define it. It's not fuzzy. It has to do with after estimating an augmented Taylor rule that includes some foreign or external or global variables, and I will get back in a second, once you estimate that Taylor Rule, whether the federal funds rate still plays a role. And here let me just add that I must apologize for not citing the Clarida, Gali paper, which, of course, is a very important paper on this topic. So this is the way I define independence, and that's why "contagion" or "spillover" is in quotation marks. It is a very particular way of doing it, and one can indeed write models where the foreign interest rate enters. But the question I think is what Vasco said, which is: Is it entering because it's an additional target, or is it entering because it affects the objective function of the central bank, which is to minimize the variability of nominal GDP over time?

ALLAN MELTZER: I've read Sebastian's paper. It's really very interesting. And it intrigued me that Mexico was so different. And I came up with this possible explanation, which I want to try on you. Mexico went through some really tough times up through 1994. And now it's 20 years past that, and it's followed a policy of noninflation during that period under sometimes difficult cir-

cumstances. So it has embedded in the holders of the peso the idea that Mexico will not inflate, just as holders of the dollar currently think the United States may never inflate again. Anyway, they have that strong belief, and they have more independence as a result. Whereas in Chile and certainly in Colombia, US pressure is very strong. And I end that by saying in my experience with the Bank of Japan over a very long time, I remember when Larry Summers came as the US undersecretary of the Treasury, came to Tokyo and told them, look, you're not allowed to change your exchange rate. And so it went back up. And he said you have to use fiscal policy.

SEBASTIAN EDWARDS: I think that I agree basically with what Allan said. Mexico is one of the few—not the only but one of the few—Latin American countries that had long, long, long periods of price and exchange rate stability: about 20 years of the peso when the old peso to the dollar was fixed at 12 pesos and fifty cents. That created a whole literature—most of you are too young to even remember it—the “peso problem” literature. The peso was at a discount every year for 20 years, and it never actually devalued, until it did. And when it did, it was gigantic. So I think that after the 1994–95 crisis in Mexico, that possibility became very clear. It was internalized by the market. I was a chief economist for Latin America at the World Bank, and I remember a good friend, Guillermo Ortiz, who was at the time secretary of the Treasury, sweating. This was a totally traumatic experience for Mexico. And they decided it would never happen again.

MICHAEL HUTCHISON: I'm wondering about the commodity prices in Chile. Isn't it the case that these kinds of exogenous shocks can be responded to immediately, while the lag of GDP takes some time? And officials also don't observe contemporaneous GDP and do observe commodity prices. Is it possible that you've underestimated the effect because you've left out commodity prices—Chile is an important example. Could you

include other variables which are contemporaneously observable for policy rules?

SEBASTIAN EDWARDS: Mike Hutchinson makes some important points about commodity prices, and Chris asked the question: Why do the Latin American countries behave differently from the Asian countries? I think that part of it has to do with commodity prices. So the main difference between these countries—the Latin American and the East Asian countries—is that the Latin American currencies are commodity currencies and the East Asian currencies are not commodity currencies. And the commodity markets are denominated in dollars. So the price of copper in dollars, which has a role in the Chilean economy and the Peruvian economy, or the price of oil in Mexico and Columbia is affected in the world markets when the dollar changes in the world market and the dollar changes and responds in general to interest rate differentials. So interest rates in the United States have an important effect. And it also has an effect in expectations. So maybe that's an avenue that one has to continue to look into: the role of commodities.

CHRISTOPHER CROWE: I thought the finding that US policy was more important to Latin American countries than Asian countries was interesting and very plausible. I was wondering if we could have your thoughts on the reason why that is. I also wanted to give what might be a reason, which is the suggestive evidence that I saw when I was looking at a related issue: that if you look at overall capital flows to EMs and then look at capital flows from the United States to each of those EMs, in general, they're not very highly correlated. The exception is Latin American countries, where flows from the United States really drive flows in and out of those countries, and particularly in bank flows and debt securities, which presumably are the most interest rate sensitive parts of those flows. To my mind, that sounds like a plausible rationale why this is the case. So I'd be interested in your thoughts.

VASCO CURDIA: Sebastian's paper seems to be implying that you don't input the exchange rate because it's implicitly there, because you have local inflation. Through the indirect effects, you could argue the same thing about the federal funds rate to the extent that it affects financial conditions. That is already transmitted through the economy. So the question is whether they are there because they are a separate target or because they are some sort of summary statistic for other financial conditions or global conditions, So it would be interesting if you could dig a bit further, by including both exchange rates and the federal funds rate, because one of the arguments you mention for including the federal funds rate is maybe just to defend the currency. But if that's the case, just include the currency itself in there, right, with lags and so on.

Another thing which is partially there already is to include expectations for inflation in the United States, which maybe could be used as a proxy for inflation in the world. Why don't you use, let's say, International Monetary Fund forecasts for global demand and global inflation, or try to use some sort of trade-weighted measure of all those conditions. That's what should be in all those countries in a way, right, other than for financial conditions. So that will be an interesting thing.

WILLIAM ENGLISH: I wanted to follow up on Harald Uhlig's question. It seems to me that US policy or the exchange rate may matter because they affect the outlook for inflation or the outlook for the output gap, say. And because central banks should be forward-looking, it's not a surprise that these things enter into the policy rule in these countries. I guess the question is whether there's an overreaction relative to what you should expect based on the anticipated economic effects of the change in the US rate.

SEBASTIAN EDWARDS: Bill English raises the question of introducing forward-moving expectations and the global versus local economic effects. I do have in all of the estimates, as I said, the

breakeven between either the five-year or the ten-year note and the five- or ten-year corresponding TIPS. And that is the market expectations of US inflation, which for these countries is an important forward-looking measure of the global inflation. So that is already in the paper.

As to Harald's point about different lags: I have tried, of course, different lags. Reporting is a complication. Sometimes you report, sometimes you don't. I should, as Harald says, report results with additional lags.

EVAN KOENIG: I have a colleague—Scott Davis—at the Federal Reserve Bank of Dallas who's made the argument that in trying to understand which countries are going to follow the Fed's lead and which aren't, it's really important to allow for the amount of dollar-denominated debt the country has and also the size of their foreign exchange reserves. So the underlying concern is the real burden of their debt.

SEBASTIAN EDWARDS: Evan Koenig makes a good point. And in terms of the empirical strategy, we have to look at what happens to reserves in these countries, and we have to look at the degree of dollarization of their debt, and so the balance sheet effect and the fear to float. The dilemma or the tradeoff in this research is whether to bring in the cross-section variability and improve the data and have a panel or whether to accept them as the unhappy families in Tolstoy's *Anna Karenina* sense: each country is different, and you have to focus on each country separately. And there is very little variability during any period of time that is not long, long, long, long, long in terms of dollarization. So let's take into account, for example, Colombia. Liabilities of dollarization may have gone in this period from 0.239 to 0.235. So it's really very hard to do it. So that's a tradeoff. And I realize that that's an important question.