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Global Imbalances: "Made in the USA" or "Made in China"

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Global Imbalances: "Made in the USA" or "Made in China"?

Tania Kallab*†

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Abstract

Three facts have characterized the pre-crisis debates in macroeconomics: the increase in the US current account deficit, the decline in interest rates and the increase in the share of US assets in global portfolios. Caballero, Farhi and Gourinchas (2008) described these "anomalies" as being external to the United States. The high saving rates in Asian countries in the aftermath of the collapse of their financial markets led to a high demand for American financial assets rather than domestic Asian ones, which were now considered unsafe. Our paper uses the basic model provided by Caballero, Farhi and Gourinchas to investigate whether an alternative explanation for these three facts, namely, the increase in American consumption. We show that the increase in US consumption would indeed cause a rise in capital flows towards the US (fact 1), but interest rates would rise rather than decrease (fact 2), and the share of american assets in global portfolios would not be affected (fact 3).

Keywords: Current account deficits, capital flows, interest rates, global portfolio share, consumption, financial assets

JEL classification: E37, E43, F43

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Contents

1 Introduction

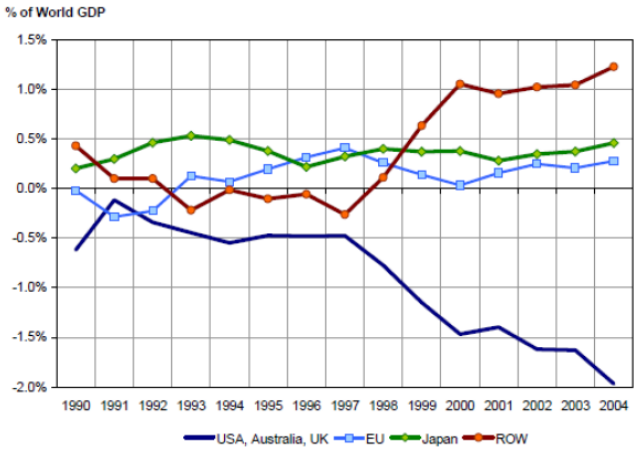
Global imbalances from 2004 to 2008 have drawn the attention of many researchers and become particularly relevant in discussions and literature. Caballero, Farhi and Gourinchas (2006 and 2008; hereafter, "CFG") discussed several major issues that, according to them, were considered "anomalies from the perspective of conventional wisdom and models". In their paper, they brought to light three puzzling facts that governed recent times.

First, the United States runs a current account deficit that increased drastically in the late 1990s until 2007—when the crisis surged—after which it started decreasing. [1] This deficit was met with surpluses in emerging markets, oil exports, and fast-growing countries, particularly China (CFG 2006 and 2008) (Figure 1.a). Second, as Miranda Xafa (2007) argues, long-run interest rates experienced a consistent decline starting in the early 1990s and continuing until 2005 (Figure 1.b) despite central banks' attempts to raise it, known as " Greenspan's conundrum". Third, the share of American assets in global portfolios increased throughout the period , as did the share of American output in the world's GDP (Figure 1.c).

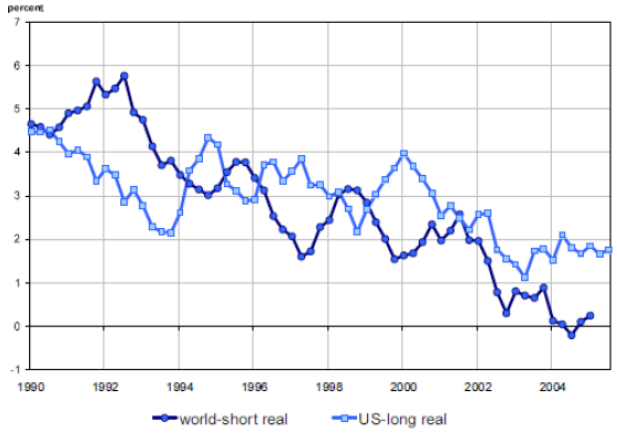
CFG's (2008) model shows that these three facts or anomalies can be explained by a savings glut that occurred in Asia's growing economies in the aftermath of the crash of the Asian financial markets. These high savings demand increased their demand for American financial assets (considered "safe" assets) in the global assets markets.

In this paper, we explore an alternative explanation to the current account deficit, the decline in interest rates, and the increase of the US share in the global portfolio. We investigate the effects of an increase in American consumption or an equivalent decrease in its savings on those puzzles. This alternative cause is worth exploring because it relates to the booming dot-com companies in which high investment opportunities were available in the United States, and people were encouraged to consume more and invest more (hence, supply more financial assets).

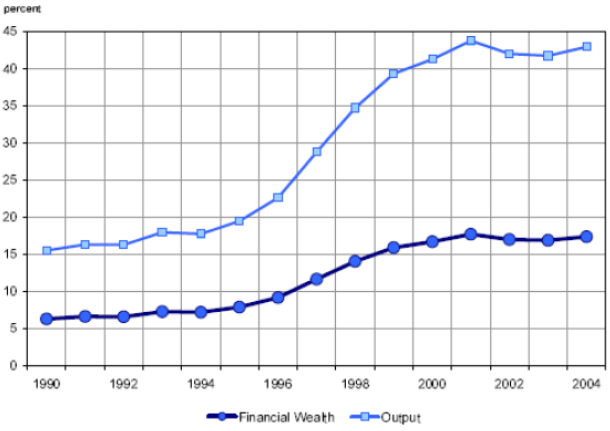
[1] Our discussion focuses on the pre-crisis phase (for elaborated work on the post-crisis phase, refer to Caballero 2009)



(a) Current account by Region (% of world output)



(b) World and US real interest rates



(c) Share of US assets in Rest of the World's Output and Financial Wealth

Figure 1: Extracted from CFG 2008. Sources (a) WDI and Deutsche Bank. (b) International Financial Statistics and Survey of Professional Forecasters. (c) World development Indicators, Bureau of Economic Analysis, European Central Bank, Bank of Japan and Author's Calculations

Actually, the increase in consumption or equivalent decrease in savings in the United States was highlighted by researchers and central planners who sought to interpret the global imbalances puzzle. Ben Bernanke (2005) argued that the current account deficit was "made in the USA" as it is the outcome of a decrease in US gross national savings. Actually, they witnessed a drastic decline in 2004, accounting for approximately 2% of the GDP. Kraay and Ventura (2005), along with Xafa (2007), also believed that the crash in the dot-com bubble was not the only factor behind the fiscal deficit; rather, a greater decline in domestic savings worsened the balance of the payment position. Xafa (2007) went on to suggest fiscal and monetary policies that provide market corrections and a rebalancing of the current deficit. Similarly, distortions might arise with both low private savings and public dissavings (Blanchard and Milesi-Ferretti 2009). Another key factor leading to the fiscal deficit in the United States is the excess demand for American assets from emerging markets that drive global interest rates down; hence, domestic prices appreciate, causing higher consumption (Obstfeld and Rogoff 2005). Figure (2) confirms this alternative explanation of the US deficit by showing a persistent upward trend in Americans' consumption, starting in 2003 and reaching its peak in 2007–2008 (see the appendix for IMF data).

In our paper, we apply an alternative exercise to CFG's (2008) model by analyzing it in response to a position shock on consumption in the United States. In this theoretical model, we focus on two groups: the "U countries," comprising the United States (the most significant weight), the United Kingdom, and Australia, and the "R countries," which include the rest of the world—namely, China and emerging Asian markets. The model basically emphasizes the net trade of financial assets between the United States and the rest of the world. The US supplies assets to finance their investment needs, and the rest of the world demands these assets for savings purposes.

The original model of CFG is based on the heterogeneity in the two regions in terms of their preferences for financial assets, which plays a major role in U countries' ability to meet the increasing saving needs in R countries in the after-effect of the Asian financial crash in the late 1990s, when ma-

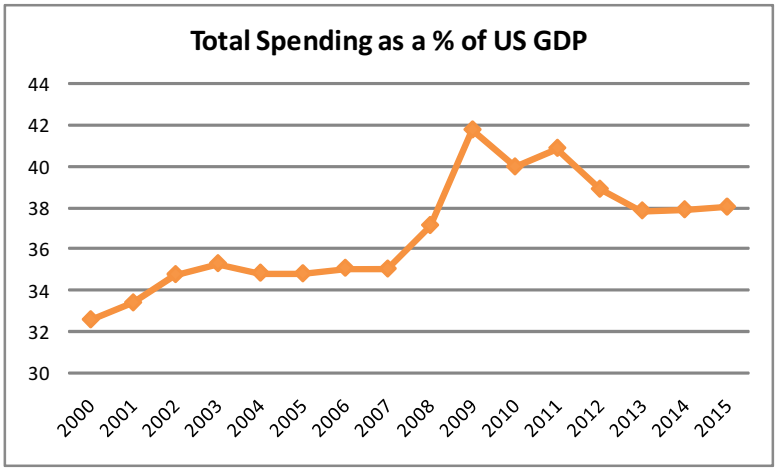


Figure 2: Government expenditure in the USA. Source: IMF data and statistics.

jor Asian countries—namely, South Korea, Japan, and Southeastern Asian countries—suffered from a balance of payment distress as well as the rapid incorporation of emerging economies such as China. R savers' increasing demand of U financial assets, simultaneously with the decrease in the value of their domestic financial assets, was met by a permanent account deficit in U countries, a decline in world interest rates, and an increase in U countries' share of assets in the global portfolio. Moreover, as long as the trade balance is positive, the rest of the world is financing part of the US external liability and keeping the deficit sustainable. [2]These results are relevant in explaining the three puzzling facts mentioned in the first paragraph and shown in Figure (1).

Our exercise instead relaxes the role of the Asian financial markets' crash and focuses only on the increase in American consumption as an explanation behind the imbalances puzzle. We show that an increase in American consumption would generate a current account deficit, but not a decline in interest rates or an increase in the US global portfolio share. Hence, it is not the key factor behind these imbalances. Actually, an increase in the

[2]This result is questioned in the post-crisis literature on whether the rest of the world will still be willing to pay for the US deficit.

U countries' consumption would decrease their interest in savings, driving the autarky and global interest rate up given that it is an open economy framework. Higher interest rates would lead to a decrease in the quantity of financial assets supplied in both U countries and R countries, leaving the share of U countries' assets in the global portfolio unaffected. Higher interest rates would also make savings more attractive to R-country savers, who will resort to U countries' financial assets as theirs are not sufficient enough to meet their growth. U countries would only be willing to supply instruments in order to finance their increasing consumption needs from which the current account results in a deficit in the latter and provide a surplus for the former.

A number of papers have tried to explain the imbalances puzzles. Blanchard and Milesi-Ferretti (2009) formalized the causes behind the aforementioned imbalances under some rational behaviors. On the one hand, aging countries with an inefficient retirement system and poor governance of firms will want to save excessively, anticipating the dissaving at retirement phase; on the other hand, fast-growing markets and oil exporting countries with increasing terms of trade will smooth their consumption patterns by increasing their propensity to save. Furthermore, countries with profitable investment opportunities respond positively to "the global saving glut"—an expression first used by the Federal Reserve governor Ben Bernanke in his 2005 Homer Jones lecture at St Louis—in order to finance those investments, thereby running current account deficits. One could reason that American assets have a marginal advantage over other assets since they are denominated in the US dollar, the most used currency in the world, which explains the excessive demand for American assets in the global portfolio, thereby "reflecting the role of the dollar in international transactions and the liquidity of the U.S. bond market" (Blanchard and Milesi-Ferretti 2009).

Obstfeld and Rogoff (2009) related the current account deficit in the United States to the high savings propensity in fast-growing and commodity-exporting countries, which was oriented toward investments in international reserves, characterized by their high liquidity and low risk. This behavior was perceived as an insurance against the Asian crisis in the late 1990s.

Our paper proceeds as follows: The next section will present the basic model under an equilibrium condition. The third section will provide the steady state results along with the transitory path in the aftermath of a shock in consumption. on consumption.[3]Section 4 will present a thorough comparative analysis between the results in Caballero's paper and those derived from the third section. The final section will conclude the paper.

2 Description of the Basic Model

This section introduces the basic model presented by (CFG, 2008). It describes an equilibrium pattern between asset supply and asset demand, interest rate and Global portfolios. We shall present a brief overview of the aforementioned model wherein the same setup is applied in both closed and open economies. We know that at equilibrium the value of assets is equal to the wealth accumulation; the interest rate is constant. It reflects the country's autarky interest rate. As mentioned earlier, we shall limit our discussion to two environments US and ROW unlike the original paper of (CFG, 2006b) where they included aside from U and R, Japan and Europe.

2.1 The Closed Economy Framework

Let us list the main hypothesis which are valid for each country i= $\{U,R\}$: time is continuous, infinite number of agents are born and die at the rate θ, with an initial endowment equal to $(1-\delta)X_t^i$ which they save until they die when they consume it all; we hence perceive θ^i as the rate of consumption. There is no production in the economy. Agents can only save in some identical saving means defined as "trees" whose value is V_t^i yielding a dividend of δX_t^i per period. The interest rate must equate the return on dividends plus the capital gains from those "trees" so we have the following identity:

$$r_t V_t^i = \delta X_t^i + \dot{V}_t^i \tag{1}$$

[3]The calibration of the parameters was extracted from CFG's (2005) paper, and the increase in consumption was calibrated using IMF data from 2004 until 2009 from the United States, the United Kingdom, and Australia (see appendix).

The saving accumulation denoted by W_t^i abide by the following equation where they increase with returns on savings and new endowments, and decrease with consumption:

$$\dot{W}_t^i = -\theta^i W_t^i + (1-\delta)X_t^i + r_t W_t^i \tag{2}$$

At equilibrium we have that the value of the assets is equal to the demand of assets so that:

$$W_t^i = V_t^i \tag{3}$$

Replacing (3) in (1) and then into (2), we get a relation between production, saving and consumption:

$$W_t^i = \frac{X_t^i}{\theta^i} \tag{4}$$

If we substitute (4) in (1) we get a relation for the interest rate:

$$r_t = \frac{\dot{X}_t^i}{X_t^i} + \delta\theta^i \tag{5}$$

where $\frac{\dot{X}_t^i}{X_t^i} = g$ the constant growth rate since the assumption goes that X_t^i is an exogenous factor that grows at a constant rate. Thus, in a closed economy framework, the interest rate is defined as the autarky interest rate:

$$r_{aut}^i = g + \delta\theta^i \tag{6}$$

We note that, the interest rate increases with the growth rate since the latter lifts the rate of growth of financial wealth demand (W) and hence the expected capital return of a tree (from (3)). Moreover it rises with δ since it increases the expected dividends to be gained and hence encourages more supply of assets. Finally the interest rate increases with θ since more consumption means less savings and according to (3), the value of assets will decrease generating higher interest rates[4].

[4]For a more thorough discussion of the setup refer to CFG, 2008 paper

2.2 The Open Economy Framework

This subsection describes a similar framework with an open economy where we assume that the world interest rates are given. For parallel reasoning and comparisons later one, we shall adopt the same assumptions as in CFG model

Definition 1. *We refer to the Trade balance TB_t and The current account CA_t for each country respectively as:*

$$TB_t^i \equiv X_t^i - \theta^i W_t^i$$

$$CA_t^i \equiv \dot{W}_t^i - \dot{V}_t^i$$

The trade balance is defined as the production minus the consumption which reflects the net exports/imports accordingly, whereas the Current account reflects the net change in the financial assets.

The model proceeds by solving the differential equations (1) and (2) so that:

$$V_t^i = \int_t^\infty \delta X_s^i e^{-r(s-t)} ds + \lim_{s\to\infty} V_s^i e^{-r(s-t)} \tag{7}$$

$$W_t^i = W_0^i e^{(r-\theta)t} + \int_0^t (1-\delta) X_s^i e^{(r-\theta^i)(t-s)} \tag{8}$$

In order to ensure the no-bubble condition, we assume that the second term in equation (7), $\lim_{s\to\infty} V_s^i e^{-r(s-t)}$ to be zero.

Lemma 1. *For a constant path of r such that $lim_{t\to\infty} r_t = r$, given that $g < r < g + \theta$[5], the asymptotic values of equations (7) and (8) and hence those of the Current account and The trade balance, are as follows and remain as such infinitely. (See appendix for the proof)*

[5]We do not need this assumption in the world economy, because this condition always holds when r is endogenously derived

$$\frac{V_t^i}{X_t^i} \underset{t\to\infty}{\longrightarrow} \frac{\delta}{r-g} \tag{9}$$

$$\frac{W_t^i}{X_t^i} \underset{t\to\infty}{\longrightarrow} \frac{1-\delta}{g+\theta^i-r} \tag{10}$$

$$\frac{CA_t^i}{X_t^i} \underset{t\to\infty}{\longrightarrow} g(\frac{1-\delta}{g+\theta^i-r} - \frac{\delta}{r-g}) = -g\frac{(r_{aut}^i - r)}{(g+\theta^i-r)(r-g)} \tag{11}$$

$$\frac{TB_t^i}{X_t^i} \underset{t\to\infty}{\longrightarrow} \frac{(r_{aut}-r)}{g+\theta^i-r} \tag{12}$$

Actually equation (9) shows a negative relation between the supply of assets and the interest rate; the demand for assets is however increasing with the interest rate. We note that the current account is negative when $r_{aut}^i > r$ since asset supply exceeds demand $\frac{\delta}{r-g} > \frac{1-\delta}{g+\theta-r}$- and positive otherwise; Whereas the trade balance is positive since lower interest rates lead to lower return on assets, hence lower wealth accumulation and eventually lower consumption. The positivity of the Trade balance finances partially the current account deficit but does not cover all the external liabilities; Consequently, the current account runs a permanent deficit, from which the expression in CFG 2008 "U's current account never needs to turn into surplus and capital flows "indefinitely" towards U."

The Metzler Diagram also extracted from CFG 2008 under figure (3) shows the Steady State values of asset supply and demand. The two curves cross when $r_{aut} = r$ and we have $\frac{\delta}{r-g} = \frac{1-\delta}{g+\theta-r}$.

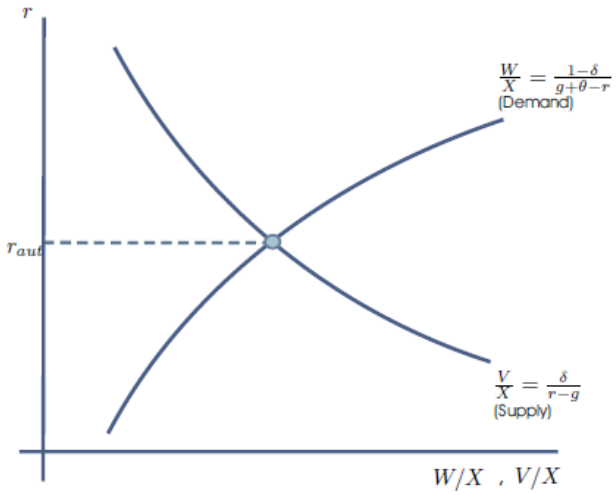


Figure 3: The Metlzer Diagram

3 The World Economy

We proceed in this section by examining the Global equilibrium under the two groups i= $\{U,R\}$. Each of the two regions abide by the same setup as in the closed economy under a common world interest rate r_t. They both satisfy equation (1) where V_t^i is the value of country i's tree evaluated at time t. The production grows at a constant growth rate and is hence defined as:

$$X_t^i = X_0^i e^{gt} \tag{13}$$

The wealth accumulation equation also follows the same setup as in the closed economy for each region aside. We assume, for the purpose of the model, that the parameter θ is unique for each region whereas both g and δ are common across the countries. It abides by Equation (2).

At equilibrium, we recall that $V_t^i = W_t^i$, however when we opened the economy, we have that at equilibrium global supply of assets must be equal to the global wealth accumulation, but they no longer equate as per each country separately.

Hence, the equilibrium condition for the world economy is $V_t = W_t$ where $V_t = V_t^u + V_t^r$, $W_t = W_t^u + W_t^r$, and that $X_t = \theta^u W^u + \theta^r W^r$, with $X_t = X_t^u + X_t^r$; they both yield the common international interest rate and the Global growth of wealth:

$$r_t = x^u r_{aut}^u + x^r r_{aut}^r + \theta^u x^u (\frac{\theta^u W^u}{X^u} - 1) + \theta^r x^r (\frac{\theta^r W^r}{X^r} - 1) \tag{14}$$

$$\dot{W}_t = -\theta^u W_t^u - \theta^r W_t^r + (1-\delta) X_t + r_t W_t \tag{15}$$

With $x^r \equiv \frac{X_t^r}{X_t}$ and, $x^u \equiv \frac{X_t^u}{X_t}$

(See Proof in appendix)

Let us move to the next subsection where we discuss the shock.

3.1 Increase in US consumption: The Steady State

Assumption 1. *(Initial conditions): Initially* $\theta^u = \theta^r = \theta$.

It follows that countries are initially symmetric; Hence, the autarky interest rate is common across both regions, the equilibrium international interest rate is the autarky one and both regions have the same setup in the steady state as shown in Figure (3) in Metzler diagram. Consequently there is no net capital flow across the economy $\frac{W^u}{x^u} = \frac{V^u}{x^u}$ and $\frac{W^r}{x^r} = \frac{V^r}{x^r}$.

We suppose now that at time $t = 3$, θ^u increases permanently to a new value $\theta^u > \theta^r$.

We are attempting to interpret the fiscal deficit in the USA not under the crash in Asian financial markets but under the increase in US consumption. As stated earlier, increase in θ can be interpreted as either decrease in US gross national savings or increase in their gross national expenditures, (Bernanke, 2005). Further papers argue that unsymmetrical capital flows lead to domestic prices appreciation encouraging higher consumption. (Obstfeld, Rogoff, 2005)[6].

[6]We can assume that the shock is unanticipated, but it doesn't affect much our analysis

The interest rate path, along with that of the CA and TB, can no longer be solved analytically since the former is no longer constant. Thus, we shall study its path in the simulation model; however, we can define the new steady states values of the interest rate, V and W.

Proposition 1. *(Increase in US consumption): In the aftermath of an increase in θ^u, at equilibrium r^u_{aut} will increase, whereas r^r_{aut} remains the same. The international interest rate will be between the ex-post autarky rates r^u_{aut} and r^r_{aut}. Both V^u and W^u decrease. U exhibits a permanent current account deficit*

At equilibrium the interest rate value derived from equation (14) is:

$$\begin{aligned} r^r_{aut} = g + \delta\theta^r < r_+ = x^u r^u_{aut} + x^r r^r_{aut} + \theta^u x^u(\frac{\theta^u W^u}{X^u} - 1) + \theta^r x^r(\frac{\theta^r W^r}{X^r} - 1) \\ < r^u_{aut} = g + \delta\theta^u \end{aligned} \tag{16}$$

Under Lemma 1, V reaches the steady state value:

$$\downarrow V^u_t = \frac{\delta X^u_t}{\uparrow r^+ - g}, \qquad \downarrow V^r_t = \frac{\delta X^r_t}{\uparrow r^+ - g}$$

Moreover we also know that from Lemma 1 that the equilibrium value of the wealth accumulation is as follows:

$$\downarrow W^u_t = \frac{(1-\delta)X^u_t}{g + \uparrow \theta^u - \uparrow r^+} \qquad \uparrow W^r_t = \frac{(1-\delta)X^r_t}{g + \theta^r - \uparrow r^+}$$

and hence,

$$\frac{CA^u_t}{X^u_t} = -g\frac{(r^u_{aut} - r)}{(g + \theta^u - r^+)(r^+ - g)} < 0$$

since $r^u_{aut} > r$ and $g < r^+ < g + \theta^u$. U runs a permanent current account deficit.

The Metzler diagram in figure (4) describes the equilibrium values for both regions in the Steady state:

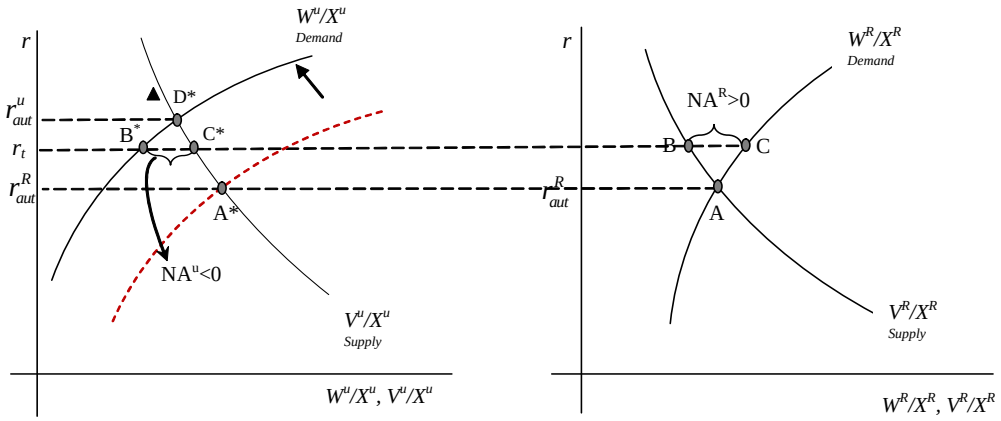


Figure 4: The Metzler diagram for a permanent increase in θ^u

Starting at point $A*$, r increases to its new equilibrium value up to the level of the segment $[B^*C^*]$. r^u_{aut} increases whereas r^r_{aut} remains the same. V^u_+ decreases to C^*. The increase in θ^u shifts the asset demand curve to the left -decrease in assets demand-. The Gap between points $B*$ and $C*$ reflects the current account deficit wherein $NA^u = W^u - V^u < 0$. We notice that V^r also decreased along the balanced growth from point A to point B. Both declines in the value of assets across regions drop the global supply of assets down keeping the share of U assets in the global portfolio constant.

Let us now examine the allocations of V and W across both regions. One can reason that $\downarrow V^u_0$ and $\downarrow V^r_0$ decrease because with higher consumption, agents are less interested in saving, hence the value of the trees decreases so does their price, counterbalanced by an increase in r. In this scenario, lower dividends streams are discounted at the common global interest rate. However, we do not know the ratio by which V^u_0 decreases with respect to V^r_0, hence we cannot describe the change in $\frac{\downarrow V^u_0}{\downarrow V^r_0}$. On the other hand, with higher consumption, $W^u_{0\downarrow}$ decreases, as for $W^r_{0\uparrow}$, it increases with the higher interest rates, since return on savings increases - $\frac{W^u_{0\downarrow}}{W^r_{0\uparrow}}$-. As long as there is some home bias, R countries are more keen in saving in their domestic assets. However, the increase in W^r is less than the decrease in those in U-countries

as we will show in the next section under the transitory path, hence $\frac{W^u_{0\downarrow}}{W^r_{0\uparrow}} \downarrow$[7].

One can interpret the increase in U consumption as follows: an increase in θ^u lowers global demand for assets, people will invest less in those saving vehicles. With lower demand for V, their price decreases. The shock is absorbed by an increase in the interest rate. The dividend rate, δX_t, is remained unchanged, however lower stream of V are now available. With higher interest rates, R-savers become more interested in saving; since their supply of assets is not sufficient in responding to the market's demand, they have recourse to U's assets. (Facing higher interest rates, ROW have lower incentive to supply assets.) Therefore, the drop in W^u, V^u and V^r is met with an increase in W^r and increase in the real rates.

Capital flows towards U countries, which hence, witness a permanent fiscal deficit. $\frac{W^u}{X^u} - \frac{V^u}{X^u}$ is negative and non-vanishing whereas $\frac{W^r}{X^r} - \frac{V^r}{X^r}$ is positive and non-vanishing. The equilibrium interest rate r^+ is such that $NA^u = W^u - V^u < 0$ and $NA^r = W^r - V^r > 0$ sum to zero.

3.2 The Transitory Path

In this subsection, we shall tend to study the transitory path of each of the variables under the shock after calibrating the model. Later on, we will conduct a comparative analysis between this shock and the one applied by CFG in their paper, and auto criticize the economic significance and explanatory power of our modeling versus theirs. For that matter, we extract the parameters values from the so-called paper where the authors calibrated the model using US aggregate data. We calculated the increase in θ^u using IMF data presented in Table 2 in the appendix. The average increase was estimated to 0.11. We rounded it to the nearest tenth. Having only two economies in the world, their shares of production must sum to one $x^u_0 + x^r_0 = 1$. Knowing the value of x^r_0 we deduced the one of x^u_0. We shall study the behavior of CA^u_t only since $CA^u_t + CA^r_t = 0$, so explaining one feature of the equality leads to the other. Table 1 summarizes the parameters assumptions.

[7] The home bias assumption is adopted to its extreme case in CFG's model, whereas it is not critical in our analysis

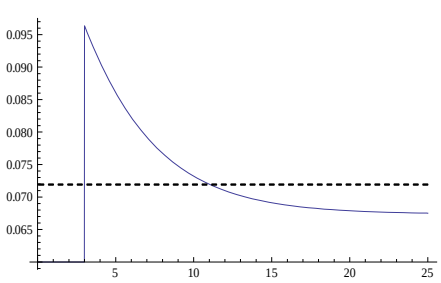
Parameter	θ^R	θ^u	g	x_0^r	x_0^u
Value	0.25	0.35	0.12	0.3	0.7

Table 1: Main parameters

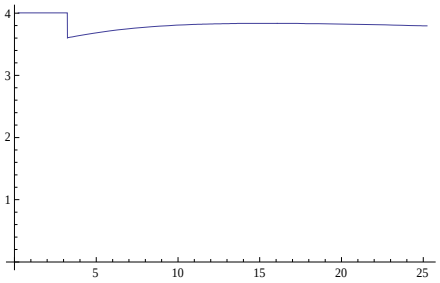
The calibration generated the graphs shown in figure (5). The simulation is quite descriptive: the interest rate initial value was at 0.06 before the shock. At impact, it increased to 0.095, a higher value than the ex-post autarky rate $r^u_{aut} = 0.072$ (figure 5.a). This increase was coupled by an immediate decrease of the value of the assets (figure 5.b). The interest rate starts decreasing progressively to an asymptotic value equal to 0.068 which falls between $r^r_{aut} = 0.060$ and $r^u_{aut} = 0.072$ (figure 5.a). Similarly the value of the assets increases asymptotically to reach, however, a lower value than the initial one (figure 5.b). The wealth accumulation, which was constant at its the initial value, starts dropping persistently after the shock (figure 5.c). The current account also exhibits a persistent deficit after dropping sharply at impact (figure 5.d). The net foreign assets position also decreased since W exhibits a larger decrease than V (figure 5.e). As for U's share in the global portfolio, it remains constant since both V^u and V^r decreased hence the global portfolio also decreased keeping the ratio constant (figure 5.f). Finally, the Trade Balance also displays a sudden decrease at impact but then increases to a positive value in order to finance the external liability incurred by the fiscal deficit. Actually the positivity of Trade Balance partially compensates the deficit and sustains a constant CA^u_t/X^u_t over the long-run (figure 5.g). Figure 5.h shows the transitory dynamics of r with respect to V^u across time. It confirms actually what has been stated at the beginning of the paragraph.

Subsequent to the simulation, we can validate the results under some intuition

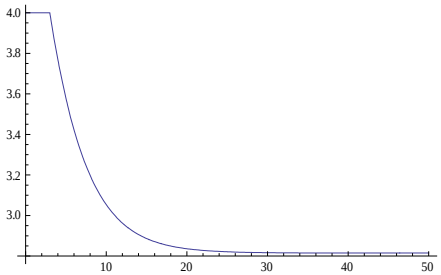
Lemma 2. *At impact r jumps up to a value greater than the ex-post U-autarky rate while V and W both decrease.*



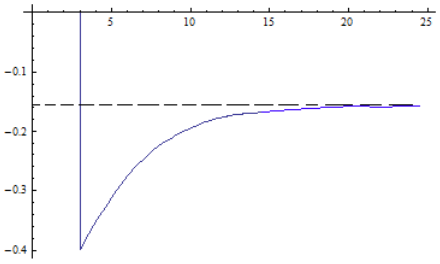
(a) Interest rate



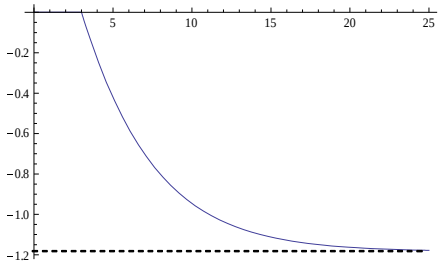
(b) Value of Assets/Output



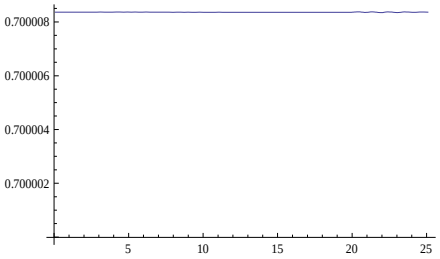
(c) Wealth accumulation/Output



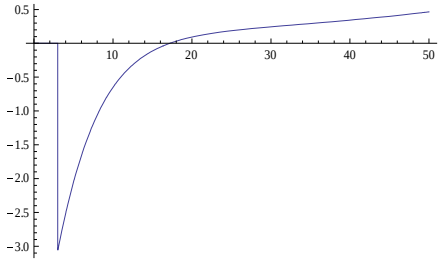
(d) Current Account/Output



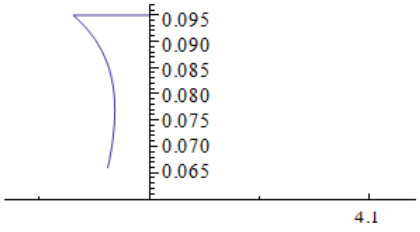
(e) Net foreign assets/ Output



(f) Portfolio share

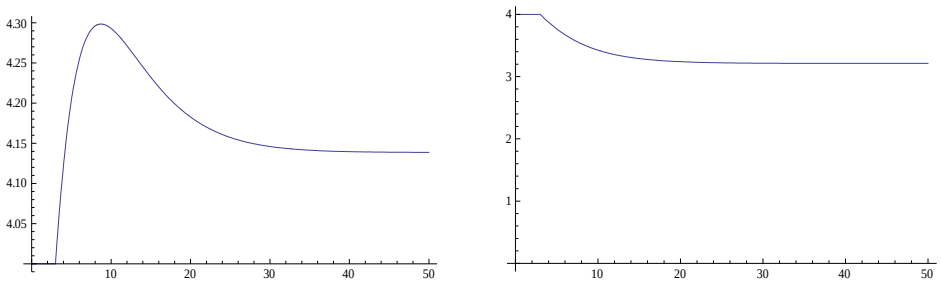


(g) Trade Balance



(h) Transitory dynamics of r with respect to V^u

Figure 5: Effect of a permanent Increase in θ^u on US variables



(a) W^r (b) W_t

Figure 6: Effect of a permanent increase in θ^u on $W^r$and W_t

At any point in time we have that

$$\uparrow \theta^u W^u \downarrow + \theta^r W^r = X_t \tag{17}$$

When θ^u increases, and since equation (17) holds at all times, either W^r_{0+} or W^u_{0+} must jump in order to keep X_t constant. We know from the simulation path that W^u drops at impact. Figure (6) shows the transitory path for W^r and W_t. W^r increases then drops (figure 6.a), but the decrease in W^u is larger since global W_+ drops (figure 6.b). Hence at impact, $\downarrow W_{0+} = \downarrow W^u_{0+} + \uparrow W^r_{0+}$ must also jump down. We recall that $V_t = W_t$, it follows that V_{0+} also jumps down.

At impact r increases to a value higher than the ex-post U-autarky rate r^u_{aut}.

$$r_{0+} = x^u r^u_{aut} + x^r r^r_{aut} + \theta^u x^u (\frac{\theta^u W^u}{X^u} - 1) + \theta^r x^r (\frac{\theta^r W^r}{X^r} - 1) > r^u_{aut} = g + \delta\theta^u$$

Proposition 2. *(Increase in U-countries consumption): If θ^u increases the interest rate increases then continuously drops to an asymptotic value between the ex-post autarky rates r^r_{aut} and r^u_{aut} . The current account in U countries will exhibit a deficit at impact then increases progressively but remains negative in the long run.*

Intuition. The interest rate jumps up at impact then falls down until

it reaches its equilibrium value between r^r_{aut} and r^u_{aut}.

$$r^r_{aut} = g + \delta\theta^r < r_+ = x^u r^u_{aut} + x^r r^r_{aut} + \theta^u x^u(\frac{\theta^u W^u}{X^u} - 1) + \theta^r x^r(\frac{\theta^r W^r}{X^r} - 1)$$
$$< r^u_{aut} = g + \delta\theta^u \tag{18}$$

When r increases at impact, V^u_{0+} decreases then starts increasing with the gradual fall of r to a new steady state value which is less than the initial value before the shock (figure 5.h).

4 Comparative Analysis

We compare in this section (figure 7), the effects on global capital flows, portfolio shares and interest rates in the aftermath of an increase in consumption on U-countries (positive shock on θ^u) as presented in our model, and the crash in Asian financial markets as induced in CFG paper (negative shock on δ^r).

We notice that both shocks lead to current account deficits in U-countries. This is due to the excess demand of R-savers to U-assets under the latter shock and both excess demand of R-savers and supply of U-assets under the former one. The persistence of the deficit is such because R-saving demand is growing with the growth of those countries whereas their financial market development is not able to meet this growth. It is also due to the larger decrease in savings relative to the supply of assets in U-countries as a result of increase in consumption. The latter shock favored excess demand for U-assets as local trees have devalued. The counterpart of asset price devaluation was an increase in the interest rates.

Moreover we also found convergence of results regarding the value of net foreign assets. Caballero Farhi and Gourinchas rendered this worsening to the initial sharp fiscal deficit. As for this modeling we notice a decrease in both wealth accumulation and asset values wherein wealth accumulation decreases with a higher proportion.

Looking at the interest rates, the results are quite diverging. As a matter of fact, CFG model could indeed explain the puzzling facts behind imbalances

where the world witnessed a persistent decline in interest rates. Our model could merely do so; Actually the results yield a sharp increase in interest rates at impact then a progressive decline to reach however an asymptotic result greater than the ex ante autarky rate.

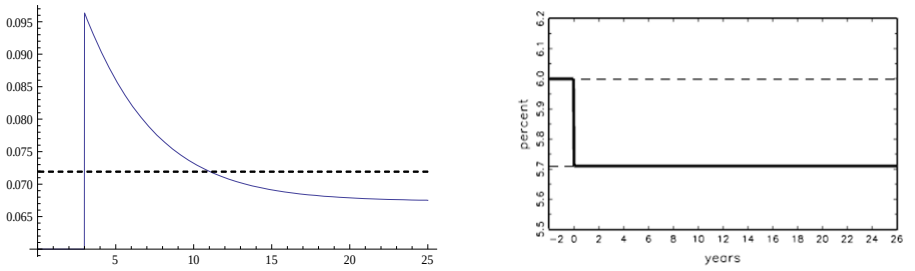
Finally, it is intuitive to reason that the crash in Asian financial markets decreased their ability to supply financial assets. R-savers resorted to U-assets to respond to their fast growing demand for savings; from which U's share in Global portfolio have increased. In our model, what happened was the following: the increase in consumption reduced people's interest in investing in those assets whose prices have declined as a consequence, leading to higher interest rates. With higher world real rates, ROW supplied fewer assets. Hence global portfolio has decreased and U's share was left unaffected.

In Summary, the exercise we applied, yet was able to explain one aspect of the global imbalances being the persistent current account deficit (Fact 1 in CFG model) it left the other two aspects unexplained since it could not generate neither decline in interest rates nor increase in U's share in the Global portfolio; the reason why the authors have abstained from adopting this parameter in examining the imbalances.

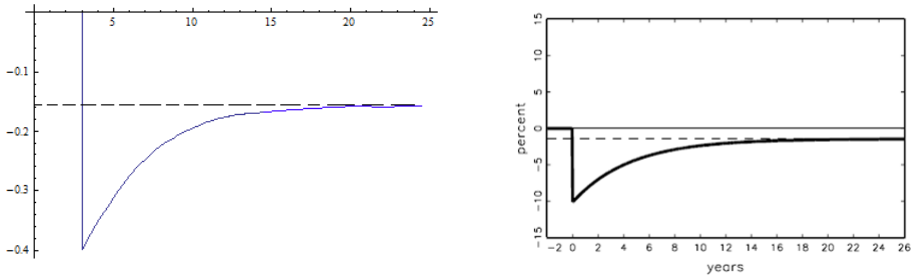
We note that the persistence in U's fiscal deficit is due to the fast growth in R-countries. Faster than the growth in U-countries

Let's make a comparative analysis at the asymptotic results as presented in figure (8):

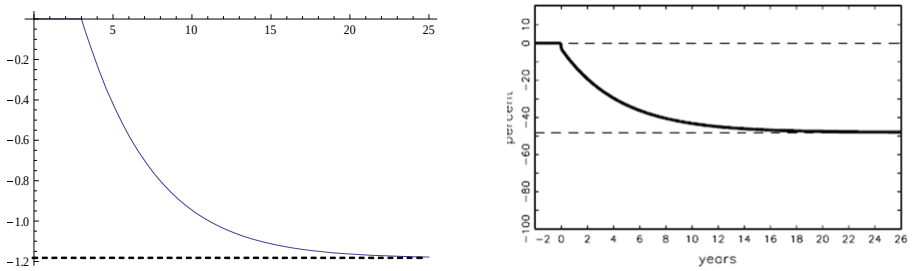
Following a crash in the Asian financial markets (figure 8.a), global supply of assets in R countries decreased as a result of a decline in "the share of R income that can be capitalized." Demand for assets increased following the increase in the endowments that can be saved shifting hence, the asset demand curve to the right. The drop in interest rates lead to an increase in the value of U-assets in the financial markets but to a decrease in the return on their savings W^u. On the other hand, the increase in consumption in U-countries (figure 8.b), generated lower savings, -from which the shift in asset demand curve- and higher interest rates. The higher interest rates, the more costly it becomes to supply financial assets, which explains the drop in



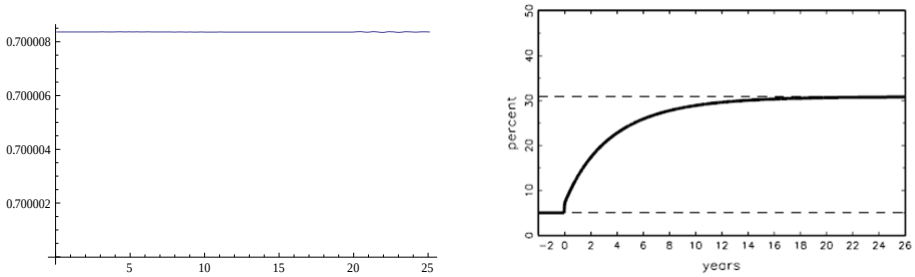
(a) Interest rate



(b) Current account/output



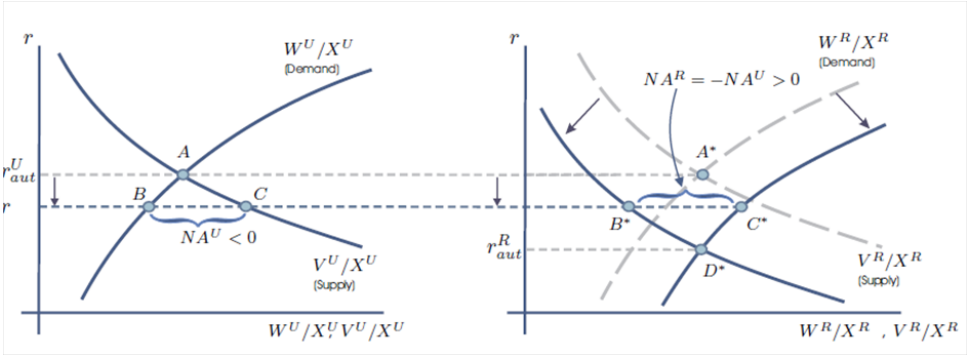
(c) Net foreign assets/output



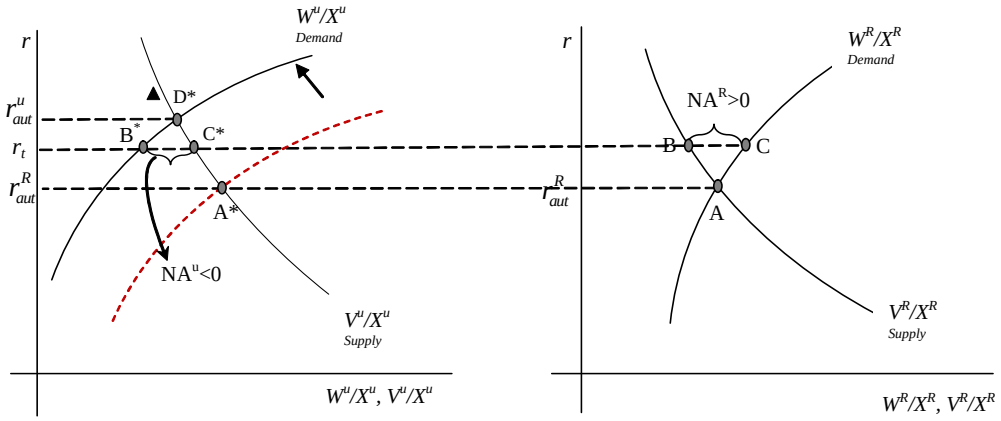
(d) Global portfolio share/output

Figure 7: Comparative results

global assets supply in both countries, Finally, ceteris paribus, higher rates yield higher returns on savings. W^r increases along the curve.



(a) For a permanent drop in δ^r



(b) For a permanent increase in θ^u

Figure 8: Metzler diagram

5 Conclusion

In this paper, we have investigated whether an increase in American consumption, or alternatively a decrease in savings, can explain the US current account deficit. In CFG's paper, the established key reason for the current account deficit in the United States was one of a savings glut following the

Asian emerging markets crisis. These authors provided a stylized model wherein they discussed various structural and financial shocks, which were relevant in describing "global imbalances". These shocks mainly reflect the collapse of Asian markets in the late 1990s. Countries accumulated international reserves as insurance to the crisis and also due to the deficiency of local liquid financial assets. Consequently, the US current account deficit was produced by the rest of the world. Their results pointed to the significant capital inflows toward U countries and declines in interest rates.

Our framework builds on a different view, although both views are related and even coexist. Indeed, our explanation tries to attribute the causes of the US current account deficit to consumption shifts in the United States. As anticipated by CFG (2008), an increase in American consumption would indeed generate a fiscal deficit in the United States, but appears to be irrelevant in explaining the decline in world interest rates or the increase in American shares in the global portfolio. We pointed in a diverging direction: Our results show an increase in interest rates, with no effect on the American share in the global portfolio.

It is important to note that we applied a theoretical exercise that lacks any empirical estimation. We tried to explain realistic scenarios in terms of a simplistic consumption decision, leaving out other important aspects of reality. We also have little to say about shifts in real exchange rates, which could be a major component in determining the balance of payments and trade patterns.

One of the many extensions that could be studied is the sustainability of those imbalances in the sense of whether the rest of the world would be willing to "pay for US deficit and for how long". Bernanke (2005), for instance, provided solutions to help developing countries play a "more natural role" in the financial markets as borrowers rather than lenders. This might contribute to a smooth rebalancing of capital flows in normal times rather than during times of crisis. Moreover, one could also relate the imbalances to the current financial crisis, as attempted by Blanchard and Milesi-Ferretti (2009).

Much remains unexplored. Future literature will have a lot to discuss in terms of pre- and post-crisis analyses and the interactions in between.

Predictions and forecasts, as well as suggestions and solutions, are still virgin fields. I shall dedicate my future research in this area, trying—if possible—to relate foreseeable and anticipated implications and solutions rather than just explaining past anomalies.

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A Proofs

A.1 Proof of Lemma 1

Since

$$
\begin{aligned}
V_t =& \int_t^{\infty} \delta X_s e^{-\int_t^s r_u du} ds = \delta X_t \int_t^{\infty} e^{-\int_t^s (r_u - g) du} ds \\
W_t =& W_0 e^{\int_0^t (r_s - \theta) ds} + \int_0^t (1-\delta) X_s e^{\int_s^t (r_u - \theta) du} ds \\
=& (1-\delta) X_t [\frac{W_o}{(1-\delta)} e^{\int_0^t (r_s - \theta) ds} + \int_0^t e^{\int_s^t (r_u - \theta - g) du} ds]
\end{aligned}
$$

Having that $g < r < g + \theta$, The lemma follows:

$$
\begin{aligned}
\lim_{t\to\infty} \int_t^{\infty} e^{-\int_t^s (r_u - g) du} ds =& \frac{1}{r-g} \\
\lim_{t\to\infty} \int_0^t e^{\int_s^t (r_u - \theta - g) du} ds =& \frac{1}{g+\theta-r} \\
\lim_{t\to\infty} \frac{W_o}{(1-\delta)} e^{\int_0^t (r_s - \theta) ds} =& 0
\end{aligned}
$$

Since along the balanced growth, we have that $\dot{W}_t = gW_t$ and that $\dot{V}_t = gV_t$, hence $CA_t = g(V_t - W_t)$

It follows that:

$$
\begin{aligned}
\frac{CA_t}{X_t} &\underset{t\to\infty}{\to} g(\frac{1-\delta}{g+\theta-r} - \frac{\delta}{r-g}) = -g\frac{(r_{aut} - r)}{(g+\theta-r)(r-g)} \\
\frac{TB_t}{X_t} &\underset{t\to\infty}{\to} 1 - \theta\frac{(1-\delta)}{g+\theta-r} = \frac{r_{aut} - r}{g+\theta-r}
\end{aligned}
$$

A.2 Proof of equation 14[8]

Starting with the wealth accumulation and asset pricing equations defined under each region

[8] Proof extracted from CFG (2008)

$$\dot{W}_t^i = -\theta^i W_t^i + (1-\delta)X_t^i + r_t W_t^i \tag{19}$$

$$r_t V_t^{\,i} = \delta X_t^{\,i} + \dot{V}_t^i \tag{20}$$

Adding both regions together we get:

$$\dot{W}_t = -\theta^u W_t^u - \theta^r W_t^r + (1-\delta)X_t + r_t W_t \tag{21}$$

and

$$r_t V_t = \delta X_t + \dot{V}_t \tag{22}$$

At equilibrium we have that $V_t = W_t$ so that

$$X_t = \theta^u W^u + \theta^r W^r \tag{23}$$

Taking the FOC of equation 23 with respect to time and substituting in equation 19, we get:

$$\begin{aligned}\dot{X}_t =& \sum_i \theta^i \dot{W}_t^i = \sum_i \theta^i [-\theta^i W_t^i + (1-\delta)X_t^i + r_t W_t^i] \\ =& r_t X_t + \sum_i \theta^i (1-\delta) X_t^i - \sum_i \theta^{i2} W_t^i\end{aligned}$$

Hence

$$\begin{aligned}r_t =& g - \sum_i \theta^i (1-\delta)\frac{X_t^i}{X_t} + \sum_i \theta^{i2}\frac{W_t^i}{W_t} \\ =& x^u r_{aut}^u + x^r r_{aut}^r + \theta^u x^u (\frac{\theta^u W^u}{X^u} - 1) + \theta^r x^r (\frac{\theta^r W^r}{X^r} - 1)\end{aligned}$$

B Tables

Country	Australia	Japan	United Kingdom	United States	Total
2004	304.88	170,495.20	478.31	4,254.20	175,532.59
2005	327.19	171,639.10	509.14	4,563.40	177,038.83
2006	357.66	176,151.30	539.58	4,796.00	181,844.54
2007	386.20	172,191.20	566.70	5,143.90	178,288.00
2008	425.41	180,044.50	616.91	5,611.63	186,698.44
2009	470.01	188,503.31	656.90	6,107.08	195,737.30
2010	499.28	189,607.57	683.23	6,055.73	196,845.80

Table 2: IMF data. Figure 2 (a)