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SIMULATING EXCHANGE RATE SHOCKS IN THE MPS AND MCM MODELS: AN EVALUATION

by

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ABSTRACT

In 1983 and 1984, the United States economy staged a vigorous economic recovery at a time when the value of the dollar was high and rising, leading to a steady deterioration of the trade balance. The strength of both the economy and the dollar exceeded most forecasts. This raises a question: are there expansionary effects from a currency appreciation that are overlooked when we focus solely on the trade balance?

The purpose of this paper is to try and resolve the issue of whether or not an appreciation of the dollar is expansionary. To do so, I evaluate the simulation properties of the MPS and MCM models. As part of this evaluation, I develop a "back-of-the-envelope" model to serve as a third alternative against which to compare the two large econometric models.

Introduction

In 1983 and 1984, the United States economy staged a vigorous economic recovery at a time when the value of the dollar was high and rising, leading to a steady deterioration of the trade balance. The strength of both the economy and the dollar exceeded most forecasts. This raises a question: are there expansionary effects from a currency appreciation that we overlook when we focus only on the trade balance?

The possibility of expansionary effects for the United States of an appreciation of the dollar is heightened by the results of simulating the MIT-Penn-SSRC (MPS) model of the U.S. economy, maintained by economists in the domestic division of the Federal Reserve Board. This model, described in Brayton and Mauskopf (1985), suggests that a 10 percent appreciation of the dollar indeed will raise U.S. real GNP. On the other hand, the multi-country model (MCM), maintained by economists in the international division of the Federal Reserve Board, has the more conventional property that an appreciation is contractionary.[1]

The purpose of this paper is to try and resolve the issue of whether or not an appreciation of the dollar is expansionary. This necessarily involves an evaluation of the simulation properties of the MPS and MCM models. To facilitate this evaluation, I develop a "back-of-the-envelope" model to serve as a third alternative against which to compare the two large econometric models.

Since the exchange rate is an endogenous variable, a question arises as to how one may interpret an exchange rate "shock" to an econometric model. In this context, it is best to view an exchange rate shock as a change in the risk premium or "asset preference parameter" in the demand equations for domestic and foreign bonds.[2]

If I myself were building a simulation model, I would use a combination of theory and statistical procedures to generate the parameters. For example, I would constrain my money demand equation to be homogenous in the price level, even though the data might appear to suggest otherwise because of a poor match between theoretical and measured construct, technological change over the sample period, or other sources of noise. On the other hand, I would have diffuse priors regarding the dynamic response path of exports to relative price changes, and for this I would rely on statistical procedures, even though the same data problems are present as in money demand. While this approach offends Bayesian purists, it seems to be the revealed preference of most model-builders.

The choice of when to impose coefficients and when to allow them to be data-driven is somewhat subjective. With regard to the MCM and MPS models, my main disagreement along these lines is in the way exchange rate changes are not passed through fully into changes in export and import prices. This is an issue on which I believe theory could be used to overturn statistical results. I make this point in the first section of this paper.

There are two prominent effects of an exchange rate shock, which will be referred to throughout this paper as the "fiscal effect" and the "monetary effect."[3] The fiscal effect is the contractionary effect of a real appreciation on the trade balance. The monetary effect is expansionary: an appreciation of the dollar lowers import prices, tending to reduce the domestic price level and thereby money demand. This leads to lower interest rates and more spending in interest-sensitive consumption and investment categories. In terms of an IS-LM diagram, the fiscal effect is a leftward shift of the IS curve and the monetary effect is a rightward shift of the LM curve.

In section two of this paper, I develop the envelope calculation to determine whether it is plausible for the expansionary monetary effect to outweigh the contractionary fiscal effect. It turns out that an appreciation indeed could be expansionary; however, this requires spending to be somewhat more sensitive to interest rates and the domestic price level to be somewhat more sensitive to exchange rates than the data appear to indicate.

In section three, I examine the simulation results of the MPS and MCM models. It turns out that an appreciation is more expansionary in the MPS model than seems possible using the envelope calculation. Consumption is boosted by several factors in the MPS model that make the model "non-neutral" with respect to inflation. Two of these non-neutralities, in particular, appear to be accidental yet significant. In addition, as noted by Brayton and Mauskopf, the response of net exports in the MPS model is muted by the technical procedures for simulating a shock to the exchange rate.

The MCM model, on the other hand, probably understates the monetary effect of an appreciation. Changes in exchange rates have an implausibly small effect on import prices, leading to a weak impact on domestic prices and interest rates. In addition, domestic spending shows very little interest sensitivity in the MCM model, particularly in the near term.

Both models treat oil prices as exogenous. As Glassman (1985) and Sachs (1985) point out, this assumption may cause the models to understate the effect of exchange-rate changes on U.S. prices. Moreover, a drop in oil prices also has an expansionary effect on the real trade balance in

the near term, since the demand for imported oil is inelastic in the short run.

In conclusion, the effect of an appreciation of the dollar on real GNP in the United States probably is close to zero. If oil prices are unaffected by the value of the dollar, then an appreciation almost surely is contractionary. If oil prices indeed fall when the dollar appreciates and if domestic spending is highly sensitive to the interest rate, then an appreciation could be slightly expansionary.

I. The Exchange Rate and the Terms of Trade

The effect of a change in the nominal exchange rate on real variables depends on the behavior of relative prices. The purpose of this section is to discuss the effect of the exchange rate on relative prices, because this turns out to be a source of conflict between my priors and the MPS and MCM models, particularly the latter.

Let me start with the following definitions of prices.

(1) $p_R = \frac{\$}{RCA}$, the dollar price of an American television

(2) $p_{S*} = \frac{yen}{Sony}$, the yen price of a Japanese television

(3) $n = \frac{\$}{yen}$, the <u>nominal</u> exchange rate (a rise in n means a depreciation of the dollar)

(4) $p_{R*} = \frac{yen}{RCA}$, the yen price of an American television sold in Japan

(5) $p_S = \frac{\$}{Sony}$, the dollar price of a Japanese television sold in the United States

I assume that the two brands of television are imperfect substitutes and that both the dollar price of RCA televisions and the yen price of Sony televisions are sticky in the short run, because these are what Okun (1975,1981) would call "customer market" goods.

Next, consider three measures of relative prices, or of the real exchange rate:

$$(1) \quad e_c = \frac{np_{S*}}{p_R} \qquad \text{(competitiveness)}$$

$$(2) \quad e_m = \frac{p_S}{p_R} \qquad \text{(real import price)}$$

$$(3) \quad e_x = \frac{p_{S*}}{p_{R*}} \qquad \text{(real export price, inverted)}$$

The first measure, competitiveness, compares the price of a Sony sold in Japan with the price of an RCA sold in the United States, adjusted for the nominal exchange rate. If instead of televisions we were talking about an auction market good, such as gold, this measure would be unity, subject to the usual caveats about transportation costs and so forth. Even with monopolistically competitive markets, it probably is justifiable to argue that the equilibrium real exchange rate measured in this way is determined in the long run, like all relative prices, by tastes and technology.[4]

The other measures of the real exchange rate compare the price of the two televisions in a common location. The real import price is the price in the United States of a Sony relative to the price of an RCA. The inverted real export price is the price in Japan of a Sony relative to an RCA.

This befuddling set of relative prices can be reduced to a single measure if we invoke the law of one price: if you trade RCA's for Sony's in one country, you should be able to make the same deal in the other country. Another way of putting this is that the dollar price of a Sony should be the same in either country.

$$(9) \quad p_S = np_{S*}, \text{ or } \frac{\$}{\text{Sony}} = \frac{\$}{\text{yen}} \, \frac{\text{yen}}{\text{Sony}}$$

Note that if the law of one price holds, the price of a Sony cannot be sticky in terms of both currencies. If it is perfectly sticky in terms of yen, then a change in the exchange rate will cause the dollar price to move. My prior is that in the short run the Sony price is sticky in terms of both currencies but that in the medium run (one to two years) the law of one price holds. Almost all of the change in price that occurs following a change in the nominal exchange rate will take place in the dollar price, but if the U.S. export market is important to Sony the dollar price may not adjust fully, in which case the law of one price suggests that the yen price absorbs some of the exchange rate shock.

An alternative hypothesis to the law of one price is that firms maintain a systematic policy of price discrimination. Having chosen a dollar price for its televisions, Sony sticks to that price regardless of its relationship to the dollar-equivalent cost of producing a Sony or to the possibility for cross-border arbitrage that exists when the dollar price differs in the two countries. While this is not entirely incredible, I feel that it certainly is questionable, and indeed it clearly becomes absurd as the size of the exchange rate shock gets large:

if it costs \$300 to produce a Sony, will Sony really stick to a \$200 price in the United States?

Neither the MPS model nor the MCM model imposes the law of one price as a long-run property. The import price equation in each model is, in effect,

$$(10)\quad \log(p_S) = a_1 \log(n) + a_2 \log(p_{S*})$$

The law of one price states that in the long run $a_1 = a_2 = 1$. In the MPS model, $a_1 = a_2 = .8$ and in the MCM model $a_1 = .5$ and $a_2 = 1$ in the long run. If the equations were so disaggregated that they literally dealt with Sony televisions, these results would be shocking. Given the level of aggregation and noise in the data, one can see how the results are plausible, but still it is questionable whether they provide appropriate input for a simulation model. It is easy to defend cross-border price discrimination as a short-run property. It even may be plausible that exchange rate changes are not passed through as swiftly as domestic cost changes into export prices (because exchange rates are more volatile and in order to avoid the cost of unnecessary price changes firms adopt a "wait-and-see" attitude when exchange rates move). However, the long-run violation of the law of one price in the equations serves to cast doubt on their short-run credibility as well.

One example of the results one can find if the law of one price is not imposed is that in the MCM model a depreciation of the dollar eventually causes the price of imports to fall. This is due not to some long-run cyclical behavior of the model, but because the depreciation eventually lowers the foreign price level, and this gets passed through fully into our import prices ($a_2 = 1$), while only half of the depreciation itself is passed through. Although this absurd result takes several years to develop, it lowers my confidence in the short-run price behavior of the model.

The "back-of-the-envelope" Model

The purpose of this section is to provide a "back-of-the-envelope" comparison of the effect of an exchange rate shock on the trade balance (the fiscal effect) with its effect on interest-sensitive domestic spending (the monetary effect). The comparison is supposed to represent a three to four year time horizon. In order to gauge the possibility that an appreciation is expansionary, I will choose parameter values that, while within the range of realism, tend to magnify the monetary effect. However, I leave out the possible expansionary effect on the trade balance of a drop in oil prices due to an appreciation of the dollar. In addition, I leave out the implications for spending of any redistribution effects of an appreciation or of a general change in the price level. In the MPS model, these "other" non-neutralities appear to be either small or the result of unintentional specification problems, so that leaving out such non-neutralities seems reasonable.

We will arrive at an equation of the form

$$(11)\quad \frac{dy}{de} = \mu(T_e + y_r r_p p_e)$$

where y is real GNP, e is the real exchange rate, r is the long-term real interest rate, μ is a multiplier, T_e is the response of the trade balance to the exchange rate, and the remaining term gives the monetary effect of an exchange-rate shock: p_e is the effect on the price level, r_p is the effect on the interest rate, and y_r is the effect on spending. It should be remembered that in the econometric models the real exchange rate is not unique, and the impact of this will be discussed in the third section of this paper.

First, I develop the aggregate supply curve, using a markup equation and a combined Phillips Curve/Okun's Law relationship. All variables should be interpreted as percent deviations from a control solution.

$$(12)\quad p = .7w + .1e$$

$$(13)\quad w = .2y + p$$

where p is the price level, w is the wage rate, e is the real exchange rate and y is real output. In the price markup equation, the coefficient on wages of .7 was chosen to reflect the share of labor cost in output. Similarly, the coefficient of .1 on the real exchange rate was chosen to reflect the ratio of imports to domestic output. Implicitly, all imports are treated as intermediate goods in this set-up, and there are no additional "competing-goods" effects.

The MCM and MPS models differ in their choice of the real exchange rate that is used in the price equation. The MCM model uses real import prices, which is consistent with my formulation (the coefficient also is close to the value I have used). In order to allow for "competing-goods" effects, the MPS model uses the competitiveness measure of the real exchange rate (the price of foreign output relative to U.S. output, converted to a common currency), but the coefficient on this real exchange rate is only .05, about half of what I have assumed.

The wage equation assumes that prices feed through fully into wages (recall that I have in mind a time horizon of at least three years). The coefficient on output combines Phillips Curve and Okun's Law estimates. Note, however, that the magnitude of this coefficient ought to be a monotonic function of the time horizon considered: a one percent rise in the GNP gap will depress wages relative to a control solution by an amount proportional to the length of time the gap is maintained. One other important remark is that all coefficients on y in the envelope model affect the overall multiplier of the model but not the relative magnitude of the fiscal and monetary effects.

Solving the wage-price block for an aggregate supply schedule, we have (after rounding)

$$(14) \quad p = .5y + .35e$$

A 10 percent real appreciation of the dollar (e down 10 percent) reduces the U.S. price level by 3-1/2 percent after a period of three years. This is a larger effect than most existing estimates suggest, because I assume a ful pass-through of the exchange rate onto import prices and a direct impact on the markup. Implicitly, equation (14) may be assumed to include the effect of the exchange rate on the dollar price of internationally traded commodities, an effect which is a subject of controversy. Glassman (1985) and Sachs (1985) offer critical surveys of the empirical literature on the effect of exchange rate changes on domestic prices.

The next step is to calculate the shift in the LM curve. We approximate the money demand equation from the MPS model as

$$(15) \quad m - p = .9y - .1i$$

where i is the short-term nominal interest rate. Inverting this equation and substituting for the price level from the aggregate supply curve gives

$$(16) \quad i = 10p + 9y = 14y + 3.5e$$

A 10 percent real depreciation would raise i by 35 percent, or 350 basis points if nominal rates were at 10 percent in the control solution. This large effect reflects the interest-inelastic money demand function and the sizable price effect of the exchange rate in the envelope model. The long-term real interest rate, r, is assumed to change by half as much as the short-term nominal rate. Therefore, the LM curve becomes

$$(17) \quad r = .5i = 7y + 1.8e$$

Finally, we build the IS curve. A change in the exchange rate will cause movement along the IS curve because of (17) and also will shift the IS curve by affecting the trade balance. Consumption and investment are taken to be interest sensitive.

$$(18) \quad C = .7y - .1r$$

$$(19) \quad I = 1.5y - .5r$$

In the consumption function, real wealth is assumed to be unit elastic with respect to the real interest rate, and the marginal propensity to consume out of wealth is taken to be .1, which is somewhat larger than the coefficient in the MPS model. Business fixed investment ordinarily is found to have an interest elasticity of .2 or less, but we allow for housing to add to this interest sensitivity.

The trade balance is determined as follows:

$$(20) \quad T = -1.5y + 2e$$

The marginal propensity to import is assumed to be 1.5, while exports and imports each are assumed to have a unit elasticity with respect to the real exchange rate.

By weighting consumption, investment, and export and import equations according to their share in GNP, we obtain the quasi-identity

$$(21) \quad y = .6C + .15I + .1T$$

Solving (18)-(21) for the IS curve, we have

$$(22) \quad y = -.27r + .4e$$

Equation (22) says that a 100 basis point rise in the real interest rate (10 percent of a 10 percent control level) lowers real GNP by 2.7 percent. That seems to me to be an enormous effect, indicating that I have packed about as much interest sensitivity as possible into domestic spending.

Now, we are ready to compare the fiscal and monetary effects of an appreciation. Putting (16) into (21) gives

(23) $y = .35(.4e - .5e)$

The coefficient .35 is a multiplier that reflects all of the coefficients on y. The first term inside parentheses is the fiscal effect, and the second term is the monetary effect. The expansionary monetary effect is slightly larger, so that a 10 percent appreciation (drop in e) would raise real GNP in the envelope model by about 1/3 of one percent.

Note that some of the parameter values that boost the monetary effect (low interest elasticity of money demand, high interest elasticity of domestic spending) tend to reduce the multiplier. Also note that it would be very easy to obtain the result that an appreciation is contractionary. For example, if only half of a real exchange rate change is passed through to domestic prices over the relevant time horizon, this would reduce the monetary effect from -.5 to -.25, which is smaller than the fiscal effect. The same result would be obtained if we were to halve the assumed interest elasticity of domestic spending.

The conclusions that I would draw from the envelope calculation are the following:

(1) A relatively large real appreciation of the dollar would have a relatively small net effect on real GNP.

(2) It is possible, even in the absence of an effect on the cost of imported oil, for an appreciation of the dollar to be expansionary. However, the parameter assumptions needed for this result appear to be extreme. If oil prices respond, then a positive effect on GNP becomes more plausible, because the demand for imported oil tends to be relatively inelastic in the short run, and any drop in price acts like a transfer from oil exporters to the United States.

III. Simulation Results

An experiment was run using the MPS and MCM models to simulate a 10 percent nominal appreciation of the dollar over a three-year period starting in the first quarter of 1979. The results are shown in table one. Explanations of variables are found in tables two and three.

As noted earlier, real GNP (y) is consistently higher in the MPS simulation and consistently lower in the MCM simulation. This is not surprising, given the ambiguity found in the envelope calculation. However, the magitude of the gain in real GNP in the MPS model far exceeds that found in the envelope calculation, even though parameters were chosen so as to maximize the expansionary monetary effect of an appreciation. The peculiarities in the results from both models will be addressed below.

The first point to be noted is that a 10 percent increase in the nominal level of the dollar does not imply a 10 percent real appreciation. As the stronger dollar restrains U.S. inflation and boosts inflation abroad, the real exchange rate (which was employed in the envelope calculation) moves by less than the nominal rate. This is shown in the first line of the table, which shows what happens to e_c, the "competitiveness" measure of the real exchange rate, comparing foreign and domestic price levels in a common currency (also recall that an appreciation of the dollar means a drop in e). Both models suggest that the amount of real appreciation is somewhat less than 10 percent and that the real exchange rate gradually is returning toward its value in the control solution as time goes on.

In section one of this paper, I pointed out that the models permit cross-border price discrimination, allowing systematic deviations from the law of one price. Therefore, the three measures of the real exchange rate (relative export price, relative import price, and competitiveness) differ from one another. In fact, relative export prices, e_x, closely track competitiveness in both models. However, real import prices, e_m, do not move as much as the other real exchange rate measures in the MPS model and they move hardly at all in the MCM simulation.

Because import prices hardly move in the MCM model, the domestic price level, p, shows little direct effect from the appreciation of the dollar. The drop in the price level and interest rates in the MCM simulation is due almost entirely to weakness in real GNP. Recall that in the MPS model the domestic price level depends on competitiveness, e_c, rather than on real import prices, e_m. Thus, the monetary effect is not short-circuited as it is in the MCM model; still, the direct effect of the real exchange rate on domestic prices is only about half the value used in the envelope calcuation. In the MPS simulation, downward pressure on prices and interest rates from the exchange rate largely is offset by upward pressure from the stronger economy (the IS curve shifts to the right rather than to the left, as will be explained below).

Looking at the domestic expenditure components, consumption and investment show almost no response to lower interest rates in the MCM model over the first 2 years of the simulation. At the end of the third year, a favorable impact on investment finally begins to appear. Overall, domestic spending in the MCM model has less interest sensitivity than in the MPS model and much less interest sensitivity than in the envelope model. Of course, this tends to reduce the monetary effect of an exchange rate shock in the MCM.

The sizable increase in consumption stands out in the MPS model. Much of this increase is due to two questionable non-neutralities in the simulation. One is that a shock that reduces prices raises real transfer payments, which are held exogenous in nominal terms. The marginal propensity to consume out of transfers is essentially one, so that this non-neutrality is significant.[5] Another non-neutrality is that lower prices increase the perceived value of real assets, such as land, as the perceived price of these assets catches up to the aggregate price level gradually over a three-year period. This quirk in specification causes perceived real wealth to vary inversely with the price level in the short run, so that a drop in price raises consumption.

Turning to the trade balance, nonagricultural exports, X', respond more in the MPS model. However, the MCM model includes an effect of the appreciation on agricultural exports, so that overall goods exports, X, fall by about the same amount in the two simulations.

Imports fall by much less in the MCM, because of the lack of response of import prices noted earlier.

In the MPS model, GNP net exports,T, does not reflect the change in goods exports and imports. Brayton and Mauskopf (1985) explain that a technical problem in the simulation exercises causes the trade balance in services to improve, offsetting the adverse effect on goods. As a result, in the MPS model the deterioration in the trade balance in goods has almost no effect on the overall net export picture.

When the odd service sector behavior is combined with the questionable non-neutralities in the MPS model, the result is that the IS curve shifts to the right in response to an appreciation. That is how the MPS model gets an increase in GNP that is three times as much as would be predicted by the envelope calculation that was biased to maximize the expansionary monetary effect of a stronger dollar.

On the other hand, the MCM model suppresses the monetary effect in two ways. First, it has a minimal effect of exchange rates on import prices. Second, its domestic spending components show relatively little interest sensitivity.

In my judgment, the truth probably lies somewhere between the envelope model and the MCM model. The envelope model's strong response of domestic prices to the real exchange rate is plausible theoretically but appears to receive no empirical support. In addition, it probably attributes too much interest sensitivity to domestic spending. The MCM model represents the opposite extreme in both cases.

1. Results of a 10 percent nominal appreciation of the dollar starting in 1979: Q1

		MPS				MCM			
concept	units	79:1	79:4	80:4	81:4	79:1	79:4	80:4	81:4
e_c	%	-9.8	-8.7	-7.5	-6.8	-9.3	-8.5	-8.1	-7.6
e_m	%	-1.6	-3.7	-5.3	-4.8	-1.2	-2.9	-2.4	-2.0
e_x	%	-9.4	-8.0	-6.6	-5.8	-9.2	-7.8	-7.3	-6.8
p	%	.1	-.3	-.8	-1.0	-.1	-.8	-1.2	-1.6
i	p.p.	-.1	-.4	-.4	-.3	-.4	-1.0	-1.6	-1.7
y	%	.1	.4	.9	1.1	-.4	-.3	-.6	-.0
y	72$	1.6	5.3	12.6	17.0	-6.1	-3.8	-8.2	-.1
C	72$	.6	4.0	9.7	14.6	-.9	1.0	-2.4	.3
I	72$	.2	.8	2.4	4.6	-.6	.2	-.2	3.6
X	72$	.1	-3.2	-4.1	-3.2	-.7	-1.7	-4.1	-2.6
X'	72$	.1	-3.2	-4.1	-3.2	-.6	-1.4	-3.3	-1.8
M	72$	.3	2.1	3.4	4.3	-.1	1.6	.7	.9
T	72$	.8	-.1	-1.1	-4.9	-4.6	-5.1	-5.6	-4.1

2. Variable Names

concept	MPS variable	MCM variable
e_c	-(10+pxpfwl-fpcpimw)	-(10+up-ufpcfwl0)
e_m	-(pxpfwl-pemnp)	-(up - upmgnfl)
e_x	-(10+pexnas-fpcpimw)	-(10+upxnag-ufpcfwl0)
p	pxpfwl	up
i	rtb	urs
y	XGNP	ugnp
y	XGNP	ugnp
C	epce	uc
I	eh+epd+eps	uifp
X	exnag	uxgni
X'	exnag	uxgna
M	emnp	umgnfl
T	eex-eim	unetxni

3. Variable Definitions

I. MPS

pxpfwl	nonfarm business fixed-weighted deflator, net of indirect business taxes
fpcpimw	foreign CPI, multilateral weights
pemnp	unit value index, nonpetroleum imports
pexnas	implicit deflator for nonagricultural goods and service exports
rtb	treasury bill rate (3 months)
xgnp	real GNP
epce	real expenditure on consumption
eh	real expenditure on residential fixed investment
epd	real expenditure on producers' durable equipment
eps	real expenditure on producers' structures
exnag	real exports of nonagricultural merchandise
emnp	real nonpetroleum merchandise imports
eex	real exports, NIA basis
eim	real imports, NIA basis

II. MCM

up	absorption deflator
ufpcfwl0	foreign consumer price index
upmgnfl	nonoil import unit value index
urs	commercial paper interest rate, 4-6 months
ugnp	real GNP
uc	real expenditure on consumption
uifp	real expediture on private fixed investment
uxgni	real merchandise exports, NIA basis
uxgna	real nonagricultural goods exports
umgnfl	real nonoil goods imports
unetxni	real net exports, NIA basis

Footnotes

1. The MCM originally was described in Stevens, et al (1984), and more recently in Hooper (1984). The simulation used in this paper was run on a test version of the updated MCM, to be described in a forthcoming paper by Hooper and others.

2. Kling (1985) shows that anticipated changes in interest rates can cause shifts in current asset preferences, even in the absence of a risk premium.

3. I have adapted the terms "fiscal" and "monetary" effect, which were coined in some internal memoranda at the Federal Reserve Board; I should not be credited with their origination.

4. Without a long-run equilibrium real exchange rate, it makes little sense to express international interest parity conditions in real terms. Cooper (1985) argues that real interest parity is tenuous compared with nominal interest parity.

5. Whether transfers tend to be fixed more in nominal or real terms is an empirical issue. However, I believe that the possibility of fixed nominal transfer payments belongs in the catalogue of potential rather than actual non-neutralities in the economy.

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