The Dollar and a Looming Currency Crisis

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Executive Summary

The US has run a current account deficit for much of the past thirty years. This paper presents reasons for why this dynamic has persisted, paying particular attention to the importance of the reserve currency status of the dollar. The status as reserve currency has created a special dynamic whereby the short-run value of the dollar is affected by shifts in asset preferences of both foreign and domestic investors. A mechanism which increases the attractiveness of dollar assets will increase the dollar value in the short run; a stronger dollar then acts as a tax on US production and a subsidy for US consumption. In the long run, asset preference shifts toward dollar assets decrease the equilibrium value of the dollar and increase the equilibrium level of debt for the US. This paper presents three reasons for asset preference shifts into dollars and dollar denominated assets: international transaction demand, safety from balance of payment crises, and export led growth through an artificially competitive currency peg. I review work by Triffin (1960) that presents the dilemma of transaction demand for the holder of the reserve currency, and present historical evidence of safety and export growth mechanisms. In the second section, this paper presents and extends work on the long run value of the dollar following a model by Blanchard, Giavazzi, and Sa (2005). Asset preference shifts that have occurred in past year are modeled, and finally I speculate on the future path of the dollar and international investment position of the US.

Introduction

One of the most interesting and rich topics in macroeconomic theory revolves around the study of currency movements and exchange rates. Over the past three decades, academic and financial analysis that argued the US would suffer dollar devaluation due to national consumption exceeding national production has been largely wrong. That such an intuitive argument has been so consistently wrong is the source of much frustration and consternation. What has become clear is that when discussing exchange rates and determinants of exchange rates, there is a necessary delineation between the dollar and the rest of the world currencies. Because the dollar is the world reserve currency, special dynamics exist for it in addition to the normal trade and monetary dynamics one would expect. In this paper, I identify three mechanisms that create a demand for dollars independent of trade dynamics: liquidity needs of the non-US world, security of assets for countries with irresponsible fiscal policy, and strategic export driven growth by developing countries. I argue that any force which increases this demand for dollars will also increase the trade and current account deficits, and vice-versa.

The position of this paper is that the US dollar is significantly overvalued in relation to its long run equilibrium value. I define equilibrium value for the dollar as the value at which the current account equals to zero[1]. Since interest payments on net international debt are a key determinant of the current account, I also examine recent developments in that area.

In the second part of the paper, I extend work done by Blanchard, Giavazzi, and Sa (2005) using phase diagrams to model global shifts in asset preferences. The three mechanisms which have created exogenous demand for dollars can be modeled as asset preference shifts. I model a specific shift that occurred in the last 9 months (August 2008-March 2009), and conclude with two alternative future paths that the dollar may take to achieve steady state in the model. These two paths are: a discontinuous devaluation of the dollar probably accompanied by a shedding of the reserve currency status; and a relatively slow devaluation of the dollar accompanied by an ever-growing net international debt position of the US.

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[1] The current account is made up by the trade balance plus any difference in payments between domestic owned foreign assets and foreign owned domestic assets. It is assumed in the paper that the Marshall-Lerner condition holds, and a depreciation of the currency not only increases exports, but improves the trade balance. Since US carries its debt in dollars, a depreciation of the dollar will also improve the current account balance. I feel the current account is the most effective measure of equilibrium in the long run because on some level it represents the relative competitiveness of US made goods and services on the international stage.

A Picture of Imbalance

The U.S. has run a current account deficit for almost all of the past thirty years, and it has recently increased in both absolute terms and as a percentage of GDP (Figure 1; Data from Fred Fed).

Figure 1: US Current Account. Source: St. Louis Fed
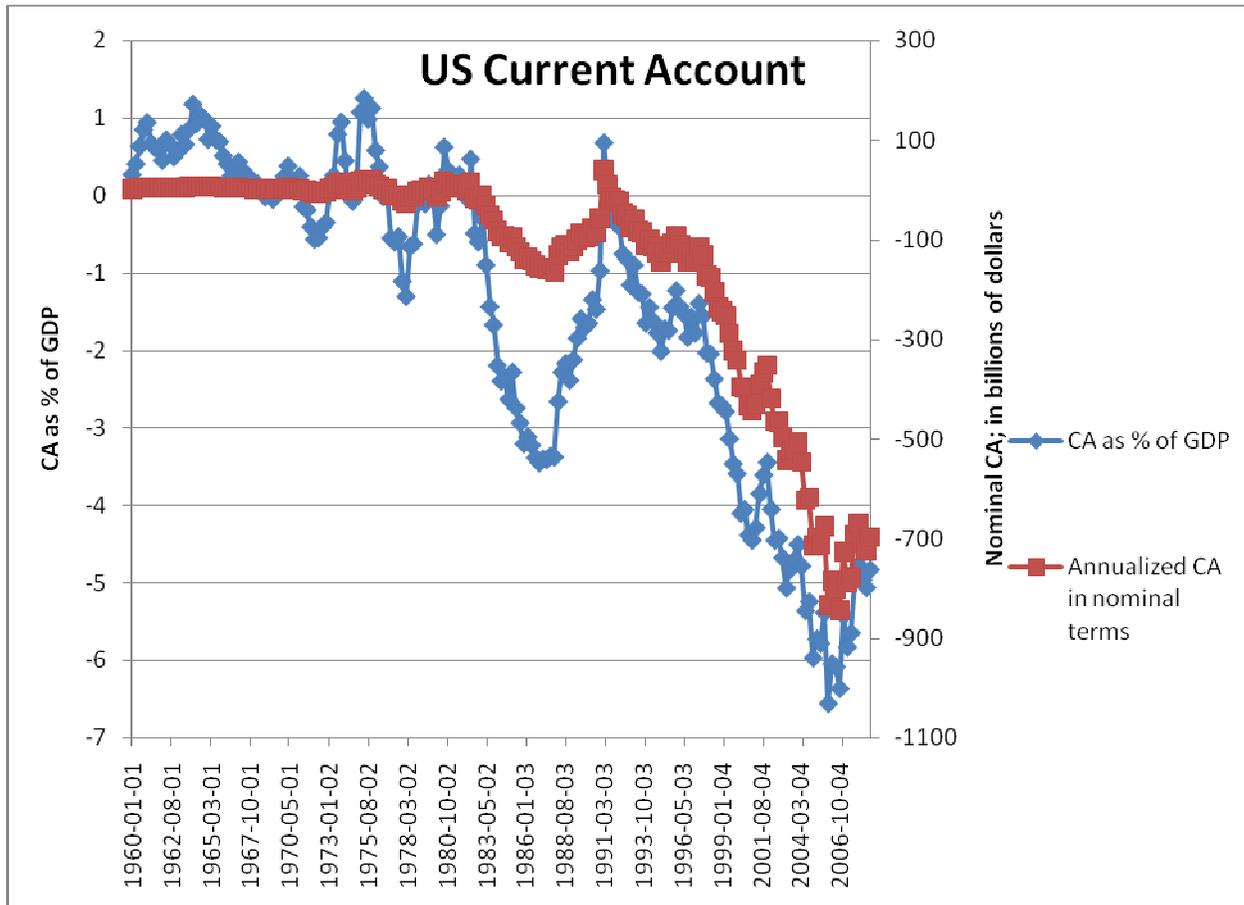
It has been suggested that the current account (CA) deficit of the US is sustainable due to dark matter (Hausmann and Sturzenegger, 2007); generally speaking, theories along these lines suffer from a dangerous combination of wishful thinking, attempts to fit theory to the short term facts, and obfuscation of simple truths through complex and impressive mathematical arguments. The same types of theories have been developed in the past to explain that securitization of mortgages reduces systemic risk, and why housing prices and other assets must always go up. Relying on assertions that the US has complete markets, or that US investors can return a higher yield on their investments is both speculative and dangerous. While risk-averse foreign investors with poorly developed financial markets might make a marginally lower yield in the long run, this difference is greatly exaggerated during economic booms (when risk- taking is rewarded) and reversed in economic busts (when risk-taking is punished). The negative change of more than $2 trillion in the net foreign asset position of the US during 2008 (Figure 2) casts an already long shadow upon theories that the US can offset its CA deficit with financial genius.

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Figure 2: Cumulative Net International Investment Position of the US.

Source: Gian Maria Milessi Ferreti; http://www.voxeu.eu/index.php?q=node/2902
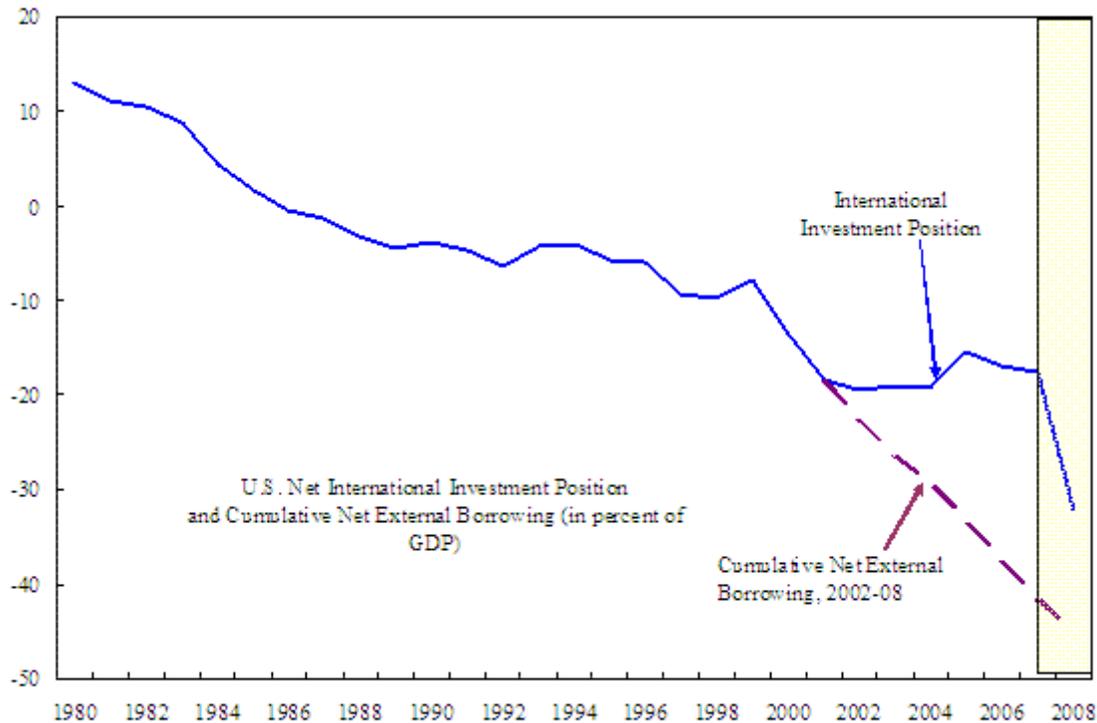
I assert that the safe and logical assumption for the present time should be that the US cannot earn a significantly higher rate of return on foreign assets than vice-versa. This point becomes important for long-run considerations of equilibrium in the current account – namely, the US will have to run a trade surplus equal to interest payments on its net foreign debt position.

Nevertheless, strong arguments do exist for why the dollar remains strong. There are (at least) three sources of demand for dollars that exert an exogenous force on normal balance of trade dynamics: (1) a demand for dollar *liquidity* for transaction needs; (2) a foreign desire for asset *security* found in the dollar's role as a reserve currency; and (3) developing country attempts to accelerate economic growth through an *export* dominated economy. To date all three factors have increased the incentive for foreigners to collect dollars (by selling goods and services in exchange for dollars) and decreased the incentive to dishoard dollars (by buying goods and services with the dollars). If these dynamics were to reverse, they would exert pressure to devalue the dollar above and beyond pressures exerted by the balance of trade dynamics. Below I expand on each of these exogenous sources of demand for dollars.

Liquidity and The Triffin Dilemma

An illuminating historical discussion of liquidity needs is provided by Robert Triffin (1960). Briefly, after World War 2 and the Bretton Woods agreement, the world actually suffered from a shortage of dollars for the purposes of transactions. Since the dollar became the reserve currency for the world, countries needed to hold a certain amount of dollars throughout the year simply to conduct transactions with other countries. Particularly for countries with seasonal industries, large fluctuations in dollar holdings created a shortage of dollars; this resulted in a substantial demand for US dollars simply for liquidity purposes. Immediately after World War 2, the US ran a current account surplus, so a problem of that day (contemporaneously known as The Dollar Gap) was that foreign countries, particularly European countries, were chronically short of the dollars they needed for transaction purposes. In the late 1950s, as the US started to run a trade deficit, the dollar shortage was relieved. The fact that the dollar gap and liquidity shortage was relieved only after the US started to run a trade deficit was not a coincidence. A flow of excess goods and services in one direction *must* be offset by a financial flow in the other direction. Therefore, as the US began to consume more than they produced, the foreign world (in aggregate) began to accumulate more dollars than they spent.

The seriousness of dollar liquidity needs from the foreign world was reflected by one of two worries that Triffin had in 1960: namely, that if the US returned to a trade surplus it would choke off liquidity and growth for the rest of the world, and set off a Great Depression type of deflationary spiral. Triffin's other worry – that the US would continue to increase its current account deficit until it became necessary to default on the gold agreement – was the one that actually came to pass.

This global demand for liquidity purposes mirrors the transaction portion of domestic demand for money, and both grow in proportion to the economy. So as the world economy grew and the size of transactions grew in dollar terms, the foreign demand for US dollars specifically intended for liquidity purposes necessarily grew. Since the world economy has grown by approximately twenty times, in nominal terms, since 1970, the liquidity demand for dollars has grown by a proportional amount.

Security: The Safety Trade

The so-called "safety trade" into dollars that occurred in the second half of 2008, while ironic in two ways,[2] is not surprising. That the dollar represents security to foreign entities is partly due to historical good behavior and partly due to wishful thinking on the part of foreign entities[3]. Certainly through 1960, the US had a virtually unblemished record in paying its debts and honoring its obligations. This historical precedent combined with geopolitical considerations and force of habit has created the foreign perception that exists to this day that the US dollar is "as good as gold." Thus, historically, we

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[2] It is ironic because of the poor risk assessment of US entities underlay the crisis, and because the US net foreign investment position was made worse by the crisis.

[3] Human beings naturally are drawn to certainty. Although this argument is speculative, the US dollar may draw some of its strength from the psychological desire of foreign agents to assign a medium whose store of value is certain; the more so for citizens of countries that have historically behaved in a fiscally irresponsible fashion.

observe that when a country suffered from a balance of payment crisis, the most common alternative to the home currency was the dollar. The list of countries whose private citizens hoard dollars as an alternative to the home currency is long: virtually any Latin American country, Russia, Eastern Europe, south-east Asia, etc.

The reason for this hoarding is fairly easy to understand. If a country pegs its currency to the dollar and the peg is kept too high, citizens of the country will consume more than they produce and the country will run a current account deficit. Mirroring this current account deficit, a country will run a financial account surplus which decreases its supply of dollars. As the supply of dollars approaches a critical point, citizens will speculate that the peg cannot be maintained and will "make a run" on the currency, trading all of their domestic currency for dollars in anticipation of the devaluation. This is referred to as a balance of payments crisis, and results in a devaluation of the national currency. Examples of recent balance of payment crises include the Argentine economic crisis (2001-2002) and the Asian financial crisis (1997). Citizens in countries who have suffered balance of payment crises will often hold a portion or even a majority of their wealth in dollars in anticipation of another currency devaluation.

As an additional demand, it is commonly considered good practice for a developing country to carry reserves in excess of what is necessary for transactions as a preventative measure against balance of payments crises. Thus, there is actually an incentive to peg a currency too low, as a method for accumulating a protective supply of dollars to prevent balance of payment crises.

Strategic Export Growth:

In addition to a proactive measure to prevent BOP crises, both developing and developed nations can create an artificially competitive export market by intentionally holding down the value of their currency. This artificially competitive export market increases production in the country, whose effects then multiply within the economy. In the short-run, or on a small scale, it is not clear that the effects of this are negative for the US. Although a depreciated foreign currency makes US domestic industries less competitive, a loss on the productive side is offset by an increased purchasing power of the dollar for consumption. However, as the effects persist and grow in magnitude it clearly creates imbalances (Figure 1) which almost certainly contain Pareto inefficiencies and deadweight loss.

This dynamic of strategic export growth is most easily seen in present day China. Examining China's actions, we see a replay of a historical pattern that has worked well for economic growth in the world. Starting with Europe in the 1950s, Japan in the 1960s, Tiger Asia in the 1970s, and China, Southeast Asia and others in the 1980s, countries around the world have followed a similar blueprint for accelerated economic development. That blueprint consists of devaluing their currency to a level that makes goods produced in their economy attractive to foreigners. Then, as the balance of payment surplus grows, their central bank neutralizes the inflow of dollars by selling bonds into the market as it continues to buy dollars. By doing so, the quantity of Yuan in the economy remains the same. If the private market was left to assign value to the dollar, it would result in a depreciation of the dollar. By

buying dollars, and neutralizing foreign exchange, their central bank is pegging the currency. In this circumstance, they also proxy for an investor with an extreme (100%) preference for US assets; this will become important to discussions later in the paper. The money that the export sector makes acts as a multiplier to the general economy in these countries, and this dynamic underlies the astronomical growth experienced by Europe in the 1950s, Japan (1960-1990), South Korea and the so-called Tiger countries (1970-2000), and China and South-East Asia (1980-2008).

Summary of Exchange Rate Dynamics

While all other countries have two primary mechanisms that determine their exchange rate, the US dollar has five. The two mechanisms present for all currencies are: the relative supply of the currency (determined by the central bank); and the terms and attractiveness to foreigners of domestically produced goods and services. All else equal, the greater the supply of currency the higher the exchange rate (depreciated), and the more attractive the terms of domestically produced goods the lower the exchange rate (appreciated). Both of these mechanisms are reflected in the current account: if a country devalues its currency through an increase in money supply, it will have higher interest payments on foreign denominated assets. In this circumstance, a net debtor will generally see a deterioration in the current account, and a net creditor will see an improvement. If a country increases the attractiveness of terms on its production to foreigners, it will improve the current account.

In addition to these two factors, the US also has the three exogenous mechanisms discussed above--liquidity, safety, and export growth. These exist primarily in the US, but are endogenous to any country holding the world reserve currency. These dynamics usually act to appreciate the dollar, which goes a long way toward explaining the peculiar ability of the US to run persistent current account deficits. However, if the mechanics reverse, then the mechanisms would likely act to depreciate the dollar. Thus, any expectations that transaction liquidity demand will decrease, that faith in the safety of the US dollar will decrease, or that the dynamics of export-driven growth strategy would reverse would serve to lower the expected value of the dollar. I now demonstrate why it is likely that all three of these dynamics will work in precisely this way in 2009.

Less International Transactions in 2009

The easiest dynamic to demonstrate is a decrease in transactional liquidity needs. The world is experiencing a contraction in both real and nominal GDP. And while GDP has contracted on the order of a few percent, exports have contracted by much more. Over the span of a year, China's exports in February fell by 25.7% , Germany's exports in January fell by 20.7%, and Japanese exports in January fell by 45.7%. While it is possible that we have reached the trough for export numbers, it is very likely that exports for the year of 2009 will fall by more than 10%. This decrease in trade means that the world will need fewer dollars for transaction purposes. As countries come to realize this fact, we can expect a marginal dishoarding of dollars allocated for transaction purposes.

Foreign Investment Opportunities Improve

There is no question that the desire for security of asset value has been a factor driving up the value of the dollar over the past 8 months. Why, then, might this trend reverse? There are two reasons:

1. Foreign holders of dollars might judge that the dollars are better spent on domestic consumption than on savings, or might judge domestic investment more attractive than dollar alternatives.
2. It may be judged that the US dollar is actually less secure than an alternative monetary asset.

The potential for the first reason can already be seen in China's plan to spend $583 billion dollars on infrastructure and domestic growth for 2009 and 2010. I assert that much of the private savings in the world will shift toward investments such as this. Although the first reaction to a marginal decrease in yield on investments is for savings to seek a safe harbor, the next step is to spend those savings on consumption goods. This spending on consumption, in turn, improves the expectation of yield on investments and leads capital back into so-called risky assets. Thus, the first reaction of the world economy to a poor growth outlook was to seek a safe harbor (US treasuries). I predict that the next step will be for countries to reduce the stock of savings by spending a portion on real consumable goods and services. This leads to the final step of increasing expectations on investment yields. I expect that independent of other factors, the savings rate in China, Japan, and Germany will decline by the end of 2009, and that expected yields on private investment will increase over 2010 and 2011.

The second reason the trend might reverse is a "black swan[4]" type of event, that is, an event whose occurrence is impossible to predict. An example of such an unpredictable event might be that a powerful individual within the Chinese government became convinced that the US could not honor its debts with real production, either now or in the future. One argument I would like to refute is that the Chinese can't stop accumulating treasuries or the value of their savings would go down. What kind of logic is this?

> See, if you try to spend it, it isn't worth anything; therefore you should continue to accumulate it. So send what you produce with your hard labor to us instead of consuming it yourself and you can guarantee more of this asset that isn't worth anything if you try to spend it.

This line of argument is simply rationalizing throwing good money after bad. If the only way to maintain the value of the dollar is by buying more of them (with yuan), than every dollar bought now will essentially be guaranteed a lower value when exchanged for yuan in the future.

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[4] The **Black Swan theory** (in Nassim Nicholas Talib's version) refers to a large-impact, hard-to-predict, and rare event beyond the realm of normal expectations.

A Zero-Growth World Economy

Finally, I believe that the strategy for export-led growth will change. A shift in this strategy could be led in the short-term by the increase in saving in the U.S. As the U.S. has been the primary engine of the export growth strategy, a secular reduction in U.S. consumption could make the strategy less attractive. However, there is a more fundamental and non-transitory reason why I believe this shift will occur: if the medium-term growth rate for the production of real goods and services in the world is zero or negative, then export driven growth is irrational.[5]

To see this requires a bit of a thought experiment. First, take two extremes: imagine one world where the next period availability of goods is vastly greater and superior, and a second world where the next period availability of goods and services is vastly smaller and inferior. In the first world, export-led growth would make sense because the accumulation of savings in period one would lead to investments and projects that yielded a vastly greater amount of consumable goods in the second period. In the second world, export-led growth would backfire because the savings in period one would lead to investments and projects that yielded vastly fewer amounts of consumable goods in the second period. In a zero-growth case, large savings would yield the same amount of consumable goods in the second period. However, if the savings were in a medium that decreased in value, then it would be irrational. Using the same argument as presented above, if an accumulation of dollars increases its value, than a dishoarding of dollars decreases its value. Thus, the strategy of export led growth through pegging (saving in dollars) in a no-growth or negative growth world yields a lower level of consumable goods in the future.

The US has a current account deficit of close to 4% of GDP, and has a net foreign asset position of negative five trillion dollars. The economy is contracting and this will lead to a lower demand for dollars for the purpose of transactions. Both of these factors unambiguously work to depreciate the dollar. While a reversal of the other two mechanisms is more speculative, consider this question: is it more likely to reverse or to continue the way it is? Put another way: are countries more likely to abandon export-led growth or to redouble their efforts? Are foreign investors and countries more likely to increase US treasury demand above their current level, or to increase their exposure to domestic industries and investments in other countries? I believe that the greater likelihood is that these mechanisms will reverse. Because these mechanisms have the potential to be discontinuous (such as

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[5]   The myth of never-ending growth is something so entrenched in economic theory and thinking, that some economic models aren't even well defined when using a negative long-term growth rate. An analogy to this myth is the belief that the world was flat and the importance of this belief to clergy in the time of Galileo. While Christianity survived the realization that the world was round, religious leaders of the time could not imagine it to be so, and the very thought threatened their understanding of the world, including the place of religious dogma. So it is with the myth of never-ending growth: economics and human existence will continue after the myth has been dispelled, but any current suggestion that the economy will not grow forever often is discounted or treated as heresy. Among other things, a careful inspection of the recent history of marginal costs for producing new oil fields suggests that we should develop theories for zero-growth, as well as contingency theories for medium-term negative growth scenarios. Even the finest golden rule steady-state loses utility if its reality is confined to textbooks.

when China abandons its currency peg), I believe that the time frame for a drastic adjustment in the dollar value could be quite short. In fact, I speculate that before the end of 2009, the majority of financial agents will see "the writing on the wall" and that a stampede out of dollars will ensue. Independent of timing, eventually the value of a currency needs to be tied directly to the relative supply of the currency and the relative attractiveness of goods produced by that country. Just as the US has enjoyed the benefits of exogenous factors of demand for its currency (in the form of increased purchasing power, and producing less than it consumes), so must the US suffer through the tax of exogenous factors that lead to the dishoarding of its currency.

Fitting the Theory to a Model

In 2005, Blanchard, Giavazzi, and Sa (The US Current Account and the Dollar) attempt to quantify the extent of dollar depreciation necessary to achieve equilibrium in the current account. They arrive at the conclusion that this depreciation would need to be on the order of 40-90%. They arrive at this conclusion by estimating that the dollar would need to depreciate by 15% to improve the trade deficit by 1%. At the time (February 2005), the US trade deficit was about 5% of GDP and they calculated payments on the US external net debt at the time to add an additional 1%. Thus, they theorized that the dollar would need to depreciate by 6*15%=90% in order to achieve Current Account Balance. Acting as an offset, valuation effects[6] (due to the increase in dollar value of US owned foreign assets) would make the necessary depreciation only 65%.

Since the paper was written, the trade deficit has actually decreased by approximately 35% or about 2% of GDP. While the dollar has depreciated by roughly 20% versus the Yuan and 10% versus the Yen, the trade weighted exchange rate has actually appreciated by 4% from the time the paper was written. So what could be going on? The theory stated by Blanchard et all implied that the dollar would have to depreciate by approximately 30% to achieve a 2% reduction in the trade deficit as a percent of GDP. The answer lies in further shifts in asset preference toward US assets. This shift occurred to a lesser degree through continued pegging by Saudi Arabia and other large petroleum exporters, and mainly through the panicked rush into treasuries and dollar assets seen in the last 6 months. Before the financial panic started, the value of the dollar had actually decreased against the trade weighted basket

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[6] A quick word on valuation effects: A tempting argument for our current environment is that we won't have to worry about interest payments on our net foreign debt because the interest rate on treasuries is so low. Although treasury yields are low, the relevant comparison is to US owned foreign assets, which have seen a large decrease in their principal value. This is what lies behind the deterioration in the net foreign asset position of the US in 2008 (Figure 2). Investors who are getting a small return on their principal are doing better than investors who are getting a small return of their principal! However, (if and) when other asset markets offer an expectation of positive return, then yields on US treasuries will rise commensurately. In addition, I think that if the dollar depreciated to the point that foreigners were being finessed out of 8 trillion dollars in net wealth (through the valuation effect) that this offset would in turn be offset by foreigners demanding incredibly high interest rates on US assets.

by 15%, and the Trade Balance had *just started to* decrease as a percent of GDP. Thus, the theory that an asset preference shift is wholly responsible for the dollar appreciation is consistent with the statistical facts. Significantly, while a shift in asset preference toward US assets appreciates the dollar in the short run, it causes the eventual steady state of the dollar to decrease still further.

At this point I will find it useful to start referring to a phase diagram (Figure 3). The phase diagram shows the dynamic path of the dollar.

It will be useful to introduce a few definitions, again following exactly in the footsteps of Blanchard, Giavazzi, and Sa:

- X=US assets
- F=US debt
- W= US Wealth
- F=X-W
- α=domestic preference for our own (domestic) assets;
- α^*=foreign preference for their own (foreign) assets;
- X^*=Foreign Assets;
- E=exchange rate;
- D(E)=Trade Deficit as a function of the exchange rate;
- E^e=expected exchange rate;
- (1+r)= gross rate of return on domestic assets.
- (1+r*)= gross rate of return on foreign assets.

We are interested in the portfolio and current account balance equations (under the condition of continuous time). For any reader not familiar with the Blanchard et al article, we also reproduce their argument that leads up to these equaations. Readers familiar with the Blanchard et al article can skip this next explanatory section and go directly to "A Movement in Equilibrium. . ." at the top of page 14.

Review of Blanchard et al portfolio and current account balance equations.

Assumptions:

1) F=X-W (by definition)

2) $F = \dfrac{W*-X*}{E}$ (my "debt" is the negative of your "debt" in the same units)

For market equilibrium in assets

$$X = \alpha \times W + (1-\alpha^*) \times \dfrac{W*}{E}$$

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(total U.S. assets should be the sum of what my wealth and your wealth would secure, given our respective preferences for U.S. goods)

Thus, using algebra with substations, for equilibrium

$$X = \alpha \times (X - F) + (1 - \alpha^*) \times \frac{E \times \left(F + \dfrac{X^*}{E} \right)}{E} = \alpha \times (X - F) + (1 - \alpha^*) \times \left(F + \frac{X^*}{E} \right)$$

α, α^*, the domestic/foreign preferences for our goods, depend on the relative expected gross rate of return on holding U.S. assets versus foreign assets. The gross rate of return for the U.S. on U.S. assets is $(1 + r)$. The expected gross rate of return for the U.S. on foreign assets has to take into account the expected change in the exchange rate, and thus is given, in the case of discrete time, by the expression

$$(1 + r^*) \times \frac{E}{E^e(next)}$$

Thus the ratio that α, α^* are functions of is the expression

$$\frac{1 + r}{1 + r^*} \times \frac{E^e(next)}{E}$$

For the continuous case, this can be written simply as $1 + \dfrac{\dfrac{dE^e}{dt}}{E}$.

Thus formally $\alpha = \alpha \left(1 + \dfrac{\dfrac{dE^e}{dT}}{E} \right)$ where the brackets indicate the 'independent variable' for the dependent variable α. The same argument holds for α^*. If there were no home bias then we would expect:

$$\alpha(1) = \frac{X}{X + X^*/E} \qquad \alpha(1) = \frac{X^*/E}{X + X^*/E}$$

But with home bias, each of the '=' is replaced by '>'.

Thus in the continuous case,

$$X = \alpha \times (X - F) + (1 - \alpha^*) \times \left(F + \frac{X*}{E} \right)$$

$$\text{where} \quad \alpha = \alpha \left(1 + \frac{\frac{dE^e}{dT}}{E} \right), \quad \alpha^* = \alpha^* \left(1 + \frac{\frac{dE^e}{dT}}{E} \right)$$

This is the portfolio balance equation.

We will adopt the usual dot notational convention for derivate and write this as

$$\alpha = \alpha \left(1 + \frac{\dot{E}^e}{E} \right), \quad \alpha^* = \alpha^* \left(1 + \frac{\dot{E}^e}{E} \right)$$

Thus, being careful to observe the dual role of brackets to denote a functional relation and a grouping relation, we can write the portfolio balance equation as:

$$X = \alpha \left(1 + \frac{\dot{E}^e}{E} \right) \times (X - F) + \left[1 - \alpha^* \left(1 + \frac{\dot{E}^e}{E} \right) \right] \times \left(F + \frac{X*}{E} \right)$$

Now we turn to the current account balance relation. In the discrete case, net debt next period depends on

A = next period's value of U.S. assets held by foreign investors

B = next period's value of foreign assets held by U.S. investors

C = next period's trade deficit:

Net debt next period = $A - B + C$

This translates directly into:

$$F(next\ period) = \underbrace{(1 - \alpha^*) \times \frac{W*}{E} \times (1 + r)}_{A} - \underbrace{(1 - \alpha) \times W \times (1 + r^*) \times \frac{E}{E(next\ period)}}_{B} + \underbrace{D(next\ period)}_{C}$$

Using the definitions and manipulating algebraically gives:

$$F(next) = (1 + r) \times F + (1 - \alpha) \times (1 + r) \times \frac{1 + r*}{1 + r} \times \frac{E}{E(next)} \times (X - F) + D(E(next))$$

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In the continuous case this translates to

$$\frac{dF}{dT} = r \times F + (1-\alpha) \times \frac{\dfrac{dE}{dT}}{E} \times (X - F) + D$$

Introducing the dot notation for differentiation and the functional dependence of α, this can be written as

$$\dot{F} = r \times F + \left[1 - \alpha\left(1 + \frac{\dot{E}^e}{E}\right)\right] \times \frac{\dot{E}}{E} \times (X - F) + D$$

This is the current account balance equation.

A Movement in Equilibrium or a Shift?

When citizens prefer to invest in their own country's assets (i.e. home bias and α+α*-1>0), we would expect to associate an increase in net debt with a shift of wealth abroad and a depreciation of the dollar. This is what the equilibrium condition ($\dot{E} = 0$ – differentiation is with respect to time) tells us. However, in spite of a large increase in net debt in 2008, there was a significant appreciation of the dollar. This speaks again to the likelihood that the appreciation was due to a shift in asset preferences, as opposed to a movement in equilibrium.

I refer the reader again to the Blanchard paper for more details on steady state conditions and the more detailed dynamics of the system. However, I will briefly note the three most salient points for my arguments:

1. The stable saddle path runs from the north-west quadrant to the south-east quadrant.

2. Shift in asset preferences toward US assets causes the $\dot{E} = 0$ locus to shift to the right causing an immediate appreciation of the dollar and increase in net foreign debt level of the US This movement also shifts the equilibrium debt position of the US out (increases) and shifts the equilibrium exchange rate down (further depreciation).

3. Although $\dot{E} = 0$ and $\dot{F} = 0$ appear linear, they are not linear in the limit, so that in both cases the locus would cross the x-axis only when net debt was infinite. The fact that there is historical precedent for important currencies to reach near worthlessness suggests that in practice, this distinction may be a formality.

In Figure 3 on the next page, we start at a hypothetical equilibrium at point "1". Each shift out in the $\dot{E} = 0$ asymptote is caused by some mechanism which causes a portfolio shift toward US assets. For simplicity, I model the $\dot{F} = 0$ asymptote as stationary; $\dot{F} = 0$ would be expected to shift under certain conditions such as a change in the US interest rate or a *shift* in the trade deficit (Blachard, Giavazzi, Sa

2005). I hypothesize a shift from "1" to "2" to be caused by an exogenous increase in the demand for dollars for "transaction liquidity" purposes. In the phase diagram, I then model the dollar as beginning to depreciate and the net debt position beginning to increase as it heads for the equilibrium point at "2a". Next, I model the "flight to safety trade" trade as a shift to point "3". Again the currency starts to depreciate toward a new equilibrium. The pegging associated with export-growth strategies is denoted by the shift toward point "4" on the graph. Finally, the asset allocation shift associated with the 2008 financial panic is represented as a shift to point "5", which is our current position.

I believe that the dynamics of the system are so skewed that the natural dynamic adjustment of the system will lead the dollar to be essentially worthless (point 6a). The path to equilibrium associated with this adjustment is a relatively slow depreciation accompanied by an ever increasing level of the net foreign debt position. Another option that is possible is an immediate and unexpected depreciation of the dollar, which would lead us to point 6b. Since much of the foreign claim to US assets is priced in dollars, a depreciation in dollars simultaneously reduces the net foreign debt of the US. Foreign assets held by US citizens would increase in dollar value, so the net foreign debt position would decrease. Since the level of US borrowing in foreign denominated currency is close to nil, we have the luxury of this possibility. Undoubtedly, taking this path would lead to onerous future terms on debt for the US However, this would be negated by a new level of competitiveness of US industry and the US would naturally run a Current Account surplus. Note that in this case we would shift to the south-east quadrant and the stable saddle path would then lead us to an appreciating currency and lower levels of net debt!

Of note, there are at least two possible ways for arriving at point 6b. One possibility would be for the US to announce its intention to devalue the currency, renounce the role of reserve currency, and suggest a discontinuous change in exchange rates (on the order of 90% depreciation.) A determined and extreme increase of the money supply could discourage competitive devaluation (a first-mover advantage of sorts). The other possibility is the possibility that was presented in the first part of the paper: foreign countries abandon pegs and shift asset preferences back to their own foreign markets. Whether this occurs due to a domestic or foreign decision, the net result is a discontinuous shift back to an equilibrium level of exchange rate that is determined strictly by money supply and production of goods and services.

Conclusion

In this paper, I have presented three mechanisms that have historically created an exogenous demand for dollars. These mechanisms can be modeled as global asset preference shifts which increase both the debt of the US and appreciate the exchange rate of the dollar in the short run. I suggest reasons for why these mechanisms may reverse and asset preferences will shift back toward foreign assets. I conclude with a discussion of how these mechanisms might be reversed and what their implications would be for the U.S. and the rest of the world.

Neither of these options is attractive, but as a nation and world, we need to be honest about the position in which we find ourselves. Either the dollar will experience a slow but complete devaluation accompanied by eventual bankruptcy of the U.S., or the dollar will experience a quick devaluation (but

not to worthlessness), followed by a return to equilibrium. Both options will have an associated level of chaos as the world grapples with a need to find a new way to settle accounts. Both options will lead to some level of default by the U.S., which will increase hostile feelings toward the U.S. However, point "6b" represents the potential for redemption, while point "6a" represents total and complete bankruptcy.

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- Continuous shifts are marked with solid lines with arrows.
- Discontinuous shifts are marked with dotted lines. That means it "jumps."
- The line from point "5" to point "6a" is curved to reflect that the net debt decreases exponentially as the exchange rate depreciates linearly. On this graph a lower exchange rate denotes a depreciation, rather than an appreciation, of the dollar.
- The red and green lines represent potential future paths for the dollar.

Figure 3: The dynamic path of the dollar exchange rate and US net foreign debt

Exchange rate, E

dE/dT=0

dE/dT=0

dE/dT=0

dF/dT=0

2

3

Current position, 5

4

1

2a

Headed for worthlessness?

6b?

17

6a?

Net US debt, F