CRISIS AND RECOVERY IN HYBRID EXCHANGE-RATE REGIMES

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1. Introduction

This paper continues exploration of the usefulness of open-economy macro models that reflect more fully certain key economic conditions of the contemporary U.S. economy. One of these is America’s dual or hybrid exchange-rate regime, in which rates float freely with some countries, but are fixed with others. Another duality may be found in the Eurozone, where rates among member states are fixed, but where the common money fluctuates freely against other currencies. Previous research (Arndt 2011, 2012a, b, c) suggests that unilateral exchange-rate pegging by China’s central bank has the capacity to prevent the U.S. from enjoying the policy autonomy of a fully flexible exchange-rate regime.

In the U.S. case, many small countries have in the past unilaterally pegged their currencies to the dollar, but they have generally been too small to make much of a difference – either economically, or politically, or both. When China fixes the yuan/dollar rate, the size of its economy is large enough to influence the results of U.S. policy actions. Even the manner in which it handles dollar reserve accumulation has implications for the efficacy of U.S. macro policy.

A second important feature of the contemporary U.S. economy is the presence of industries enjoying significant protection from foreign competition. This is the so-called sheltered or non-tradables sector, which includes housing and construction, two industries that played important roles in recent bouts with financial and economic instability. This issue is examined in Arndt (2012b) in terms of a macro model that includes a non-tradables sector. It is argued there that although inflation in real property and construction exhibited certain features resembling more orthodox asset price bubbles, it generated changes in productive activity with important consequences for the real economy at large. In other words, the “great moderation” was itself a hybrid phenomenon – relative stability in the prices of tradables combined with excessive resource-shifting inflation in non-tradables.
Viewed more closely, the housing bubble was also something of a hybrid phenomenon. Rising values of existing property could reasonably be viewed as asset inflation, but the rapid growth of demand for new housing and construction affected the real economy. Inflation in non-tradable materials and inputs impacted not only goods and services, but wages and other factor prices. Comfortably sheltered from foreign competition, firms in non-tradables industries were able to raise factor prices in order to bid labor and capital away from “exposed” tradables producers. This rise in factor costs worsened the competitive pressures U.S. tradables manufacturers already faced from Chinese imports. As noted, the “great moderation” itself was a hybrid phenomenon, with stable prices in exposed sectors and raging inflation in others.

In the following pages, the rapid rise of household wealth during the bubble years is examined in terms of its implications for economy-wide demand. Section 2 reviews the effects of monetary policy in a flexible-price, dual-rate economy. The main purpose is to set the stage for examining the implications of wealth changes associated with the construction and housing bubble. Section 3 considers the key effects of a positive wealth shock in a simple short-run, sticky-price version of the model under (i) fixed exchange rates with low capital mobility (U.S.-China) and (ii) floating rates and high capital mobility (U.S.-Eurozone) and extends those insights to the broader model. Section 4 follows with an examination of the tradables/non-tradables dichotomy. Section 5 concludes.

2. Monetary Policy in a Hybrid Exchange Rate Regime

It is well-known that monetary expansion under floating rates is more effective than in the closed economy, especially when capital is internationally mobile. This conclusion applies to U.S. relations with the Eurozone, as well as Canada, Japan, the U.K. and an assortment of other nations. It is also well-known that monetary expansion under fixed rates tends to be less effective, and perhaps entirely ineffective, even when capital mobility is low, as is the case between the U.S. and China. But
since it is the central bank of China that is fixing the bilateral exchange rate, the outcome depends on how China choses to handle reserve accumulation.

The combined effects of these two types of adjustment to monetary stimulus in the U.S. are illustrated in Figure 1, which reflects the findings in Arndt (2012a). [*See also, Arndt (2012 b,c.) In this model, the money market has the well-known Mundell-Fleming look, except that price flexibility gives the nominal exchange rate a role in determining monetary equilibrium through its effect on the price level.

\[ L(y, i) = H/P, \] (1)

where \( H \) is high-powered money, \( P \) a general price aggregate, \( y \) real gross domestic product, and \( i \) the nominal interest rate. The real demand for money (\( L \)) responds positively to changes in \( y \) and negatively to changes in \( i \). In this discussion, price expectations are static with respect to all variables. [But see Arndt 2012c]

Goods-market equilibrium is specified as follows:

\[ I(i) + T(y, y^*, y^c, e^*, e^c) - S(y) = -G, \] (2)

where \( I \) is real capital formation, \( T \) is the overall trade balance or current account, \( S \) is private sector saving, \( G \) the government budget deficit, \( y^* \) and \( y^c \) GDP in the Eurozone and China, respectively, and \( e^* \) and \( e^c \) stand for the real exchange rate between the dollar and the two currencies, respectively. (The real rate is \( EP_{\text{foreign}}/P \).) Signs on the coefficients follow the familiar M-F pattern.

There are two balance-of-payments equilibrium conditions. The balance between the U.S. and the Eurozone is given by

\[ T^*(y, y^*, e^*) + K^*(i, i^*) = 0, \] (3a)
while the balance with China reflects the fixity of the regime

$$T^c(y, y^c, e^c) + K^c(i, i^c) + R^c = 0,$$  \hspace{1cm} (3b)

where $R^c$ represents the flow of dollar reserves into Chinese hands. With the nominal yuan-dollar exchange rate fixed and Chinese prices assumed to be constant, the real rate between the two currencies changes in reverse proportion to the U.S. price level.

Finally, aggregate supply in the U.S. is specified as

$$P = P(y/y'),$$  \hspace{1cm} (4)

where $y'$ is full-employment output and where prices rise as the output gap narrows.

The effects of a U.S. monetary expansion are summarized in Figure 1. The LL curve shifts out, tending to raise GDP and prices in the U.S. and to reduce interest rates. These changes generate payments deficits with respect to both trading partners. The resulting depreciation of the dollar against the euro pushes the GG and $B^*B^*$ curves to the right until they intersect on the new LM curve. We obtain the familiar result of a more potent role for monetary policy under floating rates.

The central bank of China intervenes to prevent the incipient appreciation of the yuan. This action tends to reduce the U.S. money supply. What happens next depends on the manner in which the Chinese authorities acquire U.S. Treasury securities. If they are purchased from the U.S. Federal Reserve, the customary “automatic” adjustment mechanism of fixed rates is set in motion and leads to a leftward shift of the LM curve that serves to emaciate the efficacy of monetary policy.

If the Chinese authorities purchase the securities directly from the U.S. Treasury, which is financing a budget deficit, the monetary policy may gain effectiveness by reducing the negative crowding-out effect of the fiscal stimulus. This outcome is akin to monetary accommodation. [See Gali (2014) for a recent discussion of monetary accommodation.]
As a third possibility, the Chinese authorities may purchase the desired U.S. Treasury securities in the open market, a form of sterilization that undercuts the automatic adjustment mechanism. Since there is no fear that sterilization will ultimately deplete the stock of foreign exchange reserves, the current account deficit may be sustained indefinitely.

In Figure 1, the dollar-euro adjustment component, with dollar depreciation shifting the GG and B*B* curves out, produces a new equilibrium on the new LL curve at a point like B. At that point, the U.S.-China autonomous balance of payments is in deficit, because the original B*B* curve has not moved. The dotted B*B1c represents the sum of autonomous and accommodating transactions and gives an indication of the rate of dollar accumulation over time by the Chinese central bank.* [*It is important to recall that this analysis ignores the effects of adjustments triggered by the upward trend of Chinese money supply.] The gap between the two Chinese balance-of-payments curves also gives an indication of the “permanent” U.S. payments deficit.

In the preceding discussion, the price deflator is some general price aggregate and no distinction is made between tradables and non-tradables. To take account of the sectoral issue, we define the price index as

\[ P = \lambda E^* + (1-\lambda)p_n \]  

(5)

where \( p_n \) is the price of non-tradables and \( E^* \) and tradables prices expressed in either foreign currency are assumed constant. Hence, the U.S. price index rises with dollar depreciation against the euro and inflation in non-tradables. During the great moderation, foreign prices were relatively stable and the yuan was pegged to the dollar, so that the major sources of inflation in the United States were dollar depreciation against the euro and other freely floating currencies and inflation in non-tradables industries, including housing and construction. While overall inflation was relatively moderate, however, relative prices were changing increasingly rapidly. The consequences of those changes are
discussed in Section 4 below, after an examination in Section 3 of some key effects of a boom in household wealth on overall macro equilibrium.

3. Household Wealth

In this section, the focus is on changes in household wealth brought about by rising property values and the extent to which consumer confidence shifts (“irrational exuberance”) brought about by these changes may have affected the real economy. The anecdotal evidence suggests that American households utilized the build-up in property values in order to increase current expenditures. Consumption rose relative to income, while saving fell. Around the time the bubble burst, the U.S. saving rate was close to zero.

*The Model with Wealth Effects*

In order to keep the analysis relatively simple, the specification of the model in Section 2 is amended by the addition of an exogenous wealth term into the equilibrium conditions. In the definition of the LL curve, wealth \( Z \) has a positive effect on the real demand for money:

\[
\frac{H}{P} = L(y, i, Z). \tag{6}
\]

Equilibrium in the real economy is specified as follows, with a rise in wealth assumed to reduce saving and to worsen the current account:

\[
I(i) + T(y, y^*, y^c, e^*, Z) - S(y, Z) = -G. \tag{7}
\]

In the specification of the balance of payments, wealth is assumed also to raise the demand for foreign-currency denominated assets, so that a rise in wealth worsens both the current account and the financial account. Thus,

\[
T^*(y, y^*, e^*, Z) + K^*(i, i^*, Z) = 0 \text{ and } \tag{8a}
\]

\[
T^c(y, y^c, e^c, Z) + K^c(i, i^c, ZA) = -R^c. \tag{8b}
\]
We retain the assumption that capital mobility is high between the U.S. and Europe and low between the U.S. and China.

A rise in wealth-related confidence is assumed to have a positive effect on money demand, on the demand for foreign assets and on imports and a negative effect on saving. (During the property boom, many households are known to have used the purchasing power generated by home equity growth to upgrade the quality of their residences. This may be modeled by including the A term in the investment function.)

Adjustment with Floating Rates

The essential features of the wealth-related boost in confidence for the open economy may be illustrated most readily in terms of the short-run, sticky-price model, with Figure 2 examining adjustment under floating rates and Figure 3 illustrating the fixed-rate scenario. Starting at initial equilibrium, $E_1$, a rise in wealth shifts GG right, LL left and $B^*B^*$ left. For reference purposes, point A represents the new equilibrium that would obtain in a closed economy, with both GDP and the rate of interest rising to higher values. Not surprisingly, a wealth-driven rise in expenditure has effects similar to those of a debt-financed increase in government expenditure, including the fact that the rise in household spending crowds out business spending. This is consistent with the stylized facts of the period.

In the foreign sector, the income increase worsens the trade balance, while the higher interest rate improves the capital account. Given that capital mobility is high between the U.S. and Europe, there is a balance of payments surplus at point A, where the capital account improvement exceeds the current account deterioration. Under floating rates, this surplus gives rise to dollar appreciation, which causes both $B^*B^*$ and GG to shift left. In the short run with sticky prices, the LL curve is not affected by
the appreciation. When prices are flexible over the longer run, the appreciation reduces prices and thus shifts LL to the right.

If the initial effect of the wealth shock on income is very strong, then income will rise, but if investment is very interest-sensitive (meaning a flat GG curve) and capital mobility is very high, then the income change may be negligible (and possibly negative). In other words, the wealth-related boost in household spending raises aggregate demand, but the increase in interest rates crowds out private investment and the appreciation shift expenditure away from domestic goods. These expenditure-switching effects (one domestic, the other foreign) may also have implications for the economy’s long-run growth prospects. (Of course, the rise in household expenditures is not entirely devoted to consumption. To the extent that the rise in property values leads to new housing as well as improvements in the quality of the existing housing stock, measured household investment rises.)

From the perspective of policy makers, this situation may look like a strong case for relaxing monetary policy. Interest rates are high, the domestic currency is strong and appreciating, output and employment are not improving very much, and there is moderation in prices overall (except for the “asset-price” bubble in construction and housing). Such a monetary accommodation of the wealth shock would have the effects discussed in Section 2, raising output, reducing interest rates, and damping dollar appreciation. It would also ensure that the rise in non-tradables prices continues.

Adjustment with China

Figure 3 focuses on adjustment with China, ignoring the other part of the overall adjustment process discussed above. As in Section 2, curve B′B′ represents U.S.-China bilateral payments equilibrium. An increase in wealth-driven household expenditure has the same effect on the three curves as that shown in Figure 2 for Europe. The steepness of the balance-of-payments curve in this instance reflects the assumption that capital mobility with China is low. Hence, at the equilibrium for
the closed economy (point A), the U.S. runs a payments deficit with China. Again, a rise in U.S. GDP worsens the current account, while the higher U.S. interest rate improves the capital account. But in this case the latter improvement is too small to offset the current account deterioration, so that the overall balance of payments deteriorates.

Under floating rates, such a deficit would induce dollar depreciation, which would shift the GG and B^cB^c curves to the right to intersect somewhere on L2L2. The Chinese monetary authorities prevent the yuan from appreciating by buying up dollars, reducing the U.S. money supply and shifting LL left to meet the intersection between the G^2G^2 and B^cB^c curves. As noted in Section 2, whether this is the outcome or not depends on how the Chinese monetary authorities invest their dollars. If the purchase is directly from the Fed, then the decline in the U.S. money stock takes place. If, instead, Treasury securities are purchased in the open market, the level of the money stock will not change. This is also the case when the dollars are invested in securities newly issued by the Treasury. The deficit in the autonomous balance of payments persists and is financed by ongoing official Chinese accumulation of U.S. government debt. The magnitude of the intervention is suggested by the gap between the B^cB^c and B^cB^c curves.

4. Non-tradables and the Real Exchange Rate

In this section, we return to the point made at the end of Section 2 that the moderation in prices overall masked sustained changes in relative prices favoring resource reallocation from tradables to non-tradables. As is well-known, there was significant price inflation among non-tradables industries, especially in construction and housing and other types of real property. The lack of exposure to foreign competition made it easier for producers in non-tradables industries to raise not only prices, but wages and other factor payments, and thereby to attract productive resources for use in output expansion. Any rise in costs could readily be passed through to higher prices. This feature is important not only on
its own terms, but in relation to the claim that China’s exchange-rate policy undermined the
competitiveness of U.S. manufacturing. While that argument has merit, it is important to note that a
relative rise in domestic prices in favor of non-tradable goods and services undermines manufacturing
competitiveness from the cost side.

The effects of a wealth-based expansion of household expenditures on relative prices may be
examined with the aid of Figure 4. The two panels in the figure represent the markets for tradables (t)
and non-tradables (n), respectively. The relative price \( p = p_t/p_n \) is measured along the vertical axis. Note
that this definition of the relative price requires reversed slopes of demand and supply in the left-hand
panel. We start by assuming that in both markets domestic demand and supply are equal at the outset.
It is evident from the structure of the set-up that in equilibrium the market for non-tradables must
clear. In the market for tradables, on the other hand, domestic supply may exceed domestic demand,
leading to exports, or fall short of demand, leaving a gap to be covered by imports. For purposes of
exposition, we assume that there is full employment in the economy, so that any expansion of output in
one sector must be matched by a decline of output in the other.

Initial equilibrium in this economy is given at points \( A_{t0} \) and \( A_{n0} \), respectively. A rise in household
wealth raises demand in both sectors, as reflected in the demand curves subscripted by 1. Since the
market for non-tradables must clear, the new equilibrium relative price drops to \( p_{1t} \), indicating a relative
rise in non-tradables prices. The resulting increase in n-output is achieved by drawing resources away
from tradables production, where output falls to \( q_{1t} \). The combination of declining output and rising
demand in the tradables sector produces excess demand equal to the distance between points \( A_{t1} \) and
\( A_{n1} \). Furthermore, if non-tradables inflation raises material and other input costs in tradables industries,
such a negative productivity shock will shift the \( S_t \) curve to the left and worsen the sector’s
competitiveness problem. This discussion underscores the argument made earlier that the housing price bubble was more than a simple case of asset-price inflation.

5. Concluding Comments

This paper has employed a macro model with a dual exchange-rate regime and a two-sector economy to examine the implications of the construction/housing bubble for economic adjustment and stability. It appears that in this framework, China’s exchange-rate policy influences the effectiveness of U.S. countercyclical stabilization policy. In other words, the outcomes of policy initiatives differ – at times significantly – from those that would obtain if the U.S. had its preferred regime of “independent floater.” It also appears that the existence in the economy of a non-tradables sector facilitates inflation in relative prices in an environment of overall price moderation. Furthermore, when relative inflation occurs in the construction/housing sector, cost-push inflation spreads throughout the economy and helps to undermine the competitiveness of manufacturing and other tradables industries.

Finally, it can be shown that in this model wealth-driven demand shocks may create situations in which the overall inflation threat is minimal, but there is upward pressure on interest rates and the dollar is strong, household demand is the dominant force in the economy, with business demand less than what it might be expected to be, and there is room for actual output to grow relative to full-employment output. To be sure, there is increasing price momentum in housing and construction, but that is probably the result of “irrational exuberance” in the context of an asset bubble.
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Figure 1
Figure 2
Figure 4