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**A CARICATURE (MODEL) OF THE WORLD ECONOMY**

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# A Caricature (Model) of the World Economy

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## Abstract

This paper provides a stylized model of the workings of a global economy where one of its key driving factors is economic agents' continuous struggle to find assets in which to park financial resources. This struggle naturally comes with euphoria and disappointments, as many of the "parking lots" are built too quickly or are not of the desired size. There are also global asymmetries, as some countries are endowed with more empty "land" than others, and their growth potential may also differ. I use this caricature of the world economy to describe several of the main driving forces behind recent global macroeconomic events and to discuss "quantitative" easing policies.

**JEL Codes:** E0, F0, G0

**Keywords:** Global equilibrium, shortage of assets, interest rates, asset prices, booms and busts, sovereign crises, financial reform and development, fiscal deficits, flight to quality, decoupling, quantitative easing.

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# 1 Introduction

This paper provides an extremely stylized model of the workings of a global economy where one of its key driving factors is economic agents' continuous struggle to find assets to park financial resources. This struggle naturally comes with euphoria and disappointments, as many of the "parking lots" are built too quickly or are not of the desired size. There are also global asymmetries, as some countries are endowed with more empty "land" than others, and their growth potential may also differ. I use this caricature of the world economy to describe several of the main driving forces behind recent global macroeconomic events and to discuss suitable economic policy. I also make a series of conjectures about some of the uncertainties and trends that may emerge in the near future.

This *macroeconomics of asset shortages* perspective has been at the core of much of my research and policy proposals over the last decade (see Caballero 2006 for a short paper presented at the ECB with that title). As such, I do not pretend that this is a fully balanced view of the recent events in the world economy.

Also note that much of what I will say has a formal "micro-founded" model in the background (see, in particular, Caballero and Krishnamurthy (2006, 2008a,b, 2009) and Caballero et al (2008a,b)) but I do not make any major effort to draw those connections here. Instead, I indulge in the liberating experience of simply writing down equations that roughly capture things I believe in. (Warning: this should not be done without proper supervision or if you need to get tenure.)

## 2 The Global Economy

In this section I build a stylized model of the world economy, attempt to capture some of the main recent macroeconomic forces and trends, and conjecture upon some of the pending risks and patterns that are likely to emerge in the near future. My emphasis throughout is on financial markets implications, however it goes without saying that there is an extensive literature that describes the many connections between developments in financial markets and real activity (and their feedbacks).

## 2.1 A (caricature) model

I begin by outlining a model which serves as the backbone for the conjectures I make in the rest of the paper. There are four assumptions and equations on which the analysis builds: Aggregate consumption, portfolio demand, goods production, and asset supply.

Time is continuous. At each instant, (the rate of) aggregate consumption,  $C_t$ , is proportional to aggregate wealth,  $W_t$ :

$$C_t = \theta W_t. \quad (1)$$

There are two assets,  $A$  and  $B$ , in which to store wealth. Agents want to hold a share  $\alpha$  of wealth in asset  $A$  and  $(1 - \alpha)$  in asset  $B$ . In the model there is no real distinction between these assets in terms of payoffs since there is no explicit modelling of risk, so all differences stem from agent's perception or tastes. However this is just a "catch all" reduced form for the many factors that determine portfolio decisions in reality, that are not purely return-driven (more on this later). Let  $x^i$ , for  $i = \{A, B\}$ , denote the units of each asset held by economic agents and  $p^i$  their respective prices. We then have:

$$W_t = p_t^A x_t^A + p_t^B x_t^B. \quad (2)$$

Aggregate output is exogenous and grows at rate  $g$ :

$$Y_t = Y_0 e^{gt}. \quad (3)$$

A fraction  $\delta$  of this output is pledgable (i.e., its present value can be used to back up assets) and the rest is not (think of the latter as part of labor income, but it could include other non-pledgable incomes such as small firms' profits). There are  $\beta$  assets of type  $A$  and  $1 - \beta$  of type  $B$ , each of which entitles the owner to corresponding shares of the pledgable output (i.e., a fraction  $\beta$  of the pledgable income is of type  $A$  while  $(1 - \beta)$  is of type  $B$ ).

We are now ready to characterize some basic properties of this (world) economy. Equilibrium in goods and financial markets require that:

$$\begin{aligned} C_t &= Y_t \\ \frac{p_t^A}{p_t^B} \frac{\beta}{1 - \beta} &= \frac{\alpha}{1 - \alpha}. \end{aligned}$$

Henceforth I will assume that asset  $A$  is in *relatively short supply*. That is,  $\alpha > \beta$ , to imply:

$$p_t^A = \frac{\alpha}{\beta} \frac{1 - \beta}{1 - \alpha} p_t^B > p_t^B. \quad (4)$$

Replacing this expression back into the portfolio equation and using the consumption function and equilibrium condition in goods markets, we can solve for the equilibrium asset prices in terms of the consumption good (the numeraire):

$$\begin{aligned} p_t^A &= \frac{\alpha Y_t}{\beta \theta}, \\ p_t^B &= \frac{1 - \alpha}{1 - \beta} \frac{Y_t}{\theta}. \end{aligned} \quad (5)$$

Finally, we can find the implicit interest rates,  $r^A$  and  $r^B$ , that are consistent with these asset prices and the standard arbitrage condition:

$$r_t^i = \frac{\delta Y_t + \dot{p}_t^i}{p_t^i}$$

to imply:<sup>1</sup>

$$\begin{aligned} r_t^A &= g + \delta \theta \frac{\beta}{\alpha} \\ r_t^B &= r_t^A + \lambda_t \end{aligned} \quad (6)$$

for an scarcity premium (or convenience yield) of asset  $A$  over asset  $B$ :

$$\lambda_t \equiv \delta \theta \frac{\alpha - \beta}{\alpha(1 - \alpha)} > 0. \quad (7)$$

These equations fully characterize equilibrium and allow us to do comparative statics.

### *Discussion and apology*

Before exploring the effects of different “shocks,” it is important to provide some context to the distinction between type  $A$  and type  $B$  assets. This assumption attempts to capture the fact that at any given time there are assets that seem scarcer than others. The reasons for these scarcities are varied, complex, and change over time.

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<sup>1</sup>For simplicity, I have assumed that all future pledgable income is embodied in existing assets. A more realistic setup has new assets emerging over time, in which case the effect of growth on interest rates is reduced. In fact, in the extreme case where the stock of assets grows at the rate  $g$ , this rate drops out of the interest rate expressions.

For example, during the years between the Nasdaq crash and the recent financial crisis, type  $A$  assets were almost any AAA bond or tranche. The reasons for the enormous demand for these assets were, among others, the rise in the relative importance of sovereign savers and a variety of regulatory requirements on financial institutions. Things changed when the crisis hit; suddenly only AAA-bonds issued by sovereigns, especially the U.S., made the type  $A$  cut.

At times, type  $A$  assets are not limited to ultra-safe fixed income ones. Commodities, real estate, or the NASDAQ may become the hot asset. That is, economic investors coordination can raise the status of almost any particular asset. We can also think about the sovereign yield curve in terms of  $A$  and  $B$  assets, with the short end of the curve as the former and the long end as the latter, although there are times when the entire curve seems to be perceived as type  $A$ .

I am fully aware that I'm asking the reader to be far more flexible in its interpretation than is the norm in academic papers. In fact, all the examples in this section have some concept of risk in the background while the model has none. Still, I think this stretch is useful in order to isolate the idea that sometimes economic agents are collectively willing to put large amounts of resources into a few assets, almost regardless of price (this feature takes an extreme form in the model since the assets are identical, *except* for the price!). As it will be apparent in the next sections, this simple idea has something to say about a wide variety of first order macroeconomic phenomena.

### 3 Major Recent Global Macroeconomic Forces

Let's use this model to capture some aspects of the main global forces driving recent macroeconomic and financial market events.

#### 3.1 *Force 1: Gradual decline in global $\delta\theta$*

An important characteristic of the World economy is the sharp rise in the relative income of the largest Emerging Market economies and commodity producers, coupled with their enormous desire to save for a "rainy day." In general, these are economies that have limited capacity to produce financial instruments (low  $\delta$ ) and have a higher propensity to save than developed

economies (low  $\theta$ ).

In terms of the simple parameters of the model, this trend amounts to a decline in the global (income-weighted)  $\delta$  and  $\theta$ . In the model these parameters enter multiplicatively in the numerator of (possibly shadow) interest rates, and hence this force depresses interest rates and, correspondingly, raises equilibrium asset prices (note that in general equilibrium only the decline in  $\theta$  matters for asset prices, since the negative direct effect of the decline in  $\delta$  is exactly offset by the asset price boosting effect of lower equilibrium interest rates).<sup>2</sup> This pattern is consistent with the continuous emergence of asset "bubbles" and with the so called Greenspan's conundrum (when the Fed tried to raise interest rates but the market kept putting downward pressure on the longer end of the yield curve). This idea was developed formally in Caballero et al (2008a,b), and the  $\theta$  component also captures the so called savings glut hypothesis (Bernanke 2005).

A popular criticism of the latter is that measured global saving did not rise during the period it was supposed to apply to. However, the model here illustrates that this is not a meaningful rejection since equilibrium prices change to offset the savings glut force, and hence the adjustment may reflect entirely in prices rather than in quantities (in fact, in the model global saving is zero at all times).

Note also that the scarcity (risk?) premium  $\lambda$  is linear with respect to  $\delta\theta$  and hence it also drops as  $\delta\theta$  falls:

$$\frac{\partial\lambda}{\partial(\delta\theta)} = \frac{\lambda}{\delta\theta} > 0,$$

which is consistent with the risk-compression observed through much of the recent decade prior to the financial crisis.

In the model,  $r^B$  declines more than  $r^A$  because as  $\delta\theta$  falls, there is more scarcity of assets in general, not just of the "safest" assets. That is, it is a proportional shift in demand for *all* assets which dilutes the *relative* scarcity premium of assets type  $A$ .

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<sup>2</sup>More precisely, when  $\theta$  falls, there are more savings looking for a fixed amount of assets so prices have to rise. When  $\delta$  falls there is a similar effect in that now the supply for assets shrinks relative to given savings. However, this effect is offset by the fact that now each unit of the asset has a lower dividend.

### **3.2 Force 2: Gradual rise in $\alpha$**

Not only has the net demand for assets risen over time but also, especially after the Nasdaq crash in the early 2000s, this rise has been concentrated on AAA-assets (the type  $A$  assets of this episode). This is again due primarily to the role played by sovereigns in global saving and by a series of regulatory requirements on financial institutions favoring these assets. In the model, the direct effect of a rise in  $\alpha$  is an increase in the price of assets type  $A$  and a decrease in the price of assets of type  $B$ .

The combination of forces 1 and 2 through this period led to a generalized rise in the capitalization value of both fixed (type  $A$  in that period) and variable income, but with a much stronger rise in the former. For example, U.S. financial assets grew from less than 160 percent of GDP in 1980 to almost 480 percent in the third quarter of 2007, and almost the entire growth from the early 2000s was due to a rise in debt instruments (primarily that issued by the financial system).

The next force describes the supply side reaction to the rise in demand.

### **3.3 Force 3: Temporary (artificial?) rises in $\beta$**

*Forces 1 and 2* led to either spontaneous (coordination-based) or deliberate attempts to "arbitrage"  $\lambda$  by transforming  $B$  into  $A$  assets (and partly to transform non-pledgable assets into pledgable ones). During much of the 1990s artificial assets were created in emerging markets until the sequence of crises starting with the Asian crisis destroyed a large share of these assets. The pressure then moved to U.S. assets, and the Nasdaq in particular, which also culminated with a crash; to then be followed by the financial system's rapid rise in the production of AAA tranches from the securitization of lower quality loans. This also came to an abrupt end during the so called "subprime" crisis.

By 2001, as the demand for safe assets began to rise above what the U.S. corporate world and safe-mortgage-borrowers naturally could provide, financial institutions began to search for mechanisms to generate triple-A assets from previously untapped and riskier sources. Subprime borrowers were next in line, but in order to produce safe assets from their loans, "banks" had to create complex instruments and conduits that relied on the law of large numbers and tranching of their liabilities. Similar instruments were created from securitization of all sorts of payment



streams, ranging from auto to student loans (see Gorton and Souleles 2006). Along the way, and reflecting the value associated with creating financial instruments from them, the price of real estate and other assets in short supply rose sharply. A positive feedback loop was created, as the rapid appreciation of the underlying assets seemed to justify a large triple-A tranche for derivative CDOs and related products. Credit rating agencies contributed to this loop, and so did greed and misguided homeownership policies, but most likely they were not the main structural causes behind the boom and bust that followed.

### **3.4 Force 4: Spikes in $\alpha/\beta$ (flight to quality)**

From a systemic point of view, this new-found source of triple-A assets was much riskier than the traditional single-name highly rated bond. As Coval et al (2009) demonstrate, for a given unconditional probability of default, a highly rated tranche made of lower quality underlying assets will tend to default, in fact it can (nearly) only default, during a systemic event. This means that, even if correctly rated as triple-A, the correlation between these complex assets distress and systemic distress is much higher than for simpler single-name bonds of equivalent rating.

The systemic fragility of these instruments became a source of systemic risk in itself once a significant share of them was kept within the financial system rather than sold to final investors. Banks and their SPVs, attracted by the low capital requirement provided by the senior and super-senior tranches of structured products, kept them in their books (and issued short term triple-A liabilities to fund them), sometimes passing their (perceived) infinitesimal risk onto the monolines and insurance companies (AIG, in particular).<sup>3</sup> The recipe was copied by the main European financial centers (Acharya and Schnabl 2009). Through this process, the core of the financial system became interconnected in increasingly complex ways and, as such, it developed vulnerability to a systemic event.

The triggering event was the crash in the real estate “bubble” and the rise in subprime mortgage defaults that followed it. Almost instantaneously, confidence vanished and the complexity which made possible the “multiplication of bread” during the boom, turned into a source of counterparty risk, both real and imaginary. Eventually, even senior and super-senior tranches

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<sup>3</sup>See Gennaioli et al (2001) for a “local thinking” model of disappointment with financial innovation.

were no longer perceived as invulnerable (previously  $A$  assets turned into  $B$  assets).

Along the way, the underlying structural deficit of safe assets that was behind the whole cycle worsened as the newly found source of triple-A assets from the securitization industry dried up ( $\beta$  declined), and the spike in perceived uncertainty further increased demand for these assets ( $\alpha$  increased). In terms of the model, these dynamics are captured by a sudden rise in  $\alpha/\beta$ . Consistent with our simple equations, during this episode safe interest rates plummeted to record low levels and all forms of risk-premia ( $\lambda$ s) skyrocketed.

Initially, the flight to quality was a boon for money market funds, which suddenly found themselves facing a herd of new clients. In order to capture a large share of this expansion in demand from these new clients that had a higher risk-tolerance than their usual clients, some money market funds began to invest in short-term commercial paper issued by the investment banks in distress (that is, they found their own temporary mechanism to transform  $B$  into  $A$  assets). This strategy backfired after Lehman's collapse, when the Reserve Primary Fund "broke-the-buck" as a result of its losses associated with Lehman's bankruptcy. Perceived complexity reached a new level as even the supposedly safest private funds were no longer immune to contagion. Widespread panic ensued and were it not for the massive and concerted intervention taken by governments around the world, the financial system would have imploded.

In terms of the model, the panic phase corresponded to an even more extreme rise in  $\alpha/\beta$ , and the policy interventions are attempts to both lower  $\alpha$  and raise perceived  $\beta$  by issuing public guarantees which are aimed at limiting the sudden transformation of  $A$  assets into  $B$  assets.

## 4 Regions

There are limits to how far we can go without referring to the heterogeneity, both ex-crisis and post-crisis, in the world economy. Here I highlight some of these differences, pointing to their broad implications rather than focusing on the mechanics of global equilibrium.

#### 4.1 *Force 5: Asymmetric $\delta\theta$*

One of the key differences between emerging and developed economies is the institutional development supporting financial markets and contracts. That is,  $\delta$  is higher in developed economies than in emerging markets. This is the point we made formally in Caballero et al (2008b) to explain why capital was flowing from emerging markets to developed economies during the period starting after the Asian crisis. This effect was reinforced by the high propensity to save (low  $\theta$ ) of some emerging markets, in particular from Asia and some commodity producing economies.

As is apparent in the model, these forces lead to lower pledgable return in the "South" than in the "North", and hence justify the seemingly paradoxical direction of net capital flows from emerging markets to developed economies in recent years (it is a paradox because the standard neoclassical implication is that capital should flow from capital rich developed economies to capital poor developing economies).

#### 4.2 *Force 6: Asymmetric $\alpha/\beta$*

The relative weakness in financial development of emerging market economies is particularly severe in the production of type  $A$  assets. Other things equal, this asymmetry in  $\alpha/\beta$  means that  $r^A$  is higher in developed economies while  $r^B$  is higher in emerging markets.

Given net flows, this mechanism helps to explain why the typical gross capital flows pattern is one in which emerging markets buy "safe" assets from developed economies, while the latter buy "risky" assets from emerging markets (Gourinchas and Rey (2007) very lucidly describe this phenomenon as the venture capitalist behavior of U.S. investors in the international context).

The many adjustments they made in response to their own crisis in previous decades paid off. The solid macroeconomic performance of emerging markets during the crisis has reduced the perceived  $\alpha/\beta$  asymmetry, which is gradually turning type  $B$  emerging market assets into type  $A$  assets.

#### 4.3 *Force 7: Asymmetric $g$ (decoupling)*

While emerging markets typically grow at a faster pace than developed economies, this gap has become very pronounced in the post-crisis phase. From the point of view of our model, this effect increases the expected return of all emerging market assets over those in developed

economies. This is probably a key factor behind the recent surge in capital flows to emerging markets. While developed economies are still mired in double-dip concerns, most non-Eastern European emerging market economies are struggling to cool down capital inflows and their expansionary consequences.

As I said earlier, these new pattern of capital flows is partly due to growth differential, but it is also a result of the weakening of Force 6.

#### **4.4 Force 8: Transitions**

In this new environment of extreme safe assets scarcity, it makes a great difference to countries whether they are perceived as primarily type *A* or type *B* asset producers. Perhaps more importantly, the transition from one to the other category can have devastating or exhilarating consequences depending on the direction of the shift. The PIIGS have seen the consequence of the bad transition, from *A* to *B*, while many emerging markets, such as Indonesia or Chile, are on the other side of the spectrum (of course this is a relative statement that reflects the direction of marginal changes, not the relative level of investors' appeal of these regions).

Perceived relative growth potential can have similar effects, which explains why some Eastern European economies are having a particularly hard time during the recovery as they face a combination of weak growth potential and institutional development.

These transitions, when involving a large group of countries, have global equilibrium consequences. In fact, the recent appreciations of the Swiss franc and Japanese yen do not owe to any particular domestic strength (especially the latter), but to the fall in expected return in other developed economies' returns (the connection between exchange rates and returns differential follows from the interest parity condition). On other side of the spectrum, the surge in capital flows to many emerging markets are not exclusively due to new strengths in them, but also due to the relative weakness of much of the developed world. These general equilibrium sources of capital flows are important to keep in mind for understanding the strength and weaknesses of particular recoveries.

## 5 Quantitative easing

This simple framework is useful for understanding the essence of the financial implications of quantitative easing policies (QE). Presumably, the ultimate financial goal of such a policy is to reduce  $r^B$ , as most private sector produced assets (borrowing by corporations and households) have a large component of type  $B$  assets. In the early stages of QE,  $r^B$  was targeted directly through the purchase of MBS and other distressed assets. This "credit-easing" policy was instrumental in stabilizing the economy, but as the recovery took hold, a series of political constraints and concerns brought that unorthodox strategy to an end. The recent faltering in the recovery is not severe enough to make it politically feasible to go back to credit-easing policies, which has left the FED and other central banks with the second best policy of lowering  $r^A$  (Treasury rates) and hoping that this will indirectly reduce  $r^B$ .

Let  $\beta\Delta$  denote the purchases of type  $A$  assets by the Fed, which reduces the net supply of these assets faced by the private sector from  $\beta$  to  $\beta(1 - \Delta)$ . The Fed's earned returns on these holdings are transferred to the treasury, which in turn gives it back to households.

It is easy to see in the stark model that QE targeted at assets type  $A$  have no effect on  $r^B$ : Since the share of income invested in assets type  $B$  is constant and the net supply of assets type  $B$  is not changed by QE, there is no effect of the policy on the price and return of this asset. Instead, all that happens is that  $p^A$  rises by (approximately)  $\Delta$  percent, and  $r^A$  drops correspondingly:

$$p_t^{A,QE} = \frac{\alpha}{\beta(1 - \Delta)} \frac{Y_t}{\theta} \approx (1 + \Delta)p_t^A, \quad (8)$$

$$r_t^{A,QE} - r_t^A = -\delta\theta \frac{\beta}{\alpha} \Delta. \quad (9)$$

Thus, in order for QE to have an effect on  $r^B$ , there needs to be a leak out of demand for assets type  $A$ .<sup>4</sup> This is unlikely to happen during a severe flight to quality episode, but it is more likely during a recovery (and in this sense it is reasonable to shift from a policy targeting  $B$  directly to one targeting  $A$  once one considers the political costs of the former). As  $r^A$  drops

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<sup>4</sup>See Krishnamurthy and Vissing-Jorgensen (2010) for an estimate of the size of this indirect effect. They conclude that the indirect effect on "less safe" assets is likely to be much smaller than the direct effect on "safe assets."

to extremely low levels, it triggers a search for yield process that lowers  $r^B$ . This is one of the main mechanisms by which emerging markets have been flooded by capital as QE takes place in the U.S.

Let us introduce a minimal modification in the model to capture this search for yield effect and assume that the minimum return investors are willing to accept for assets type  $A$  is  $r^{A,\min}$ . It immediately follows from expression (9) that there is a maximum QE,  $\Delta^{\max}$ , such that any further increase in QE leaks entirely into market for assets type  $B$ . In this  $\Delta \geq \Delta^{\max}$  region, we have that in addition to  $1 - \alpha$ , private investors hold a share  $\beta(\Delta - \Delta^{\max})$  of their wealth in assets type  $B$ . Thus, in this region we have that:

$$p_t^{A,QE} = \frac{\alpha}{\beta(1 - \Delta^{\max})} \frac{Y_t}{\theta}; \quad r_t^{A,QE} = r^{A,\min}$$

and

$$p_t^{B,QE} = \frac{1 - \alpha + \beta(\Delta - \Delta^{\max})}{1 - \beta} \frac{Y_t}{\theta}; \quad r_t^{B,QE} = g + \delta\theta \frac{1 - \beta}{1 - \alpha + \beta(\Delta - \Delta^{\max})}.$$

Some of this search for yield is concerning, as agents that should not be holding certain risks begin to do it (this is what caused the demise of Reserve Primary Fund at the worst point of the subprime crisis). Initially the search goes to marginally riskier assets, but as the progression continues the private sector loads increasing amounts of risks into its balance sheet. In fact, this pattern is already building up, as some pension funds that traditionally have invested in type  $A$  assets are now being forced to move into type  $B$  assets since  $r^A$  is too low for them to honor their future contingent liabilities.

One area of particular concern arises once we think of assets type  $B$  as those that are most exposed to systemic events. Currently, the price for insurance against "Black Swan" type events is so high, that is pricing in the possibility of an event worst than the great depression in the next few years. This situation is worrisome not only because it reflects a major dislocation, but also because it provides potentially dangerous incentives for the distribution of aggregate risk holding. Because  $p_t^A$  is so high, it deters agents that should be insuring against systemic events from doing so, and it gives incentives to institutions that should not be in the business of selling this type of insurance to get into this business (a sort of AIG on steroids).

In summary, QE policy targeted at assets type  $A$  can be effective in reducing  $r^B$  when flight-to-quality is moderate (a situation that can be captured by low but positive  $r^{A,\min}$ ),

but it entails important risks as it essentially consists in pushing private investors into risky investments by reducing the effective supply of safe assets. This reallocation may be fine for some investors but it may also raise systemic fragility if the wrong economic agents end up holding the risk. From the point of view of the distribution of risks in the economy, current QE is very different from credit policy targeted to the purchase of assets type  $B$ , as in the latter it is the government that increases its risk exposure while the private sector reduces it. Which one is the right recipe depends largely on the fragility of the financial institutions that are required in equilibrium to shift their portfolio in one direction or the other.

## 6 Conclusion

In these notes I have proposed an extremely stylized organizing framework to get a first impression on some of the consequences of the different forces that are influencing global financial and macroeconomic patterns. The organizing theme is the relative scarcity of different types of financial assets, which I argue offers a parsimonious account of many broad patterns as well as insight into the workings of quantitative easing policies.

What makes an asset type  $A$  or type  $B$ ? This varies from time to time. Today, it seems that a central feature is the degree of exposure of the asset to systemic macroeconomic risk. The cost of insurance against “Black Swan” type events has risen since the pre-crisis period, and hence the degree to which an asset provides or consumes such insurance is a key determinant of its perceived value.

Relative to the pre-crisis period, at the world level,  $g$ ,  $\delta$ ,  $\theta$ ,  $\beta$  have declined while  $\alpha$  has risen. The most immediate consequence is an extremely low  $r^A$  for the few assets that are considered type  $A$  (a few sovereigns and corporations), and an enormous reluctance to hold macroeconomic risk (a sharp rise in  $\lambda$  when we think of type  $B$  assets as those that are exposed to systemic events).

Moreover, the world is decoupled with most emerging markets growing at a fast pace and reducing the institutional gap with developed economies, there is a shrinking group of developed economies whose sovereigns can issue type  $A$  assets and hence finance their deficits at a record low rates level, and there is a range of economies whose sovereign’s liabilities lay in the gray

area between type  $A$  and type  $B$  assets. This environment is conducive to a rise in capital flows to EMs and to great instability in the economies that live in the downgrade-region.

In the developed world, it is not that interest rates are low because central banks have decided to keep them there. The causality runs the other way around: they have to set low policy rates because the equilibrium rates are so low that if they didn't, the economy would experience strong deflationary forces (this is by Walras' Law, since an excess demand for assets must mean an excess supply of goods – see Caballero 2006).

Of course, the counterpart of the tough environment for  $B$  assets is the enormous reward from being a type  $A$  asset producer, which is precisely what has maintained very low deficit funding costs for prime sovereigns.

Quantitative easing is not the most effective instrument to address this environment. It operates by pushing the private sector into riskier investments rather than by the government absorbing a bigger share of the risk during the recovery. This may be the only politically feasible policy, but it does come with additional systemic risks.

Needless to say, many governments are simply not in a condition of strength to absorb any additional risk, in which case there is no way around but to have the private sector hold a larger share of aggregate risk and build up a buffer to prevent panic-driven asset price swings. But this is not an objective in itself, rather it is one of the many costs of chronic fiscal misbehavior. For economies suffering from weak public finances, a reduction in  $\theta$  (the government component of it) could be extremely effective, since in addition to the direct effect on the budget there could be an increase in perceived  $\beta$  and hence a reduction in the cost of servicing public debt.

There have been many recent calls for a global rebalancing, which essentially means that  $\theta$  should rise in surplus economies and, perhaps, decline in deficit economies. Note that if only the former takes place, the direct impact would be a rise in all interest rates and scarcity premium. This negative effect from the asset market side should be weighed against the conventional net-exports channel, which underlies the prescription.

To conclude, it is important to highlight that in this context, the long run fiscal health of a country has a first order importance, since governments are the ultimate providers of extreme-events systemic insurance. The perception that such implicit or explicit facility is unavailable, is in itself a great source of instability and self-fulfilling downward spirals.



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