

Teaching Post Keynesian Exchange Rate Theory

John T. Harvey
Professor of Economics

Department of Economics
Box 298510
Texas Christian University
Fort Worth, Texas 76129
(817)257-7230

j.harvey@tcu.edu

Teaching Post Keynesian Exchange Rate Theory

Those who teach economics from a Post Keynesian perspective almost invariably report that students, particularly those with business experience, find our real-world oriented approach much more appealing than that represented by Neoclassicism. In fact, the main opposition to Post Keynesianism appears to be concentrated among those already indoctrinated in mainstream graduate schools. It is therefore important to introduce elements of Post Keynesian analysis as soon as possible—before students become completely turned off by economics!

A common approach in classes taught by instructors with Post Keynesian leanings is to cover the standard Neoclassical material, add critique of the latter, and—if available—offer the Post Keynesian alternative.¹ If the last does not exist then it can be a very unsatisfying experience for both teacher and student as the attack on the orthodox approach can sound very hollow. The goal of this paper is to present a Post Keynesian model of exchange rate determination for classroom use. It is specifically designed to parallel Neoclassical presentations, particularly the Dornbusch model. The central features of the model presented here are a macro sector based on Keynes' Z-D diagram, endogenous money (including, if one prefers, a completely horizontalist view), a currency market driven by portfolio capital flows, and no assumption of a tendency toward full employment or balanced trade (over any time horizon).

This paper is organized as follows. In the next section, the orthodox view is presented. In particular, purchasing power parity, the Monetary approach, and the Dornbusch models are introduced and their relative strengths and weaknesses are reviewed. Next, the Post Keynesian

¹For covering the Neoclassical approach, I really like Laurence Copeland's textbook (Copeland 2005). My graphical representations of the Monetary and Dornbusch models are adapted from those he uses.

alternative is developed, including historical examples. Finally, conclusions are drawn and suggestions regarding course organization are offered.

1.0 The Neoclassical approach

The very beginning of most of my courses is a lecture on the difference between validity and cogency. Almost every argument/model/theory the student will come across in economics is valid. It is rare to find a situation where the theorist was not careful to ensure that the conclusion followed logically from the premises. And yet, we have many competing theories, not all of which generate conclusions that correspond to what we observe in the real world. This must be, I argue, because even if every model were valid, they are not all necessarily cogent. Some models are built upon premises that are so out of line with reality that they cannot be justified merely as conveniences. In those cases, no amount of “elegance” can prevent the theory from being irrelevant. Thus, I tell them, the job facing us is a difficult one: we must evaluate the effects of premises to see which one or ones is keeping our model from being a reasonable explanation of what we see around us.

After this basic lesson on model building in economics I cover a number of definitions and then move to the theory that forms the core of the Monetary and Dornbusch models: purchasing power parity. I will not go into much detail here as it is well known. Purchasing power parity can be expressed as follows:

$$(1) \$/FX = P_{\$}/P_{FX}$$

where $\$/FX$ is the dollar price of foreign currency (one particular currency or a weighted basket), $P_{\$}$ is the average price of goods and services in the United States, and P_{FX} is the average price of

goods and services in the rest of the world. If this equality does not hold then the implication is that the average real price (i.e., the price translated into a common currency) of goods and services varies across countries. Assuming for simplicity that there exist no transportation or other transaction costs, this will lead agents to buy output in the cheap country and sell where it is dear. This continues, with prices being bid up in the cheap country and driven down in the dear country and the currency of the cheap country appreciating, until $\$/FX = P_{\$}/P_{FX}$ once again.²

The Monetary Model is essentially purchasing power parity with a particular explanation of $P_{\$}$ and P_{FX} added. This is accomplished using the quantity theory of money:

$$(2) P = MV/y,$$

where P is the domestic price level, M is the supply of money, V is the velocity of money, and y is the level of real output. A core Monetarist assumption is that V is constant due to the fact that it is based on habits and institutional factors that are slow to change. Another key premise is that y is attracted to a long-run natural level (rate, if you set the model up as rates of growth—it is usually easier to use levels in the classroom), though it may vary in the short run as agents become confused about the true price level.³ M is viewed as under the complete control of the central bank and hence exogenous.

Substituting (2) into (1) and adding the appropriate subscripts yields:

$$(3) \$/FX = (M_{\$}V_{\$}/y_{\$})/(M_{FX}V_{FX}/y_{FX})$$

This is the Monetary Model. One may add interest rates, but it does not affect the conclusion.

²Though I typically stop here and raise questions about the underlying premises of purchasing power parity, in this paper I will save that until the Monetary Model is complete.

³Due to time constraints I never include money illusion in my class on exchange rates, particularly because it does not change the results.

The role of interest rates is to affect the demand for money function such that as U.S. (for example) interest rates rise, the demand for cash falls and V_s rises. This gives the very counter-intuitive result that as domestic interest rates rise, so the domestic currency depreciates.

In this model, if the money supply rises this causes inflation which makes domestic goods more expensive to foreigners. Exports then fall (as imports rise) and, as implied by the purchasing power parity, the home currency depreciates. This can be shown graphically as in Figure 1.

*****FIGURE 1 ABOUT HERE*****

The graph on the left is purchasing power parity. All variables are defined as above and the price level in the foreign country is equal to the slope of the line. As P_{FX} rises, so PPP becomes steeper, and vice versa. The graph on the right is the Monetarists' domestic macro model, with a vertical supply curve at the level indicated by the natural rate and a demand curve derived from the quantity theory of money (holding velocity and the supply of money constant along the curve).

Illustrated is a rise in the money supply. Starting at the levels indicated by the subscript zero and the marker ①, the first effect of the expansionary monetary policy is an upward shift of y^d to $y^{d'}$. Because output cannot rise and velocity is assumed to be constant, the quantity theory of money shows that the entire impact is on P_s , which moves from P_{s0} to P_{s1} . On the purchasing power parity diagram, the rise in the U.S. price level leaves the economy temporarily at point A where, due to the now higher P_s , the U.S. experiences a trade deficit. This means that agents are

selling dollars in order to obtain the currencies of nations with cheaper goods and services. As a consequence, the dollar depreciates. Once it falls from $\$/FX_0$ to $\$/FX_1$, we are back on PPP with a balanced trade equilibrium. The economy comes to rest again at the points labeled ②. The basic lesson is that of Monetarism in general: though it causes no harm over the long run (where the natural rate takes over), in the short run money supply growth in excess of the growth of real output causes unnecessary distractions and inefficiencies. This is particularly true is the rate of money supply growth varies.

As suggested above, this is a quick and easy model to present in the classroom and it is standard fare in mainstream text books. Once this is shown, the Post Keynesian instructor can stop for a moment and spend time critiquing it. First and foremost we must ask whether or not it appears to explain the real world. On top of the prediction that rising interest rates cause domestic currency depreciation, which contrasts sharply with what we observe, the Monetary Model suggests a high correlation between inflation and exchange rate movements. This arises from the assumption of purchasing power parity. However, one can cite any number of studies to show that, at best, purchasing power parity *may* hold over very long periods and for countries with high rates of inflation (see, for example, Sarno and Taylor 2002, p. 96). It is practically useless for time horizons less than five years or so and for relations among the developed economies. In short, the Monetary Model is not very helpful to those who wish to know how currency prices actually work over reasonable time horizons and among those countries who are the main players in the international economy.

Why does this model fail? There are a number of key premises with which a Post Keynesian economist would take issue. First and foremost is the full-employment assumption.

Even the more sophisticated version of the Monetary Model that allows for fluctuations away from y_0 (when agents become confused about the actual price level—note that even then there is still technically no *involuntary* unemployment) still assumes that the natural rate and full employment represent an inevitability that precludes the necessity of government intervention into the economy. This contrasts sharply with the uncertainty and less-than-full employment equilibrium of the *General Theory* and it is critical to the conclusion that increases in the supply of money lead to a proportional increase in prices. Also playing a role in that part of the model is the assumption that changes in liquidity (via a change in velocity or the supply of money) cannot be initiated by the private market. The y^d curve shifts if and only if government policy changes and it moves in direct proportion to the change in the money supply. Third, the Monetary Model assumes that purchasing power parity holds constantly. This is how changes in prices are transmitted to the exchange rate. But if this were true then a) trade flows (and not financial flows) must be the primary (if not only) determinant of currency prices, and b) we are making the assumption that the only factor driving trade flows is the change in relative prices. There is no income effect whatsoever and the financial sector has no impact on the currency market. None of this meshes well with the Post Keynesian view of the economy and it leads to conclusions that do not correlate with what we observe, the latter including involuntary unemployment, chronic trade imbalances, endogenous fluctuations in liquidity, and powerful income effects on imports and exports.

Though it remained in text books and the scholarly literature, it was evident even in the 1970's that the Monetary Model did not do a terribly good job of explaining what happens in the real world. So, in 1976, Rudiger Dornbusch introduced a new approach that took into account

two glaring empirical facts: currency market volatility and equilibrium trade imbalances (at least in the short run). Dornbusch's approach is basically the Monetary Model with several modifications and so it is best covered after the latter has been explained. A core premise is that the financial sector adjusts more quickly than the real sector. This seems reasonable and it has two key manifestations in the model. First, prices (of goods and services) are assumed to be sticky in the short run.⁴ Second, while purchasing power parity (the real sector) holds only in the long run, interest rate parity (the financial sector) holds constantly. The primary impact of all this is that, because the real side of the economy does not adjust sufficiently in the short run, the financial sector must take up the slack. The financial sector, and in particular the exchange rate, overshoots its long-run equilibrium, only to return once the real sector has had time to adjust. For this reason, the Dornbusch Model is sometimes called the Overshooting Model.

Graphically, the Dornbusch Model is composed of four quadrants. The bottom two are basically the Monetary Model as shown in Figure 1. The purchasing power parity diagram requires no modifications, though it is now assumed that the economy could in the short run come to rest at a point off the PPP line. On the y^d - y^s macro portion, the original y^s becomes the long-run aggregate supply curve and is re-labeled $y^s(lr)$. The short-run aggregate supply curve is drawn as a horizontal line from the current price level and is labeled $y^s(sr)$ (see Figure 2). This is an extreme view of the sticky-price assumption. One can assume $y^s(sr)$ to have some sort of positive slope, but it will not change the basic result.

⁴I have always found it strange that firms would find it easy to instantaneously change output but not prices.

*****FIGURE 2 ABOUT HERE*****

The two upper quadrants represent (going left to right) uncovered interest rate parity and the IS-LM apparatus. The first is derived from

$$(4) (\$/FX)^e/(\$/FX) = (1+r_{\$})/(1+r_{FX})$$

where $r_{\$}$ is the rate of interest on the dollar, r_{FX} is the rate of interest on foreign currency, $(\$/FX)$ is the spot price of foreign currency measured in dollars, and $(\$/FX)^e$ is market participants' expectation of the future spot price of foreign currency measured in dollars (where the time horizon for the expectation is the same as that for the interest rates). If this equality does not hold, then agents expect to earn more on the interest-bearing assets (once expected exchange rate movements are taken into account) of one country than another's. Financial capital flows to the high-return country, driving down their interest rates and raising the spot price of their currency. Meanwhile, the flight of capital from the low-return country raises their interest rates and makes their currency cheaper. This continues until equality is restored.

Graphically, Figure 3 shows equation (4) by placing $(\$/FX)$ and $r_{\$}$ on the axes and relegating changes in $(\$/FX)^e$ and r_{FX} to shifts in the UIRP function. It takes the slope it does because, holding $(\$/FX)^e$ and r_{FX} constant, as $r_{\$}$ rises so dollar assets become more popular, leading to a dollar appreciation (and a leftward movement on the $(\$/FX)$ axis). Were $(\$/FX)^e$ to rise then UIRP would shift right as agents expect to earn excess returns on foreign interest-bearing assets. This would lead to a movement of capital away from the U.S. and a depreciation of the dollar and/or a rise in U.S. interest rates, which moves UIRP to the right. Analogously, a fall in $(\$/FX)^e$ would create a leftward shift. Were r_{FX} to rise, the effect is similar to the rise in

$(\$/FX)^e$. Again, capital flees the U.S. and the UIRP curve must shift right.

*****FIGURE 3 ABOUT HERE*****

Note that when $r_{\$} = r_{FX}$, then it must also be true that in equilibrium $(\$/FX)^e = (\$/FX)$. On Figure 3, this means that we know that the $(\$/FX)^e$ associated with innermost UIRP curve is equal to $(\$/FX)_0$. Even if we now move along that same UIRP, it is still true that $(\$/FX)^e = (\$/FX)_0$, making the point at which $r_{\$} = r_{FX}$ a useful point of reference.⁵

The last remaining quadrant is the top right, which is an IS-LM construct. It will show the prevailing interest rate, which will then feed into the UIRP curve. The IS-LM apparatus is the standard one with an open-economy element in that one of the factors that may shift IS the real exchange rate, Q:

$$(5) Q = (\$/FX)(P_{FX}/P_{\$})$$

All variables are defined as above. Because this represents the relative dollar price of goods and services abroad versus in the U.S., as it rises IS shifts to the right (on the assumption that U.S. exports are rising and imports falling). A fall in Q does the opposite. Meanwhile, LM is shifted when the real money supply (M/P) changes, rightward for a rise in the real money supply and vice versa.⁶

The complete set up is shown in Figure 4 with all initial positions labeled with the

⁵The general rule that can be derived is that if one labels r_{FX} on the vertical axis as a point of reference, one can see where $(\$/FX)^e$ is on the horizontal axis by tracing a line out to the UIRP curve and dropping down.

⁶Other factors may of course shift IS and LM, but I opt to keep the explanation as simple as possible. That intermediate macroeconomics is not a prerequisite for my class is a further incentive to steer clear of complications.

subscript zero. Now imagine that there has been an increase in the nominal money supply. The very first thing that happens in the Dornbusch model is that agents see this and alter $(\$/FX)^e$ accordingly. This occurs because it is assumed that they believe the Monetary Model will eventually prevail and so they immediately (armed with rational expectations) conclude that the dollar will depreciate to the level that would have been consistent with the analysis shown in Figure 2 (assuming the same change in the money supply). This causes a rightward shift in UIRP, as shown.

*****FIGURE 4 ABOUT HERE*****

With $(\$/FX)$ and r_s unchanged, interest rate parity no longer holds on the new UIRP. Because financial markets adjust quickly, this is not permitted. Since r_s will be a function of domestic macro conditions, $(\$/FX)$ bears the entire burden of adjustment and moves immediately to $(\$/FX)_1$. It will not, however, stay there for long, for the overshooting is about to take place.

To show this it is most convenient to next move to the IS-LM apparatus. There, two events have occurred. First, because prices cannot move in the short run, the rise in the nominal money supply has created a rise in the real money supply. This shifts LM to the right. Meanwhile, the dollar depreciation described in the previous paragraph leads to a rise in Q and a rightward shift in IS. Together, this means a rise in y on IS-LM, with an ambiguous effect on r_s . By assumption, and consistent with the premise that financial markets react faster than goods ones, LM is drawn so that it shifts further right than IS, thus lowering r_s (to r_{s1}).

Returning to UIRP, the fall in r_s means that there is a movement along the new function

and $(\$/FX)$ moves to $(\$/FX)_2$.⁷ This is the overshooting and it occurs because prices did not adjust. Had they done so, the real money supply would have remained unchanged, LM would not have shifted, and Q would not have risen (thus shifting IS). Moving to the PPP diagram, since there is no requirement that it holds over the short run it is only necessary to drop a line down from $(\$/FX)_2$. Since the price level is still $P_{\$0}$, we are at point A which shows the U.S. trade surplus that shifted IS to the right.

The y^s - y^d diagram is somewhat more complex. The bottom line is that y^d shifts to the outermost curve shown in Figure 4 and that we remain, for the time being, on $y^s(sr)$. The process by which this occurs is the following. First, as in Figure 1, the rise in the nominal money supply, M , shifts y^d up and to the right. At this point, however, the combination of IS-LM and the Monetary Model runs into a bit of a problem. Both macro models must come to the same conclusion regarding the effect of the change in the money supply. If the monetary stimulus alone takes us to a particular point on y^s - y^d , then that same monetary stimulus should take us to the same level of real output on IS-LM (the former through y^d and the latter via a shift on LM). But, while there is no provision for changes in the exchange rate to affect y^d or y^s , the rise in Q caused by the increase in the money supply shifts IS to the right. Hence, we could end up with a higher y on the IS-LM apparatus than on y^s - y^d if $\$/FX$ causes a shift in one but not the other.

This is solved by assuming that changes in the nominal exchange rate do, in fact, shift y^d further to the right. This is not entirely ad hoc because it can be assumed that the rise in $\$/FX$ led to U.S. trade surplus shown on PPP and hence an inflow funds that raise domestic liquidity

⁷Rather than now once again shift IS to the right due to the consequent rise in $\$/FX$ and Q it is assumed that the original shift was consistent with $(\$/FX)_2$. This is, after all, a set of simultaneous equations. Any sequence we superimpose is merely for our convenience.

on y^d (though not, curiously, on LM).

This completes the explanation of the short-run. Each of the movements marked ① have taken place and we are in a temporary state of equilibrium.

The move to the long run starts when domestic prices in the U.S. begin to adjust. This means we move from $y^s(\text{s.r.})$ To $y^s(\text{l.r.})$. Jumping first to the IS-LM diagram, this shifts both curves to the left, IS due to the fall in Q (see equation (5)) and LM because the real money supply is shrinking. Note that if we are assuming that Q must return to the level consistent with purchasing power parity (i.e., that at which it started) and that the real money supply must end unchanged (since, in the quantity theory of money shown in equation (2), in the long run P absorbs the entire effect of the rise in M while V and y remain constant), then we must end up back at $r_{\$0}$ and y_0 . IS and LM move accordingly.

On the UIRP curve, the events on IS-LM create a movement up and along to $r_{\$0}$ and $(\$/\text{FX})_1$, the appreciation of the dollar being a function of the higher rate of interest offered on dollar assets. Note that this is where market participants had been expecting the dollar to settle all along. Note further than when a vertical line is dropped from $(\$/\text{FX})_1$ to the PPP curve, it shows a point that is now consistent with purchasing power parity.⁸

Last, the y^d curve shifts slightly in as the dollar appreciates from $(\$/\text{FX})_2$ to $(\$/\text{FX})_1$ and the inflow of liquidity from the trade surplus ends. In terms of the supply curve, $y^s(\text{l.r.})$ replaces $y^s(\text{s.r.})$ as the relevant supply curve, meaning that the economy comes to rest at $P_{\$1}$ and y_0 . All the adjustments marked ② have now taken place and the economy is at long-run equilibrium.

⁸In class, it takes some careful planning to get this to work. One may need to invoke the big dot theorem!

At this point the instructor can stop to review the strengths and weaknesses of Dornbusch. It is certainly an improvement over the Monetary Model. It allows for the existence of trade imbalances, it provides a rationale for the perceived volatility of the currency market, and fluctuations in GDP and employment are possible. It is furthermore a great leap forward to allow a change in expectations alone to move the spot rate. And that interest rates are important forces in driving currency prices (as shown on the UIRP curve) fits well with the facts of experience. But it is still ultimately the Monetary Model and shares all its weaknesses. The overwhelming importance of capital flows, less-than-full-employment equilibrium, and chronic trade imbalances—all salient features of the international economy—cannot be found in Dornbusch.

Again, it is necessary to look more closely at the premises upon which the Dornbusch model is built. To begin, the assumption of rational expectations and the market participants' use of the Monetary Model in forming their forecasts is absolutely critical to the functioning of the model. Recall that the very first impact of the increase in the money supply was the rightward shift of UIRP that occurred as expectations adjusted. Because, in the end, domestic interest rates return to their original level, **this initial shift is the sole determinant of the long-run equilibrium position of \$/FX.** Had Dornbusch not simply *assumed* that agents use the Monetary Model in their long-term forecast (and that those forecasts are, on average, correct), that initial shift is unlikely to by sheer coincidence put us at the one and only \$/FX consistent with purchasing power parity in the long run. The centrality of this assumption to the model's operation cannot be overemphasized.

In point of fact, not only is there strong evidence that agents' expectations are not rational (Harvey 1998-99), but there is little reason to think that they would employ a model whose core

assumption, purchasing power parity, is viewed by the majority of currency dealers as “academic jargon” (Cheung and Chinn 2000: 16). It appears therefore that expectations are permitted to play a key role only because agents are **required** to expect what Neoclassical economists expect! There is furthermore strong evidence that uncovered interest rate parity does not hold (Harvey 2004) and I do not even bother in class (in the interest of time) to review the deficiencies of IS-LM. In the final analysis, Dornbusch approach shares all the problems cited under the Monetary Model and then some.

By this time, the students are anxious to hear something that they can actually use in the real world! It is time to move on to the Post Keynesian view.

2.0 The Post Keynesian exchange rate model

In order to make it easier for students to compare the two approaches I have developed a model that adopts the same four-quadrant approach as Dornbusch. Each of the four graphs plays roughly the same role as it did in the Neoclassical conception, but adheres to Post Keynesian principles. It is, in a way, the Dornbusch Model rewritten assuming endogenous money, uncertainty, less-than-full employment equilibrium, and no tendency (over any time horizon) towards balanced trade. The hope is that making these particular premises more realistic will lead to a model whose conclusions match more closely what we observe in the real world.

Figure 5 shows the complete Post Keynesian model. The sector in the bottom right is Keynes’ Z-D diagram, as outlined in chapter three of the *General Theory*. This is a well-known analytical tool within the Post Keynesian community and this basic approach has spawned adaptations and applications. The graph is set in P_y, N space, where P_y is the price level times

real output or income (and hence nominal output or income) and N is employment. The Z curve represents the behavior of employers and shows the level of nominal sales they must expect for them (in aggregate) to be willing to hire a particular number of workers. Its shape is a function of the diminishing marginal productivity of workers. In order to be willing to hire more employees, sales must increase at an increasing rate so as to offset the falling productivity at the current wage.⁹ Note that at zero expected nominal sales, zero workers are hired.

*****FIGURE 5 ABOUT HERE*****

The D curve shows the nominal sales generated at various levels of employment. Its slope is a result of the consumption function. Income rises as employment rises, but the resulting spending only does so at a decreasing rate. Were agents to decide to spend more from a particular amount of income, so D would become steeper. This might happen, for example, if the distribution of income became more even. The vertical intercept of D depends on autonomous spending: private investment, government expenditures, and net exports. As they rise, so the D curve shifts up, and vice versa. It is a fundamental result of Post Keynesian macro theory that less-than-full-employment equilibrium is possible, even likely. D has a flatter slope than Z and may therefore cut the latter at an N that does not represent full employment. Only if, by coincidence, the vertical intercept of D moves to compensate for the falling consumption per unit of income can we expect there to be no obstacle to full employment. Autonomous spending, and

⁹Victoria Chick's book contains an excellent explanation of the derivation of the Z - D diagram (Chick 1983).

in particular investment, is the driving force in Keynes' macroeconomy.

To the left of Z-D is the quadrant occupied by the purchasing power parity relationship in both the Monetary and Dornbusch models. Here, too, it will be the sector that explains the state of the current account, but there is no assumption that the latter will tend toward balance or that it is driven primarily by price factors. Indeed, in the real world, trade is much more sensitive to income effects.¹⁰ The bottom left quadrant of Figure 5 shows the BTFX curve, which is the locus of points showing the combinations of P_y and $(\$/FX)$ that yield balanced trade. The assumption is that $(\$/FX)$ is directly related to net exports and P_y indirectly so. Hence, in order to maintain balanced trade, every time there is a rise in $(\$/FX)$ (raising net exports) this must be offset by a rise in P_y (which would lower net exports). No such movement is expected to be forthcoming, of course; BTFX is simply a reference and, unlike PPP, not an equilibrium relationship. It shows whether the current account is in deficit (all points to the left of BTFX), surplus (all points to the right of BTFX), or balance (all points on BTFX). Whatever prevails, that condition that may exist indefinitely. It is further assumed that whatever balance exists in the current account, an offsetting one is generated in the capital account. BTFX would shift if the underlying relationships were to change (i.e., if trade flows were to become more or less sensitive to changes in P_y or $\$/FX$). I typically draw BTFX as very flat to reflect the relative insensitivity of trade flows to changes in exchange rates (something that stands in stark contrast to the Neoclassical assumption).

As was true in the Dornbusch model, the top left is where the exchange rate is set. The

¹⁰Unfortunately, this specification does not allow us to separate P from y , but at least the latter is actually included as a determinant of trade flows.

Post Keynesian approach to exchange rates is premised on the belief that, in today's market, currency prices are driven by portfolio capital flows. As agents come to prefer one country's assets to another's, so the money issued by the former appreciates at the expense of the latter's. Thus, the question of what makes currency prices move is akin to asking why does portfolio capital flow move in the direction that it does?

In Harvey (manuscript), this is a question that is explored at length. For present purposes, let us assume simply that capital flows are driven only by interest rates and expectations of future currency movements.¹¹ In particular, use the following specification:

$$(6) \quad (\$/FX) = f(r_{\$}, r_{fx}, (\$/FX)^e)$$

where $r_{\$}$ is the domestic (in this case, U.S.) rate of interest, r_{fx} is the foreign rate of interest, and $(\$/FX)^e$ is the market's expectation of the future spot rate.¹² The first is assumed to affect $(\$/FX)$ negatively, such that a rise in U.S. interest rates causes a dollar appreciation as agents buy the dollar to buy the interest-bearing assets offering a higher return; rising foreign interest rates have a positive effect on $(\$/FX)$ as agents buy foreign currency to buy the interest-bearing assets offering a higher return; and a rise in $(\$/FX)^e$ drives $(\$/FX)$ up as agents buy the currency they expect to see appreciate.

¹¹I spend much of the rest of the semester developing a more complete picture of this quadrant.

¹²Technically, one should really also include trade flows as a determinant of the demand for currency. As it plays a relatively minor role (with trade flows around roughly 10% of all international transactions) I have left it out in the interest of simplicity. There are periods when the market appears to put a great deal of emphasis on current account balances. However, as during these periods the significant exchange rate movements occur after official announcements of events that occurred a month ago I would argue that this is more properly an example of a change in $(\$/FX)^e$.

The vertical axis of the top left quadrant is $r_{\$}$. Because a rise in U.S. interest would cause a dollar appreciation, the slope of the function is negative. A change in any of the other factors will lead to a shift in the FXM function. A rise in r_{fx} , for example, would lead to a dollar depreciation and hence a rightward shift. A rise in $(\$/\text{FX})^e$ will shift FXM to the right as agents divest themselves of the currency they expect to see depreciate (i.e., the dollar). Changes in $(\$/\text{FX})^e$ (and therefore shifts in FXM) are a terribly important factor in currency markets. The factors that determine it, however, are fairly complex, requiring reference to psychological theory, the structure of the market, and chapter twelve of Keynes' *General Theory*. I cover all this in class, but not until after this graph is explained. For the present purposes, treat $(\$/\text{FX})^e$ as exogenous, though certainly not constant or even stable.

The remaining quadrant represents the domestic money market and the combinations of N and r yielding equilibrium there. The basic premise is that N proxies the overall level of economic activity and that at higher levels pressure is placed on loan markets, driving the rate of interest up. However, in an endogenous-money world this is not such a straightforward proposition. A range of functional forms is possible. For example, those taking a strict horizontalist approach can assume that money endogeneity and central bank policy combine to leave the economy at some target rate of interest regardless of the current level of economic activity. In that case, a horizontal line would be appropriate. Otherwise, at least some positive slope would make sense as increasing demands for liquidity would eventually drive up the price of money. As at first one can expect the decline in hoarding and plentiful excess reserves to offset this, M would be drawn as shown: relatively flat over low levels of N , with an increasing slope at higher ones. Upward and downward shifts of M would occur as central bank interest-

rate targets were adjusted and would likely be the more important source of changes in the interest rate.

This completes the model. I have purposely left it fairly simple, including only as much detail as would allow me to drive home the points I want to make. One could add a number of other determinants to each of the graphs, not to mention some interrelationships among them.¹³ Instructors may, of course, do so at their discretion.

Figure 5 shows the complete set up in initial equilibrium. The economy is currently at the levels subscripted with a zero. N_f on the Z-D diagram indicates the level of N necessary for full employment. Note that there is no assumption that N is attracted to N_f . At N_0 , r_0 is the interest rate that prevails. According to FXM, this yields a currency price of $(\$/FX)_0$ which, as we see on BTFX, represents a currency price at which the U.S. enjoys a trade surplus and, therefore, a capital account deficit (where $(\$/FX)_1$ would give balanced trade). The economy may remain at this point indefinitely.

Recall for a moment the central lessons that students take from the Monetary Model: trade tends toward balance, the primary drivers of trade flows are price (and not income) variables, and national inflation rates are a function of changes in the exogenously controlled supply of money. They further learn that economies tend toward full employment and a “natural” rate of output growth and that currency prices are a function of trade flows. The Dornbusch model makes all these same claims for the long run, but allows for temporary fluctuations away from the natural rate and balanced trade in the short run and suggests that we

¹³For example, it would be logical to allow for an upward shift in D whenever an event elsewhere in the model caused an improvement in the trade balance (as shown on BTFX), and vice versa. As this will not, in general, change the overall story told, I opt to omit it.

should observe currency price volatility. Dornbusch also introduces the idea that agents' expectations are important, arguing that these are rational (i.e., correct on average) and generate predictions consistent with the Monetary Model. This is how Neoclassicism arms students to understand the world.

I would argue that the central features of the post-Bretton Woods world have instead been chronic payments imbalances, trade flows dominated by income variables, less-than-full employment, and exchange rates driven by interest-rate differentials and irrational (at least by the standard definition) expectations. The model presented here illustrates all of these but the last (which I do later in class).

In working through the Post Keynesian alternative, I like to focus on historical examples so that students are learning both how to manipulate the model and some recent economic history at the same time. I start with the run up of the dollar-Deutsche mark rate from 1980 to 1985. The dollar started at \$0.57/DM (1.75 DM/\$) and ended at \$0.31/DM (3.25 DM/\$). This is a remarkable movement and any worthwhile exchange rate theory must be able to explain it. This was not a fleeting or random event. It took place in a well organized financial market over the course of almost five years.

A major factor in the dollar run up was the shift in Federal Reserve policy that took place in October of 1979. The move to targeting money supplies rather than the interest rate, combined with the decision to combat inflation by restricting the former, led to a historic rise in U.S. interest rates. This, combined with the fact that the U.S. entered an expansionary period at the end of 1982 lead to sharp turn from a current account surplus of \$3.8 billion in February of 1982 to current account deficit of almost \$29 billion by the time the dollar had peaked three years later

(all data from Economagic.com).

This can be shown on the Post Keynesian exchange rate diagram as in Figure 6. The M curve is shifted up to represent the new Federal Reserve policy stance and the move from D to D' is the economic expansion referenced above. As in February 1982, the current account begins in slight surplus (see point P_{y_0} , $(\$/FX)_0$). When the shifts of D and M are complete, there is now a large trade deficit (at point P_{y_1} , $(\$/FX)_1$). In addition, one can see by the slope of BTFX that the primary cause for the state of the current account balance is the domestic macroeconomic expansion. Had the only change been a move to $(\$/FX)_1$, the trade deficit would be very slight. The fact that as the dollar went through a dramatic fall to the end of 1987 and yet the deficit continued to rise lends support to the assumption that BTFX should be relatively flat.

*****FIGURE 6 ABOUT HERE*****

A second period I like to show is the fall of the euro on its introduction in January, 1999, and through 2001. By June, 2001, the new currency had lost twenty-five percent of its value against the dollar. Two main factors were responsible: an interest rate differential that favored the dollar and the expectation that the U.S. would experience faster GDP growth than its European trading partners. With respect to the former, at the outset the U.S. one-month libor rate exceeded the euro one by almost two percentage points. This rose to nearly three by the end of 1999. Though the differential then started a steady decline, it was still positive until May of 2001. Throughout this period and up to June the euro fell against the dollar. One can represent this graphically by either shifting M upward (showing a central-bank initiated change in the

target rate) or a leftward shift in FXM (showing a fall in the foreign interest rate). I elected to do the former. To make matters worse for the euro, though events did not always bear this out, the market's sense in general was that the U.S. economy would grow more quickly. This led agents to expect a dollar appreciation, lowering $(\$/FX)^e$ and shifting FXM to the left. Such a scenario is illustrated in Figure 7. As shown, the US had a current account deficit for the entire period, which became steadily larger.

*****FIGURE 7 ABOUT HERE*****

Depending on time available, more examples can be shown. The refreshing thing is that one does not have to finish this lecture with, "Of course, this model does not work in the real world!" It most certainly does, and, because they assume that they might actually be able to use it at some point, students ask some penetrating questions about it. As the instructor, it is a very satisfying feeling to teach a theory of currency prices that amounts to something more than just an exercise in logic.

3.0 Conclusions

In our increasingly interdependent and global economy students deserve to leave school armed with something more useful than purchasing power parity. And yet, without a formal alternative, we can do little more than this. Critique is useful as a starting point, but students eventually want to know what alternatives are available. I hope that the model developed here can help with the latter.

In terms of finding time to cover the Post Keynesian perspective in class, I urge the instructor to consider carefully the true benefit of covering the Neoclassical models. While there may be compelling reasons to teach some aspects of the latter, how much does the student really gain from learning irrelevant theory after irrelevant theory?¹⁴ In fact, one is certainly not obligated to cover Dornbusch at all.¹⁵ It takes quite some time and is fairly complex. I like to do so because, first, it represents a Neoclassical attempt to take into account the fact that their earlier models did not predict what was observed in the real world (exchange rate volatility and chronic trade imbalances). This is precisely what we, as economists, should do, and I want students to learn from this. In addition, Dornbusch takes the important step of allowing exchange rate expectations to play an active role. That this is only so because they are deliberately handcuffed is also a good lesson, though this time in terms of what **not** to do. Last, I actually think the Dornbusch model is quite clever. Imagine having to build a theory that will predict exchange rate volatility and equilibrium trade imbalances, but you are forced to work with rational expectations, purchasing power parity, and the natural rate hypothesis! It is an interesting exercise in model building.

In my class I do not stop with the analysis shown here, incidentally. This takes me ten weeks of a fifteen-week semester.¹⁶ The lecture then turns to the factors driving the top left diagram in the Post Keynesian exchange rate model. In particular, I spend the next several weeks

¹⁴Something that I must admit that I did for many years.

¹⁵Or any Neoclassicism, for that matter.

¹⁶The Post Keynesian Model itself takes two to three weeks. If intermediate macroeconomics were a prerequisite then this could be shortened.

explaining the exchange rate expectations variable, $(\$/FX)^e$. This requires a detour to Keynes' chapter twelve and the psychological literature on decision making. Such factors, it is shown, play an important role in creating bandwagons and crises.¹⁷ The last portion of the course examines the design of international monetary systems. We look especially at Paul Davidson's approach and we emphasize, as he does, the necessity of avoiding deflationary biases (Davidson 1992-93). One can use the model developed here, incidentally, to show how nations burdened with reducing current account deficits find the most success, unfortunately, by acting to lower the level of domestic economic activity (and setting into motion system-wide deflation).

When all is said and done, I hope that my students graduate with a more realistic conception of what drives international finance than those in comparable mainstream courses. The above graphical analysis is simple, but offers several important lessons, not the least of which is that the premises upon which any argument is built are vital to the conclusions drawn. Full employment, perfect foresight, purchasing power parity, rational expectations, et cetera, are not just simplifying assumptions. Without them we get a very different—and much more realistic—view of the world. I hope that this is a lesson my students take with them to other classes, as well.

¹⁷All of this is outlined in greater detail in the draft of my book (Harvey manuscript).

BIBLIOGRAPHY

- Cheung, Yin-Wong and Menzie D. Chinn. (2000) "Currency Traders and Exchange Rate Dynamics: A Survey of the U.S. Market," University of California Santa Cruz Department of Economics Working Paper. Online.
Available<<http://econ.ucsc.edu/faculty/cheung/nysurvey.pdf>>
(accessed February 28, 2004)
- Chick, Victoria. (1983) *Macroeconomics After Keynes: A Reconsideration of the General Theory*, Cambridge, MA: The MIT Press.
- Copeland, Laurence. (2005; 4th Edition) *Exchange Rates and International Finance*, Harlow: Pearson Education.
- Davidson, Paul. (1992-93) "Reforming the World's Money," *Journal of Post Keynesian Economics*, 15(2): 153-179.
- Harvey, John T. (manuscript) *Exchange Rates and Capital Flows: A Post Keynesian Approach*.
- _____. (2004) "Deviations from Uncovered Interest Rate Parity: A Post Keynesian Explanation." *Journal of Post Keynesian Economics*, 29 (1): 19-35.
- _____. (1998-99) "The Nature of Expectations in the Foreign Exchange Market: A Test of Competing Theories." *Journal of Post Keynesian Economics*, 21 (2): 181-200.
- Keynes, John Maynard. (1964) *The General Theory of Employment, Interest, and Money*. New York: Harcourt Brace Jovanovich, Publishers.
- Sarno, Lucio and Mark P. Taylor. (2002) "Purchasing Power Parity and the Real Exchange Rate," *IMF Staff Papers*, 49(1): 65-105.

FIGURES

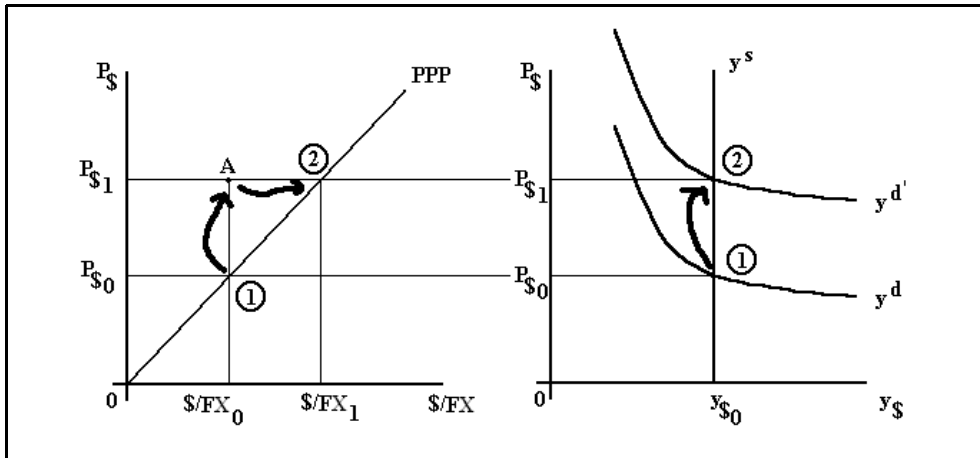


Figure 1: The Monetary Model with an increase in the money supply.

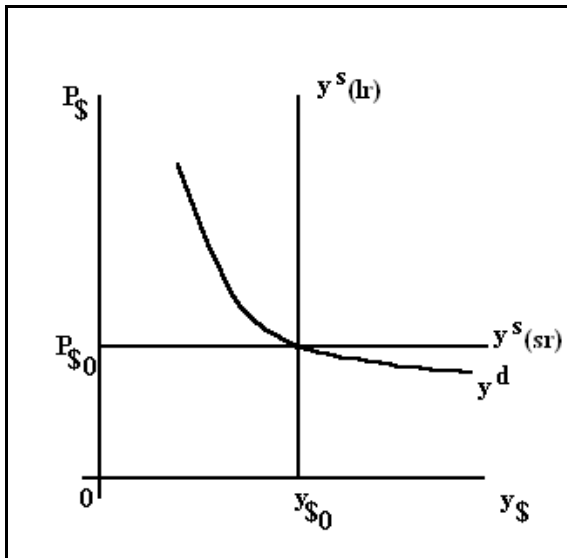


Figure 2: Aggregate Supply-Aggregate Demand portion of the Dornbusch Model.

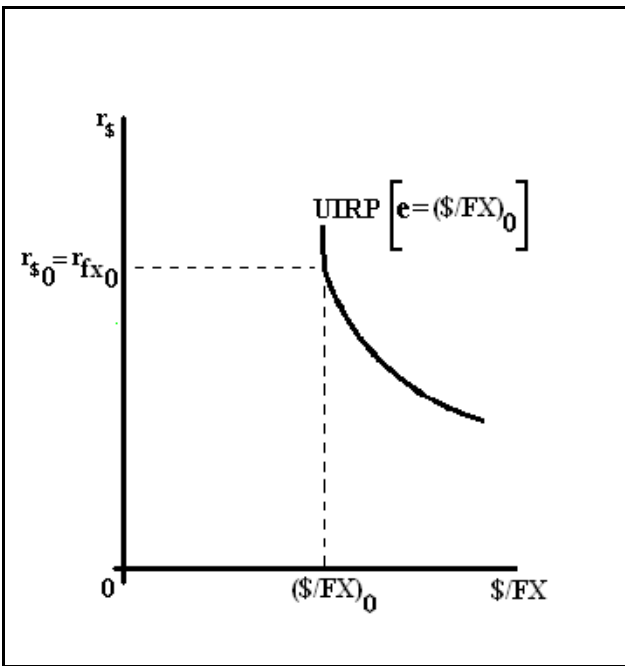


Figure 3: Uncovered Interest Rate Parity portion of the Dornbusch Model.

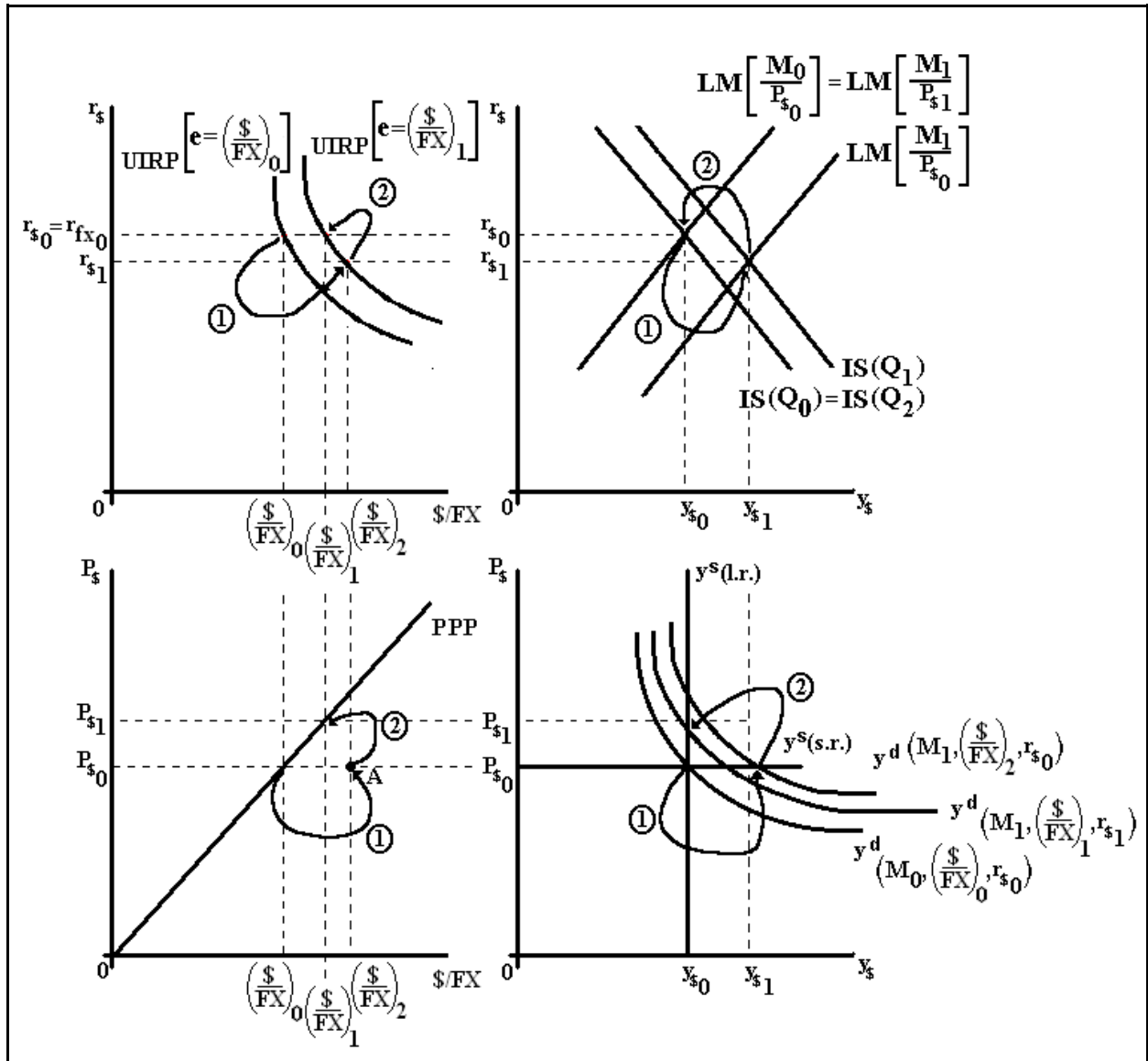


Figure 4: The Dornbusch Model with an increase in the money supply.

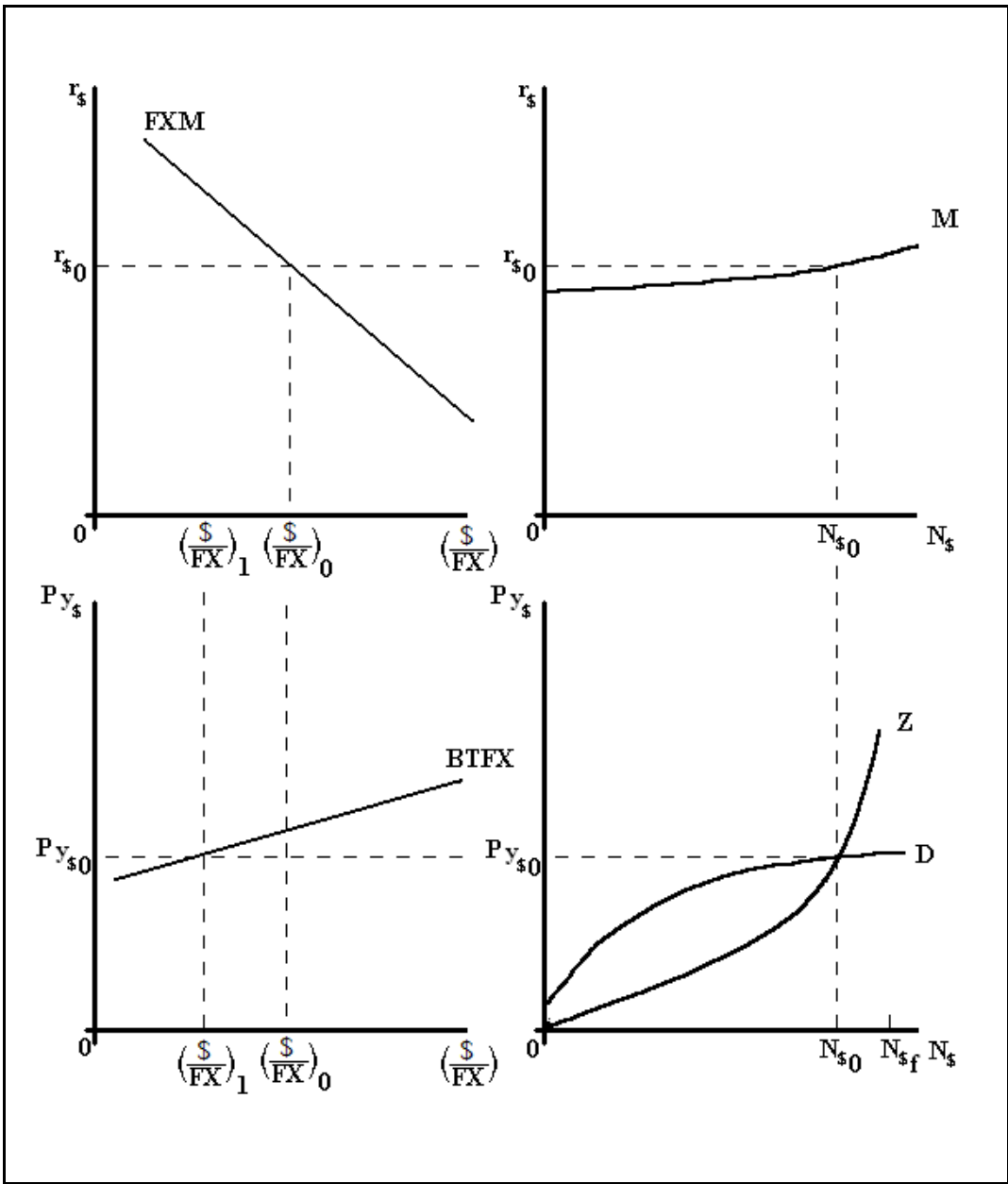


Figure 5: Post Keynesian Exchange Rate Model.

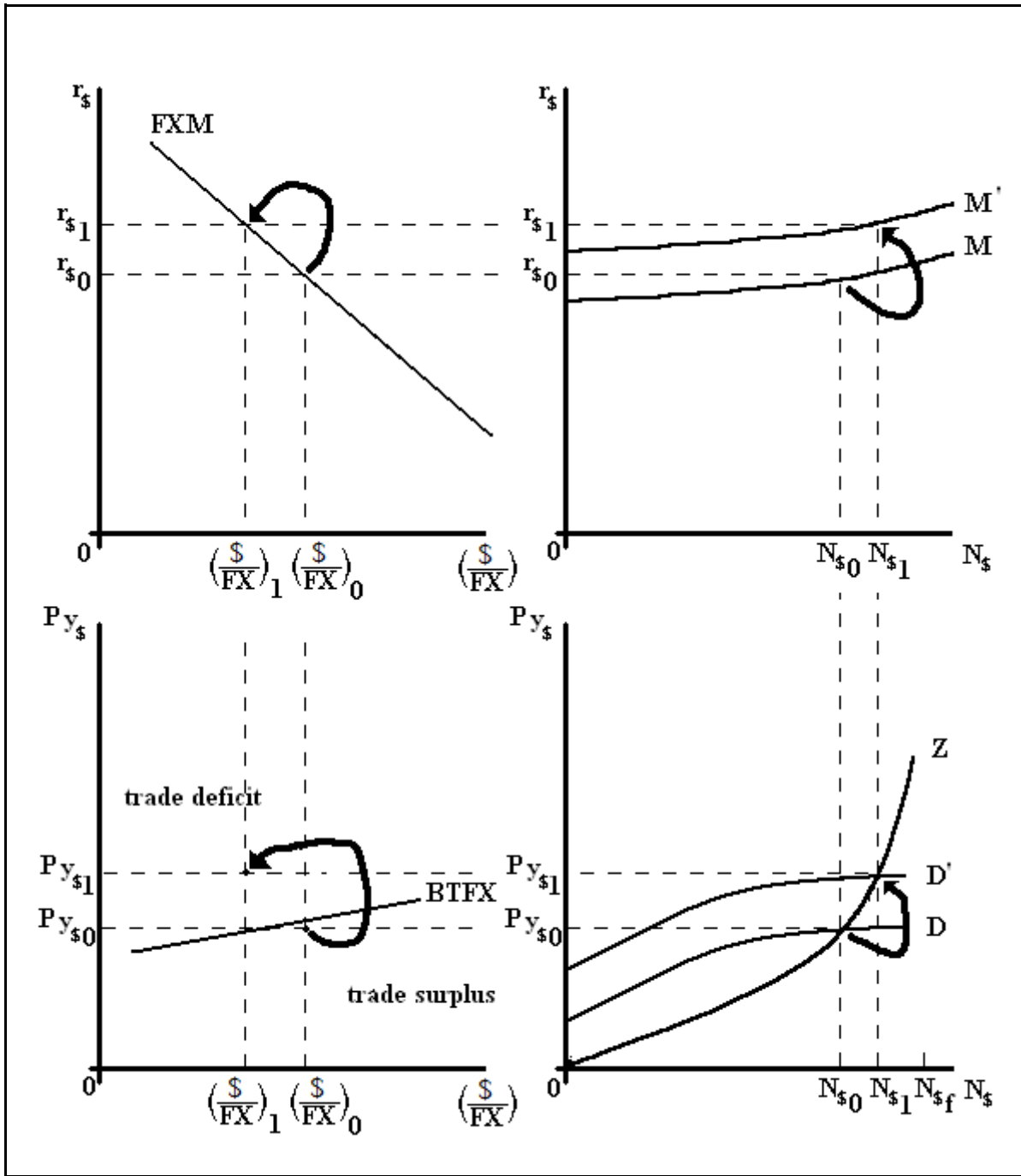


Figure 6: Post Keynesian Exchange Rate Model, the dollar 1980-85 appreciation.

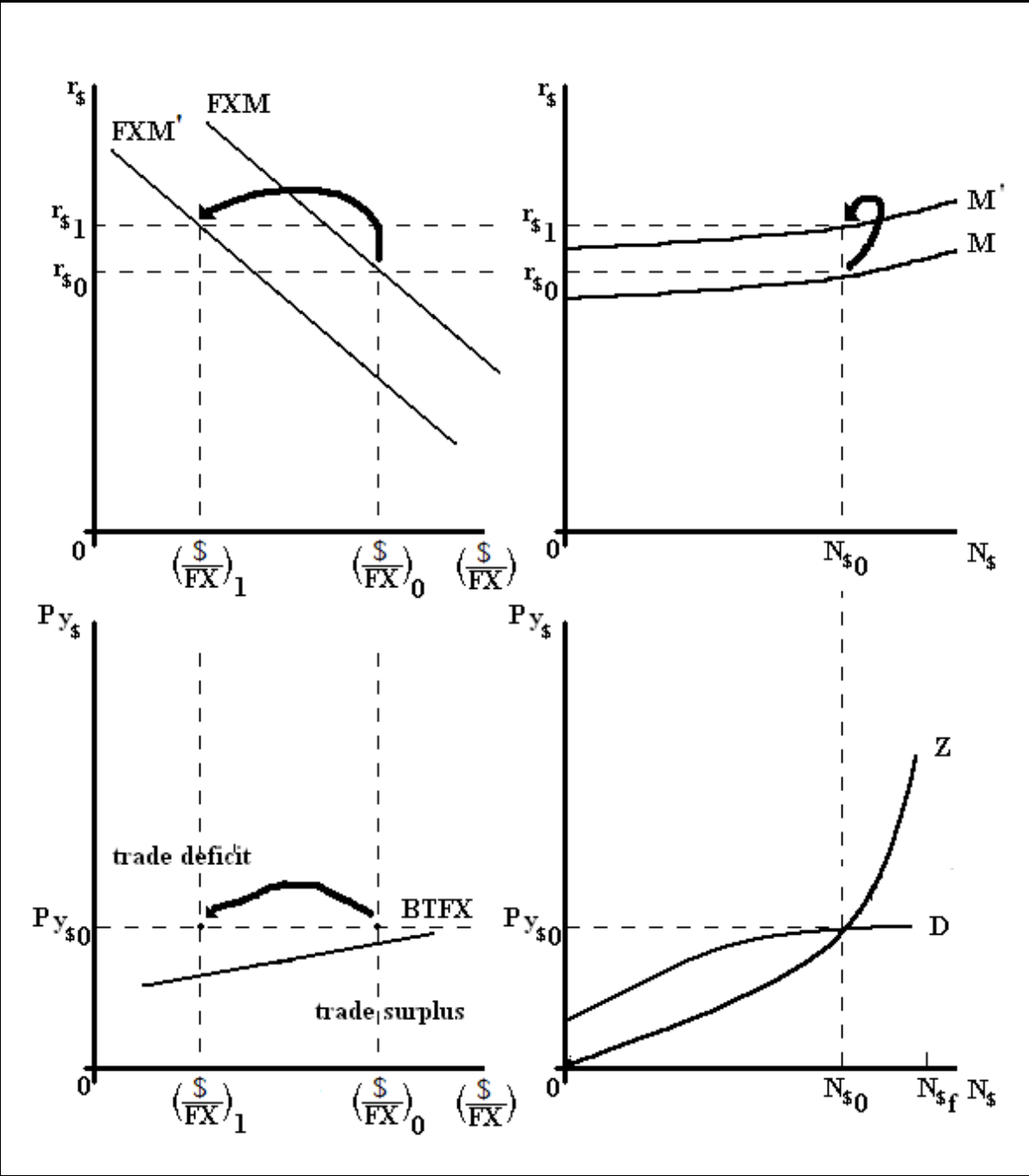


Figure 7: Post Keynesian Exchange Rate Model, the introduction of the euro (1999-2001).