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## *Comment*

*Jeffrey Frankel, Harvard University and NBER*

A first look at this paper can get one excited. The introduction holds out the promise of using “simple geometry” to exposit “the recent literature on macroeconomic stabilization,” namely, macroeconomics based on “choice-theoretic models.” The sort of choice-theoretic models the authors have in mind are Dynamic Stochastic General Equilibrium (DSGE) Models, and in particular the New Open Economic Macroeconomics (NOEM). The promise is repeated when one sees that the central geometric tools are graphs AS and AD (the familiar Aggregate Supply and Aggregate Demand). As the authors say, such an exposition would be “especially relevant for . . . a field in which analytical complexities can reach formidable peaks and hinder access to—and communication of—its basic results beyond a restricted niche of acolytes.” It sounds as if the paper will show how the recent literature compares to traditional textbooks in such a way as could be used with students and even central bankers. The new models would then be on a par with other AS relationships: classical, Keynesian, the Natural Rate Hypothesis of Friedman and Phelps, the Rational Expectations approach of Lucas and Sargent, the inflation-bias approach of Barro and Gordon, and so on. One then could hope to see clearly what difference the models make for the answers to key policy questions.

In one sense the promise is delivered: a large variety of important questions are addressed within a common framework. These include two traditional questions regarding international transmission of shocks: whether floating gives insulation, and whether international policy coordination is useful. They also include some questions that are newly subject to debate: For inflation targeting (IT), what is the optimal price index to target? And has openness changed the AS parameters? Specifically, has it reduced the inflation bias (of discretion), and has it flattened the AS curve?

There are indeed some advantages to using the DSGE models, relative to earlier approaches that assumed some of the behavioral relationships rather than always deriving them from first principles of expected utility maximization. Other things equal, it is always aesthetically pleasing to derive behavior from first principles of expected utility maximization. Personally, I have always considered the realism of the assumed behavior to be more important than mathematical derivation from maximization, if one has to choose. But, after twenty years, much of the recent literature (e.g., New Open Economy Macro) has succeeded in combining verisimilitude with maximization. An additional major payoff is that one can do welfare analysis.

A preliminary quibble regards whether the word “simple” in the title is merited. Articles or books with “simple” in the title are generally longer than those with “complete” or “complex” in the title. This paper is no exception.

I do recognize that the task is a big one. The authors’ analysis covers

- Sticky versus flexible prices
- Open versus closed economies
- Discretion versus commitment
- Fixed versus floating rates
- Nash versus cooperative equilibria
- Producer Currency Pricing (PCP) versus Local Currency Pricing (LCP) and also Dollar Pricing, a welcome added third possibility

This variety of cases ensures a degree of complexity. Accordingly, various simplifications have indeed been made. For example, the production function is assumed linear:  $C = Output = Zl$ , where  $l$  = labor input.

### **Why Call a Production Function an AS Curve?**

I have some comments regarding exposition. I might have liked to read something more about the objective function, how it compares to those that include inflation, either on an ad hoc basis or derived.

But my most important presentational question is, *why aren’t there graphs with  $P$  or inflation on the vertical axis?* This is how everyone else presents AS relationships; it is virtually what Aggregate Supply means. I understand that, given the length of the paper, the authors have made a tactical decision to focus on the graphs that most directly show what goes on in their model. But then, given that all eleven figures have out-

put on the vertical axes, isn't it wrong to call them AS curves? They are production functions. This may sound like mere semantics, but it has serious consequences: if we are not talking about what is usually understood by AS, then isn't the discussion of the flattening of the AS curve (a putative consequence of globalization) misleading?

Although the authors decided on space grounds not to include true AS curves—graphs with  $P$  or inflation on the vertical axis—they suggested that I put them in my discussant's comment. With the authors' help, I will show in figures 2C2.1 and 2C2.2 the AS curves that correspond to their model.

### Three Questions of Substance

To turn to what are indisputably questions of substance as opposed to presentation, let's continue to assume we are talking about the AS curve as conventionally understood, with  $P$  or inflation on the vertical axis, even though it is not drawn explicitly in the paper. First is the question of the slope. It is true that many commentators, particularly Federal Reserve officials, have recently claimed that globalization has flattened AS; intuitively, inflation in each country is affected less by domestic demand and more by developments abroad. But there is an equally plausible case that globalization has made AS *steeper*. Increased competition gives firms lower markups (less pricing power), bringing the economy closer to the frictionless neoclassical model. This line of reasoning is consistent with the argument that globalization and competition has reduced inflation bias (Rogoff, 2004, 2006) and should do so in theory (e.g., Romer, 1993, and Lane, 1997, who are cited by Corsetti and Pesenti). I elaborate and attempt a reconciliation below.

Secondly, is it really true that "the empirical consensus [is] that *technology improvements are . . . contractionary on impact*"? This is taken as a firm stylized fact that the models must be forced to obey. But I would have said the opposite: positive productivity shocks are often associated with rapid growth *and* overheating of economy (e.g., rising real estate prices): Ireland, China, Dubai . . . the assertion seems key. Sometimes assumptions that are claimed to be empirical regularities are really theoretical regularities. They can be patterns that originate in the authors' imagination, not in real-world data. The authors should build an empirical case for their claim that productivity improvements are contractionary.

Thirdly, and most importantly, why is all of the analysis focused on

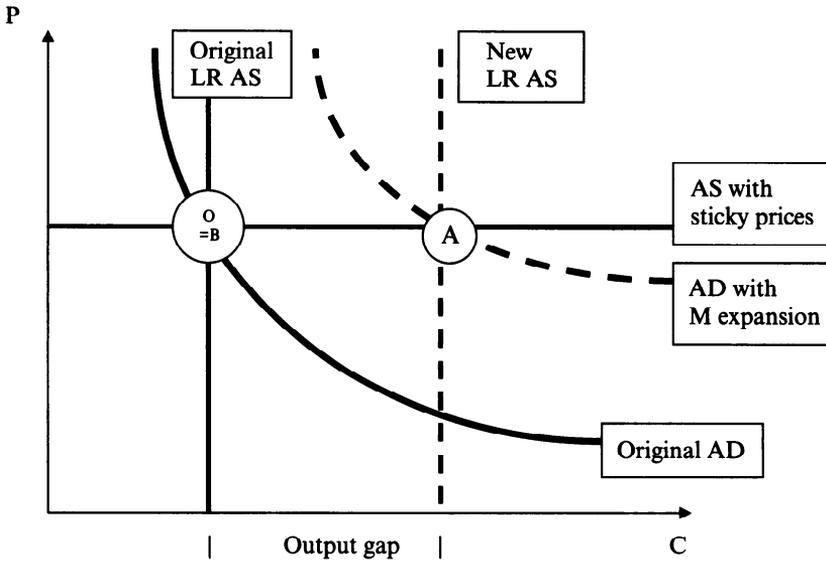
AS shocks and none on AD shocks; for example, fluctuations in spending or money demand? I realize supply shocks are important, especially terms of trade shocks in open economy models, where exchange rate regimes make a difference. But monetary policy cannot do that much to offset productivity shocks anyway. In traditional textbook models, negative supply shocks reduce output below potential and raise prices. Central banks can do no more than choose a slightly different combination of these two “bads,” whereas monetary policy *can potentially fully offset* shocks in money demand and other determinants of demand. So why the neglect of AD shocks?

### The Corsetti-Pesenti Model in Terms of the True AD-AS Graph

Here, with the authors’ help, I show how their model works in terms of graphs that truly merit the label AD-AS rather than the production function graph which usurps that name in their paper. So the price level is now on the vertical axis, and the horizontal axis represents Consumption, which is the authors’ chosen quantity measure. We begin, in figure 2C2.1, by showing the effects of a positive supply shock in a closed economy. A productivity shock raises potential output from  $Z_1,l$  to  $Z_2,l$ . If prices are flexible, the economy moves from  $O$  to the higher output (but unchanged employment). If prices are sticky, the economy is stuck at point  $O$ , which is now relabeled  $B$  to indicate that employment has fallen. The policy implication is that the authorities should use monetary expansion to shift AD out until the economy is at point  $A$ , thereby reproducing the real equilibrium of the flexible price case, eliminating the unemployment that is present at point  $B$ , and achieving the higher level of output that has become available at potential.

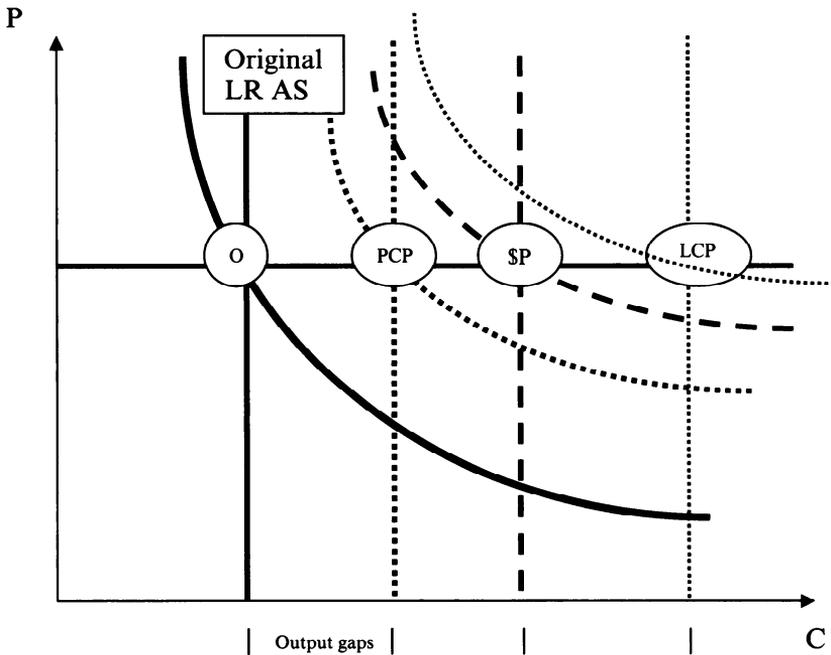
Now that we have seen it in standard AS-AS terms, I have mixed feelings about this exercise. On the one hand, the inability to show explicitly the fall in employment in this graph is precisely the reason why the authors prefer to use the production function graphs that appear in their paper. On the other hand, I question whether the single most important experiment on which to focus is one in which a positive (supply) shock is associated with unemployment. Again, my view is that if the topic of interest is the scope for monetary policy to respond to possible unemployment and an output gap, then it is more important to focus on demand shocks; here, the AS-AD framework would be more illuminating.

Figure 2C2.2 repeats the productivity-shock experiment for the case of an open economy. Here, the most interesting result is the comparison



**Figure 2C2.1**  
Productivity shock (accommodated by monetary expansion) in a closed economy

of the consequences of the three alternate assumptions regarding how prices are set. We see that the increase in potential output/consumption (which corresponds to the actual increase, if sufficiently accommodated by monetary expansion), is smallest in the case of Producer Currency Pricing, largest in the case of Local Currency Pricing (LCP), and intermediate in the case of Dollar Pricing (DP). The reason follows from the fact that the monetary expansion is accompanied by a nominal currency depreciation. Under PCP, import prices rise in proportion to the depreciation, and in the authors' telling, the home country loses consumption and welfare because the terms of trade worsen, whereas under LCP the terms of trade improve, allowing the home country higher consumption and welfare. In both cases the changes in the terms of trade and in welfare—worsening under PCP but improving under LCP—come at the expense of the foreign country. Dollar Pricing combines properties of the other two. The differences show up only in consumption, not in output, which is at the level of potential in all three cases. These results are of substantive interest. I do not think I have seen them before in the literature. There is a question, however, whether the results come from the terms of trade effects that the authors identify, or instead are simply a consequence of their choice of money demand function,  $M = PC$ , which



**Figure 2C2.2**  
Productivity shock in an open economy

in itself imposes an inverse relationship between  $M$  and  $C$ , given that  $P$  is fixed under LCP.<sup>1</sup>

### More on the Slope of the Phillips Curve under Globalization

Consider the slope of the Phillips Curve: the magnitude of the increase in inflation resulting from a given expansion of domestic *demand* (or the fall in inflation resulting from a given contraction in demand). Some suggest that globalization implies that inflation is less sensitive to domestic demand conditions, and more to global demand conditions, than it used to be: Borio and Filardo (2006), Fisher (2005), IMF (2006, pp. 106–108), Kohn (2006), and Yellen (2006), who calls this the new view. The argument is that foreign supply is more readily substituted for domestic output than before, so that the Phillips curve is flatter. (Firms have less pricing power.) Others suggest that globalization has produced a *steeper* Phillips curve: Dornbusch and Krugman (1976, pp. 570–573), Romer (1993), Rogoff (2004). The argument is that it is harder to raise output—

a country pays the price of monetary expansion more quickly, especially if the exchange rate is floating—because the economy more closely approximates the frictionless, perfectly competitive neoclassical paradigm. As much as international competition, Rogoff (2004) has in mind domestic sources of increased competitiveness from deregulation, privatization, decreased union power, and the advent of Wal-Mart, Amazon, and eBay.<sup>2</sup>

Remarkably, both camps, those who argue that globalization makes the Phillips curve flatter and those who argue that it makes it steeper, are suggesting that it results in lower inflation. In the new view, a given monetary expansion, or a given target in terms of output, is associated with lower inflation. The Romer (1993)-Rogoff (2004) claim that the Phillips curve is steeper of course recognizes the implication that a given monetary expansion will lead to higher inflation. But it goes on to point out that precisely because it would accomplish little, central banks in highly open economies will refrain from monetary expansion. People are aware of this, which reduces their expectations of inflation. The result in the general equilibrium of rational expectations (Barro-Gordon 1983) is that open economies will exhibit less inflationary bias than less open, less competitive economies. The attractiveness of this model from a theoretical viewpoint is that it provides the missing theoretical rationale for the common claim that an increase in the *level* of globalization produces a permanent fall in the average *rate* of inflation. Romer (1993) and Lane (1997) produced evidence that more open countries indeed have lower inflation rates.<sup>3</sup>

The April 2006 *IMF World Economic Outlook* finds that a trend increase in trade openness in a given sector tends on average to lead to a trend decline in the relative producer price in that sector (for 1987–2003; fig. 3.11). This suggests a microeconomic competitiveness effect. While the effect cannot come from aggregate Phillips Curves or monetary policy, it does validate the link from increased trade to decreased monopoly power—increased import competition drives down profit margins—which in turn firms up the link between globalization and domestic sources of increased competition such as deregulation, privatization, and decreased power of organized labor.<sup>4</sup>

I offer a tentative proposal for reconciling the new view with the Romer (1993)-Rogoff (2004) view. Individual firms in many sectors face increased international competition. As a result, it is true that they operate in more competitive markets and have less pricing power. In other words, they face more elastic demand for their products because of elas-

tic supply from competitors. In response, they develop new pricing policies, which involve setting prices more frequently and more flexibly in response to market conditions. But it would be a fallacy of composition to say that U. S. producers in the aggregate have more elastic supply. Rather, the Aggregate Supply relationship becomes closer to vertical. It becomes harder for monetary policy to push output away from potential.

But perhaps the slope of the Phillips curve is a red herring. If globalization and other sources of increased productivity narrow the gap between potential output and the level of output to which the public aspires, it can bring down the rate of inflation. This is true regardless of the slope of the Phillips curve, and regardless whether we are talking about the discretionary policy equilibrium for a given level of expected inflation or the long-run rational expectations equilibrium.

For much of the public, statistical measures of economic integration would be beside the point. The 800-pound panda in the boat is China, which is accompanied by various other tigers and jaguars. It is pointed out that (in the roundest of numbers) a billion low-wage workers are in the process of joining the world economy. It is already clear that China has put substantial downward pressure on prices of clothing and many other manufactured goods.<sup>5</sup> It is important to remember that China has also put upward pressure on oil and other agricultural and mineral products. But for most countries, the effects on the terms of trade and real income have been positive—certainly for commodity producers, including to an extent the United States—though not for rival producers of labor-intensive manufactures.

The effects do not necessarily show up in econometric studies to date. A limitation to statistical analysis of China's impact on U. S. inflation or other international variables is that China's substantial weight in the global economy is such a recent phenomenon.<sup>6</sup> But the effect is clearly there. And the public's intuition is right, that the biggest impact of low-wage Chinese and Indian workers joining the world workforce remains in the future. It is but the most dramatic illustration of how globalization is indeed changing the parameters of the American economy.

### **Miscellaneous Reactions**

The conclusion that dollar pricing leads to asymmetric transmission one-way from the United States to RoW (Rest of World) sounds like a

welcome possible answer to the puzzle of why, even post-EMU (European Economic and Monetary Union), the United States economy, the Federal Reserve Board, and the New York financial community seem still more powerful in the world than, respectively, the European economy, the European Central Bank, and the London financial community.

Finally, an issue in which I have personal interest. The authors find that optimal monetary policy targets a price index "... assigning higher weights (other things equal) to the core sectors in which nominal rigidities are more pronounced." Mankiw and Reis (2003) and Woodford (2003) have produced similar results, so the authors are in excellent company. But it seems to me that the conclusion might change if one included exogenous terms of trade shocks (most relevant for mineral exporters) and the necessity of including external balance as an objective—stemming from imperfectly functioning international financial markets—alongside the objective of internal balance. I want the targeted price index to emphasize volatile commodity export prices, so the currency automatically depreciates in response to adverse terms of trade shock.

Charles Engel at the conference mentioned targeting the PPI instead of the CPI. For example, if the world price of oil or coffee falls, should monetary policy in countries that produce those commodities expand enough to depreciate the currency? I would say yes, in order to accommodate adverse terms of trade shock. The PPI target has this property, as does targeting an export price index (Peg the Export Price, or PEP).<sup>7</sup> But CPI targeting does not have this property, especially if low weight is assigned to sectors in which nominal rigidities are absent.

All in all, Corsetti and Pesenti have examined a wide variety of important assumptions and policy questions within the New Open Economy Macroeconomics. I am grateful for their valiant attempt to do so within a simple graphical apparatus that would be expositionally useful. But I personally would have preferred some attention to Aggregate Demand shocks, and in any case I cannot agree that it is appropriate for the authors to label their production functions AS-AD curves.

### **Acknowledgments**

I would like to thank Charles Engel, and the authors, Giancarlo Corsetti, and Paolo Pesenti.

## Notes

1. The macroeconomic consequences of LCP versus PCP have been extensively worked out by others cited by the authors, including in particular Devereux and Engel (2003, 2004), Devereux, Engel, and Tille (2003), and Engel (2002, 2005).
2. A variant of the argument in Rogoff (2004) is that the higher level of real income that results from globalization narrows the gap between desired output and potential output, and thus reduces the inflation bias in the Barro–Gordon model. (This is close to the wage aspiration argument made previously.) Loungani and Razin (2006) reach the same conclusion.
3. A more recent examination is Gruben and McLeod (2004).
4. There are signs of this even in Europe, where regional integration through the European Union is a possible contributing factor (Blanchard and Philippon 2003).
5. For example, Fishman (2005).
6. Kamin, Marazzi, and Schindler (2004).
7. Frankel (2003, 2005).

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