

# Exchange Rates during the Crisis

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## Abstract

Nearly two years after the onset of the financial crises, many central banks have brought their policy interest rates down to, or close to zero. Various governments have seen their budget deficits soar. Both policies have affected exchange rates, partly through market expectations. With a majority of exchange rates officially floating, exchange rate movements do not necessarily reflect official decisions as was the case in the 1930s. Yet, also in the 2008 crisis, authorities have directly intervened in the foreign exchange market, sometimes in order to defend a falling currency but in other instances with the aim to limit appreciation pressure, akin of competitive devaluations. This paper documents the exchange rate interventions during the height of the

2008/09 financial crisis and identifies the countries which have particular high incentives to intervene in the foreign exchange market to competitively devalue their currency. While various countries had increased incentives to devalue, we find that direct exchange rate interventions have been rather limited and contagion of devaluation has been restricted to one regionally contained case. However, sharp market-driven exchange rate movements have reshaped competitive positions. It appears that these movements have so far not seriously disrupted global trade. After all, a world crisis is likely to require widespread exchange rate adjustments as different countries are affected in different ways and have different capacities to weather the shocks.

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## **Exchange rates during the crisis**

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## 1. Introduction

A key leitmotiv as we go through the crisis is to avoid a repeat of the policy mistakes of the Great Depression. There is general agreement that beggar-thy-neighbor competitive devaluations have been one key mistake, for it led to rising protectionism and a deconstruction of international trade (Kindleberger, 1973). Preventing this mistake from repeating was a central motivation at the Bretton Woods conference.

Although, there are already signs of increased trade protectionism (Gamberoni and Newfarmer, 2009), today's situation is very different from the 1930s. In the 1930s exchange rates were mostly fixed within the prevalent Gold Standard. Depreciations were the result of explicit decisions. Today, only some 42% of countries are officially pegging their exchange rates although de facto pegging is detected in 45%.<sup>1</sup> This means that exchange rate movements do not necessarily reflect official decisions but are rather market-driven fluctuations.

Governments today have nominally many more policy tools at hand ranging from fiscal policy over labour market to monetary policy measures. This should make them less reliant on measures which are perceived as beggar-thy-neighbour. However, nearly two years after the onset of the financial crisis, central banks around the world have brought their policy interest rates down to, or close to zero. Most countries have seen their budget deficits soar, reflecting both the automatic stabilizers and various degrees of discretionary actions.

While the recession is still under way, traditional instruments become severely constrained. In such a situation, it is natural that national authorities explore non-conventional policies. Central banks are experimenting with quantitative easing and credit easing. There is no guarantee that either type of non-conventional monetary policy will be successful; the Japanese precedent is not particularly encouraging either. Another non-conventional form of monetary policy is deliberately weakening of the exchange rate. This raises the specter of the much-feared beggar-thy-neighbor policies. Exchange rates have moved a lot since the onset of the crisis, but these movements have been mostly interpreted as byproducts of expansionary policies. Sharp depreciations in countries like the UK or South Korea have not been welcome by the authorities, at least officially. Intentions, of course, are hard to detect and no one suggests that monetary policies should not be expansionary.

This paper examines the many questions that surround explicit or implicit exchange rate policies as the crisis continues. We start by discussing briefly the desirable evolution of exchange rates from a global perspective and the exchange rate consequences of traditional measures. Section 3 contrasts this global perspective with the incentives that operate on the level of the individual countries. We offer a measure of incentives to derive which countries have a particular interest in a relatively lower value of their own currency. In Section 4, we examine to which extent the deliberate or merely market-driven occurrence of depreciations by a single country can lead to counter-depreciations initiating a contagious process that characterized the 1930s. We examine two possibilities. The first one involves competitive depreciations among the

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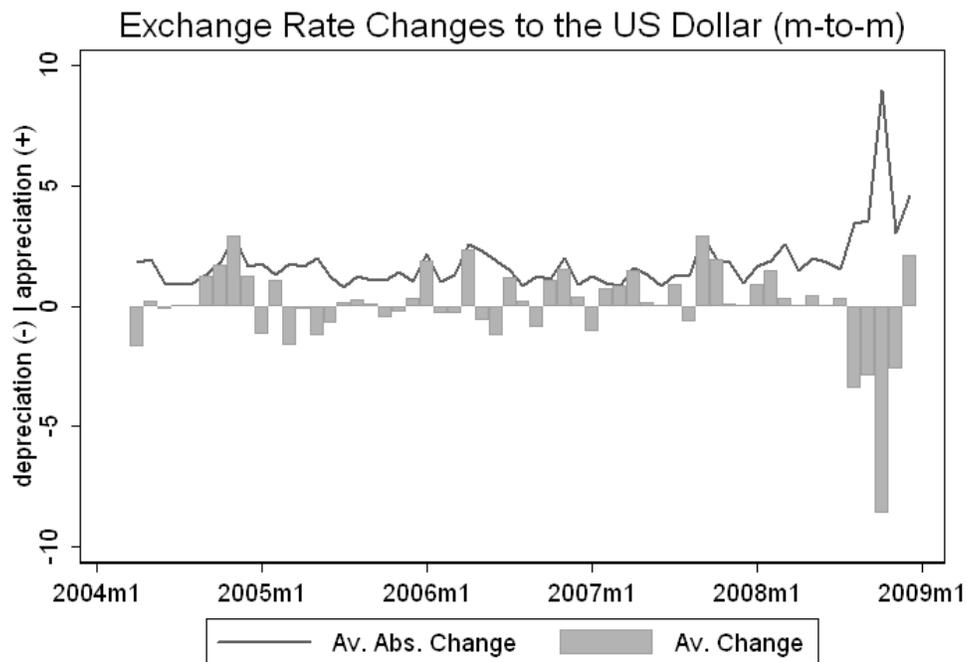
<sup>1</sup> The defacto number is based on the updated Reinhart and Rogoff classification (2004). An updated defacto classification by Ghosh (2003) puts this number somewhat higher with close to 50%.

46 large, systemically important countries. The alternative is competitive depreciations starting among smaller, non systemically important countries spreading to more and more countries until it engulfs the whole world. Section 5 brings together the previous results to examine and evaluate possible actions that would remove the exchange rate from becoming an aggravating factor as the world hopefully comes to grip with the recession. Obviously, there is no miracle solution but a number of measures may mitigate the risks.

## 2. Desirable exchange rate policies

Since the onset of the crisis exchange rates have moved sharply. As figure 1 shows, the average *absolute* monthly change in the exchange rate relative to the US dollar for a sample of major export countries has increased sharply indicating a higher volatility in exchange rate markets.<sup>2</sup> Moreover the average change for the countries amounted to an 8% depreciation at its peak in 2008.<sup>3</sup>

**Figure 1: Exchange Rate Developments**



Source: IFS and own calculation.

A significant literature (e.g. Roubini and Stetser, 2004; Obstfeld and Rogoff, 2005; Blanchard et al., 2005) has long argued that global imbalances – the combination of a large US current account deficit with Asian surpluses – were unsustainable and would result, sooner or later, into large exchange rate realignments, with potentially dramatic

<sup>2</sup> We concentrate on the 46 most important export countries, measured in exports in percentage of world exports. Results are unaffected when considering a broader set of countries.

<sup>3</sup> Note that when the two values are identical all countries in the sample appreciated (or remained unchanged) against the US in the respective year. This is two times the case: in M11 2004 and right after the outbreak of the crisis in M10 2007. In our sample it is never the case that all countries depreciate against the US Dollar in a given month.

effects. Now that the crisis has happened, this view argues for monitoring exchange rates to make sure that they move in the right direction. This leads to reasonably simple conclusions. In particular the US dollar needs to depreciate to eliminate the current account deficit and the Asian currencies, chiefly the Chinese renminbi, must appreciate to reduce their surpluses. Ominously, the dollar has appreciated and several Asian currencies – but not the renminbi – have nearly crashed.

However, the crisis has happened to a great extent for other reasons. Indeed, another literature initially claimed that the imbalances could be sustained long enough not to call for massive realignments (Dooley et al., 2003; Caballero et al., 2006). This alternative literature holds that the global imbalances are not a cause of the crisis but a symptom of other disequilibria originating in the financial markets in the US and elsewhere (Dooley et al., 2009; Caballero et al., 2009). In that view the exchange rates cannot play center stage in resolving the underlying disequilibria. Their desirable evolution must be based on other criteria.

Whichever literature holds true, there is a case for a desirable evolution of exchange rates, from a world welfare viewpoint, which facilitates the international adjustment to shocks and disequilibria. But given that the sources of the disequilibria are not generally agreed upon, pinpointing the solution for the required path is far too complex a task making a coordinated response close to impossible. Under this uncertainty, using explicitly the exchange rate should be a last-resort option, since it can be helpful only if few countries adopt it and is at the cost of other nations' competitiveness. It follows that other options must be implemented first.

### **2.1. The traditional monetary policy option**

Obviously, the first instrument is monetary policy. However, an easier monetary policy through interest rate cuts is also expected to be accompanied by an exchange rate depreciation. In fact, the depreciation is the main channel of monetary policy in small open economies. This implies that a fully coordinated monetary expansion would translate into exchange rate changes only to the extent that their magnitude differ from one country to another. It follows that monetary policies will have to be primarily on other channels. All these channels involve the banking and financial systems. In most developed countries, these systems are impaired and demand for credit is highly subdued. This is why we observe a massive accumulation of liquidity in banks with little credit expansion. In developing countries, financial systems are small and unlikely to transmit the expansion.

Thus monetary policy is likely to work mostly in a small number of developed and emerging-market countries that have sufficiently robust banking systems. If this conclusion is warranted, it follows that the other countries will benefit from the monetary policy instrument to the extent that they depreciate relatively to the countries that can rely on the domestic banking channel.

### **2.2. The fiscal policy option**

The second conventional instrument is fiscal policy. It is a complex instrument whose effects are surprisingly little known, in spite of decades of theoretical and empirical

research.<sup>4</sup> However, there is a compelling case that fiscal policy is hampered in very open economies as a significant part of any boost is bound to leak abroad in the form of imports. This risk is magnified in countries where the exchange rate freely floats if a fiscal expansion triggers an appreciation.<sup>5</sup> Despite these misgivings, it is the only conventional macroeconomic instrument left and it should be used wherever governments can borrow substantial amounts.

The optimal world distribution of fiscal policy effort should recognize the room for maneuver (pre-existing debt, ability to borrow, administrative capacity). While we know far too little about the impact of fiscal policies on exchange rate changes, the safe conclusion is that exchange rates should be stabilized. Put differently, if we are going to rely mostly on fiscal policies, hopefully coordinated, the exchange rate should be a playing field as neutral as is possible. Countries that can undertake such policies, with positive externalities for those that cannot, should be protected from potentially offsetting appreciations likely to deter policy action in the first place.

### **3. Country-level incentives**

With policy rates approaching the zero lower bound and budget deficits soaring, policy options become severely constrained. Additionally, policies like fiscal expansion have to be paid at a national level, while their benefits can dilute away to other nations, which makes more direct measures attractive. Many developed and emerging markets have been hit hard by dropping export revenues as a result of the global contraction and falling prices for major export products. To ease the domestic adjustment burden, several countries have an incentive to manage their exchange rate in such a manner that their economies remain competitive. This appears to come at no cost and promises to have a direct impact. However, such a step puts other nations at a disadvantage and imposes on them a disproportionately higher adjustment burden. The consequence is that the behavior of few countries could be contagious.

The likelihood of engaging in exchange rate depreciation policies can be seen as a function of the associated cost and benefits, the range of alternative options to choose from and political will to engage in actions perceived as beggar-thy-neighbour. The benefits should be increasing in both, the importance of the external trade balance for total output and the elasticity of the trade balance to exchange rate changes. The costs are increasing in the level of foreign currency indebtedness and the threat of rising inflation.

The alternative options that are available will also play a key role in defining whether policy makers will embark on direct exchange rate intervention or not. Within the group of the major export nations, some countries are already heavily constrained in the extent to which they can choose from various macroeconomic policy options. Countries which: (1) are close to the zero lower bound interest rate lose the classical monetary policy channel (2) have a very high public debt ratio may not want to increase future debt burdens even more, making fiscal expansion less likely (3) expect low inflation rates are more likely to increase the monetary mass since the output

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<sup>4</sup> As recently observed by Yung Chul Park, the IMF's *World Economic Outlook* concludes in its October 2008 issue that fiscal policy is largely ineffective while it finds it effective in its April 2009 version.

<sup>5</sup> The Mundell-Fleming model predicts a 100% offset that makes fiscal policy wholly ineffective.

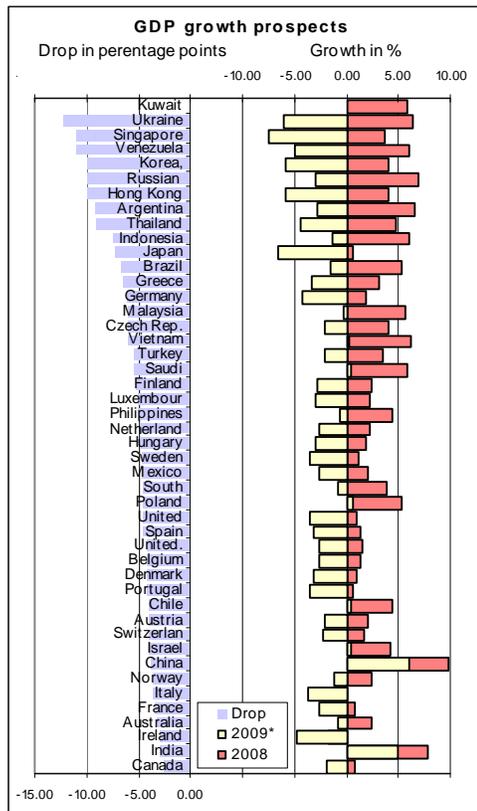
concerns tend to outweigh the inflation concerns and deflation worries may even make depreciations more likely.

The political willingness to engage in a devaluation may be captured to some extent by the past experience of exchange rate misalignment. Finally, there must be a strong enough incentive to engage in expansionary policies in the first place, which may be captured by the expected growth slowdown.

### 3.1. Evaluation of incentives

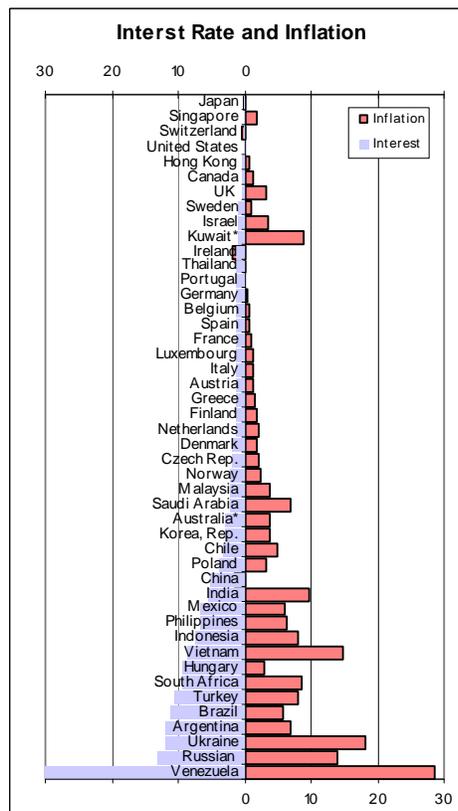
The outlook matters a lot as authorities evaluate their options. Since the onset of the crisis, economic forecasting has proven to be extremely difficult, if not impossible. Output and inflation forecasts have constantly been revised, by large margins, within very short periods and always downward. This is normal as the forecasting models either rely on econometric estimates from sample periods that do not include a crisis of the kind that is unfolding, or are based on theoretical models that do not allow for any of the on-going events (bubbles, financial meltdown, seizure of financial markets) and the policy responses so far. In Figure 2, we use forecasts provided by the Economist Intelligence Unit as an illustration of the issues at stake, while warning that these forecasts can prove to be as unreliable as the recent ones. For half the countries in our sample of exporters, output is predicted to contract by more than 5 percentage points. Only seven countries are expected to register a non-negative growth rate.

**Figure 2: GDP growth**



Source: EIU (Apr. 2009), no forecast is available for Kuwait .

**Figure 3: Interest rates and inflation**



Source: Interest Rate is the policy rate as of Apr. 2009 (Central Banks) and inflation is the latest figure from EIU (Apr. 2009)

The largest drops in output growth are expected to occur in various Asian countries including Japan, Thailand and Singapore as well as in Argentina and Venezuela.

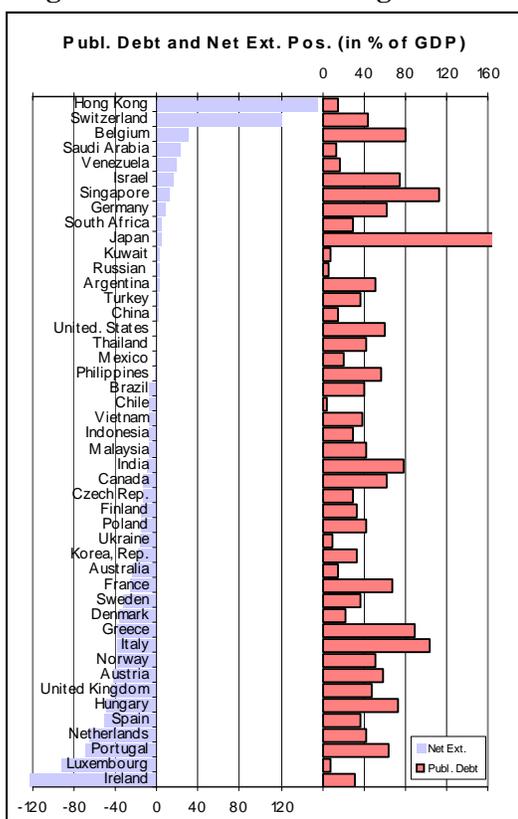
### Interest rates and Inflation

Figure 3 shows that interest rates are close or below 1% in more than half of the countries of our sample. Only six of these countries have an inflation rate in excess of 1%, which means that many of the countries that have hit the lower bound still face positive real interest rates. The list of countries which are close to the zero lower bound includes most developed countries: the US, Japan, the UK, Canada, Sweden, Switzerland, Singapore and Hong Kong.

### Deficits and debts

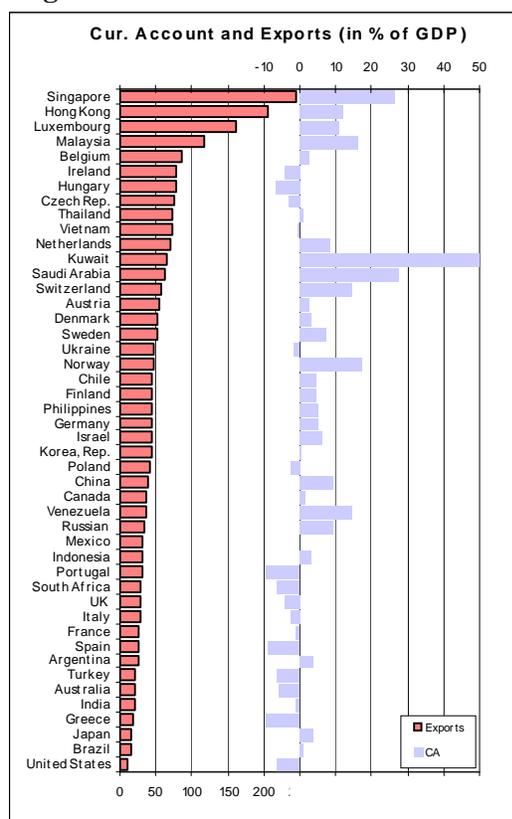
Debt as a percent of GDP in our sample stands on average at 46%. Most prominently, in Japan and Singapore debt levels exceed 100% of GDP.<sup>6</sup> Both countries are expected to experience a severe output contraction in 2009 and have seen their competitiveness seriously eroded (Figure 7). European countries tend also to have a relative high debt level, in particular Italy, Greece and Belgium. Finally, some emerging markets including Hungary, Israel and India belong to the group of high debt countries. Given the recent world wide fiscal expansion these figures will increase over the next year by several percentage points.

**Figure 4: Debt and net foreign assets**



Source: BIS (2008 Q3) and CIA Factbook (2008)

**Figure 5: Current account balance**



Source: WEO, pre-crisis levels (2006)

<sup>6</sup> Despite this fact, Japan already decided to increase its deficits to new record levels.

### *Current account and external positions*

While there may be several countries that benefit from more competitive exchange rates others do all to avoid a depreciation of their currency. Unsurprisingly, these are primarily countries in Central and Eastern Europe who have accumulated high foreign liabilities often due to the anticipated euro accession and the favourable interest rate differentials. For these countries any depreciation increases the foreign currency debt and thereby threatens the stability of their financial sector. Hungary features in our sample with a relative high net foreign liability, as measured by the external position vis-à-vis BIS reporting banks relative to GDP (50%). The levels for Poland (15%) and the Czech Republic (13%) as well as Korea (19%) and the Ukraine (18%) appear to be less worrisome. The bulk of countries with high net external liabilities are the EU countries and Norway. On the other hand, countries with a positive net external position do not suffer any (aggregate) losses from exchange rate depreciations. This group includes highly integrated countries like Switzerland, Hong Kong, Singapore and Belgium but also countries like Venezuela, Israel and Saudi Arabia.

In terms of trade pattern, the 4 countries which have the highest export to GDP ratio (Singapore, Hong Kong, Luxemburg, Malaysia and Belgium) used to maintain on average current account surpluses well above 10%.<sup>7</sup> Other countries with so high current account surpluses are the oil producers, Switzerland and China. Interestingly, the countries for which exports appear to contribute less to GDP are also the countries with the highest current account deficits. In fact, in our sample there is a significant positive correlation between the pre-crisis current account surplus and the importance of exports in GDP measured in % of GDP. To the extent that exchange rate depreciation boost exports, this implies that countries, which have more to gain from a 1% increase in exports, tend to have already a current account surplus.

### *Exchange rates: initial situation and recent changes*

At the onset to the crisis various countries have been said to maintain undervalued exchange rates by not allowing their nominal exchange rate to depreciate and thereby contributing to the global imbalances. To measure this extent of misalignment we use a simple extended PPP approach to estimate the equilibrium rate along the lines of Cheung et al (2008). The approach chosen here is based on the consideration that the evolution of the real exchange rate is a function of (slow moving) factors affecting the equilibrium exchange rate and factors, which in the short-run lead to a deviation from the equilibrium rate.<sup>8</sup> These deviations may be a result of country specific policies such as the accumulation of foreign reserves. The misalignment may then be interpreted as the percentage deviation of the actual real exchange rate from the predicted rate, where the prediction is based on letting only the changes in the structural, slow-moving factors affect the real equilibrium rate, holding policy variables unchanged.

### *Initial Situation*

One of the findings of this analysis is that defacto floats – as theory predicts – do in fact equilibrate better than pegged regimes in the sense that we find less evidence of misalignment for these countries. Figure 6 indicates the point estimate as well as a country specific confidence interval, based on 2 standard deviations of the country

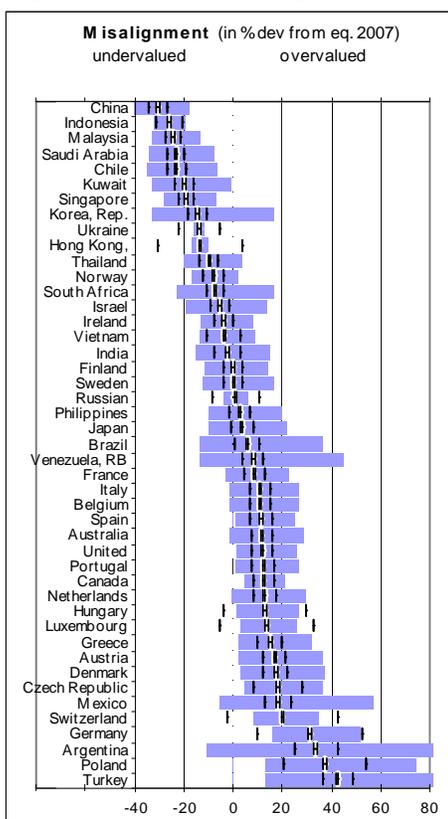
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<sup>7</sup> Using the trade balance rather than the current account would be no less impressive.

<sup>8</sup> For a more detailed description of the approach we chose in measuring exchange rate misalignment see Appendix A and B.

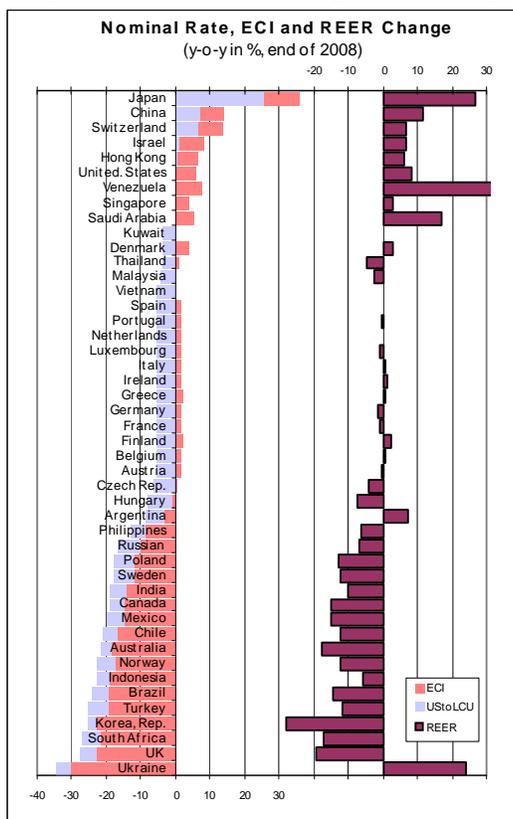
specific errors.<sup>9</sup> Of the *defacto* floater in our sample with the exception of Turkey that we find highly overvalued, Japan, South Africa, Australia are not misaligned. On the other side, all major exporting countries that maintain a *defacto* peg are found to have been highly misaligned in 2007. This group is composed of China, Hong Kong, Saudi Arabia, Kuwait, the Ukraine and Denmark. There is also evidence that countries with current account deficits tend to have overvalued currencies (including Poland, Czech Republic, Greece, Portugal, Spain and Turkey). On the other hand the undervalued-currency countries tend to have trade surpluses (China, Malaysia, Singapore, Indonesia, Saudi Arabia, Kuwait and Chile). They have higher reserve coffers and are unlikely to switch quickly from export driven to internal, consume driven growth.

**Figure 6: Initial misalignment**



Source: See Appendix A and B

**Figure 7: Recent exchange rate changes**



Source: BIS, IFS and own calculation

### Recent Changes

The recent changes in exchange rates have been mitigating the undervaluation in instances where nations pegged to the dollar and currencies moved nearly one-for-one (China, Singapore, Saudi Arabia). This appears to be true when measuring the adjustment in terms of the real exchange rate, the nominal rate with respect to the dollar or in terms of the ECI an index which captures the nominal third market competitiveness of a country.<sup>10</sup> Surprisingly perhaps, the currencies that float more freely against the dollar have mostly depreciated in 2008, thus deepening the further undervaluation in certain cases. This concerns Chile, Indonesia and to a lesser extent

<sup>9</sup> The parameter uncertainty is given by the black left and right lines to the mid point estimate. Generally these tend to be very low.

<sup>10</sup> The ECI is described in more detail in the next section.

Malaysia. Euro zone members that already appeared overvalued do seem to be on the loosing end, since the Euro remains relatively stable, while neighbouring European countries, like Norway, Sweden and the United Kingdom are benefiting from their depreciated rates. While these developments are to some extent in line with the adjustment of global imbalances, this is not entirely the case.<sup>11</sup> Both the US dollar and the Euro appear to be too strong, given the external position of the US and most Euro zone members.

### **3.2. Incentive Index**

We bring these various incentives now together by computing a single index based on the above observations. The index, which is designed to gauge incentives to depreciate, is computed as the simple average of the ranks of each country along the eight criteria: the nominal interest rate, the inflation rate, the inverse of the export to GDP ratio, the pre crisis extent of undervaluation, the inverse of the public debt level, the negative value of the net foreign asset position, the expected drop in output growth and the negative value of the change in the ECI.<sup>12</sup> Thus a lower (more negative) value implies a stronger incentive to depreciate and is therefore associated with a higher rank. The index ranges from a minimum of 1, the highest possible incentive to depreciate, to 46.<sup>13</sup>

Clearly, this index should be interpreted with care. To start with, the criteria are equally weighed, which simply reflects the absence of strong priors. It can well be that different countries attach different importance to the criteria. In addition, the index does not account for other potentially important factors like the presence of a financial centre or heterogeneity within a country. One could also note that using rank order may underplay the differences among the country performances.

Keeping those caveats in mind, it is worth noting that the group of countries with the highest incentive includes two countries, Switzerland and Singapore, which have already taken (limited) action to weaken their exchange rates. At the other end of the spectrum, we find Ukraine, which has already seen its exchange rate depreciate by roughly 35% and is therefore unlikely to see further changes. That they are at the two extremes is explained by the fact that Ukraine's devaluation is already accounted for while Singapore and Switzerland's devaluations are not registered in the exchange rate indicator, since they took place in April and March of 2009, respectively. Additionally, the extent of the devaluation in Switzerland and Singapore were rather low and do not preclude future devaluations, while this is considered unlikely for the Ukraine with relative high inflation and negative net foreign assets.

It is interesting to note that China is found to have a rather high incentive to depreciate. China's exchange rate policy is a very sensitive issue, though, which may explain why it has recently chosen to adopt a very expansionary fiscal policy. This might temporarily reduce global imbalances, but large surpluses could reappear once

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<sup>11</sup> In particular the US dollar should be depreciating against most Asian currencies.

<sup>12</sup> We also explored other methods, for example ascribing values to the top ten (quartile) and bottom ten (quartile) countries for each criterion. The results for the upper and lower group are essentially unaffected.

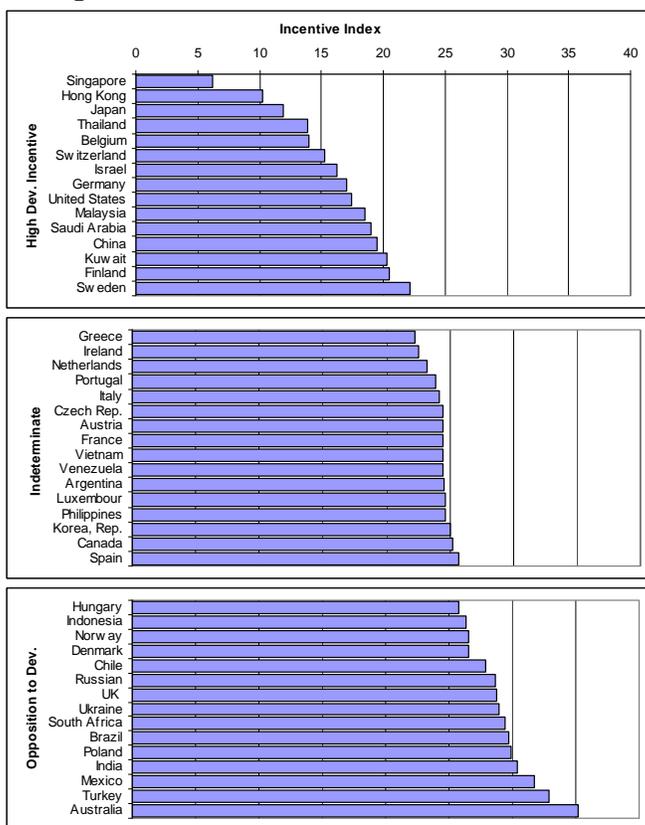
<sup>13</sup> For Kuwait we had not enough data to compute the ECI and there was no growth prediction available. For the US we have no measure of misalignment. The two countries' index value is therefore based on the remaining sub-indices.

the fiscal boost comes to an end. This could rekindle demands that it appreciates. Given its large reserves, however, China stands to suffer serious losses were it to let its currency appreciate against the dollar.

Meanwhile, China's stance on the exchange rate is exerting a powerful influence throughout East Asia. Some countries, for instance Korea, have experienced deep depreciations, which may be paradoxically raising China's competitiveness since much of its export goods incorporate parts manufactured elsewhere in the region. But China's goods also enter the production chain of other East Asian countries, thus reducing the competitiveness gains from depreciation.

Other countries found to have a high incentive to devalue include Japan, Thailand, Israel, Malaysia Saudi Arabia, the United States and Germany, which is however constrained by the common monetary policy of the euro area. From an economic perspective it may be highly tempting for Japan to devalue in the current situation, but the political cost is potentially much higher. However, in the case of Japan and the US a further increase in the monetary mass, which may eventually lead to a depreciation, seems much more likely since it is not associated with the stigma of being beggar-thy-neighbour. Finally, it is worth noting that many emerging markets and Australia, which have recently been depreciating heavily, feature at the end of the list.

**Figure 8: Incentive Index**



Brazil, Mexico, Argentina and Chile have been depreciating heavily last year. While this development seems consistent with the external position of Mexico and Brazil and their real exchange rates that have been above equilibrium levels (though insignificantly so) for Chile developments are contributing to an already competitive exchange rate. However, for none of these countries do we find a strong incentive to devalue, primarily since policy options are not (yet) constrained and competitiveness is already relative high given the recent depreciations.

Raw material exporters, which peg or maintain a band to the US dollar including Saudi Arabia and Kuwait, could devalue as it already happened in Kazakhstan and Ukraine, two other raw material exporters. However, Saudi Arabia and Kuwait have a relatively high buffer of reserves and low debt burdens, which should induce them to rely more on a fiscal

stimulus as opposed to monetary policy actions. Nevertheless, they may be tempted, since both countries have lost competitiveness in recent months by pegging to the US dollar and interest rates in both countries are already very low.

All in all, the incentive index provides a disquieting picture. Some of the most important world exporters, in particular Singapore, Hong Kong, China, Japan and the US, are found to face powerful incentives to seek a weakening of their exchange rates.

#### **4. Contagion**

The rising incentives to maintain a competitive exchange rate have already led to first explicit steps. Since the end of 2008, at least 9 countries officially devalued their exchange rate as shown in Table 1. Within the last year nearly all major export nations' currencies have weakened against the US dollar. However, it is very difficult to distinguish between explicit exchange rate decisions and the exchange rate implication of monetary policy actions if countries maintain a (managed) float. In some cases (Sweden and the United Kingdom), it is clear that this is the outcome of monetary policy actions. In other cases (Russia and several CIS countries), the authorities have tried to prevent or slow down the depreciations and ended up attempting to control the process. A few countries (Vietnam, Singapore and, Switzerland) have taken explicit steps. In some cases, the instauration of capital controls show that the depreciations were not welcome at all. Argentina, on the other hand, has lifted its controls.

Are these developments a source of concern? Not as long as they remain limited because they are accepted as a consequence of the situation (like Iceland's massive depreciation) or of domestically-oriented policies. As emphasized earlier, there exists a pattern of exchange rate changes that is justified. However, the movements in a situation of global output decline bear the risk that some large exporters feel threatened and respond. A second risk is that exchange rate decisions among small countries trigger a bottom-up reaction chain.

##### **4.1. Contagion risks among major export countries**

Devaluations by major export nations are likely to disrupt trade patterns. Recent movements of nominal exchange rates have already significantly shifted the competitiveness of countries. To shed some light on these changes we look at a measure of effective exchange rate which we call ECI (External Competitiveness Index) designed to reflect third market effects.<sup>14</sup> Rather than contrasting the relative competitiveness of exports to imports as a nominal effective exchange rate does, the index compares the competitiveness of the own exports relative to the exports of the competitors in third markets based on the changes in the nominal exchange rates with respect to the destination currency. This implies that one countries devaluation/depreciation worsens the competitors' situation, which is reflected in an increase in the ECI, even if the own exchange rate with respect to the destination market remained unchanged. A drastic increase in the ECI level can hence be seen as reflecting an increased risk of devaluation due to 3<sup>rd</sup> market effects, i.e. contagion.

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<sup>14</sup> See Appendix C for details.

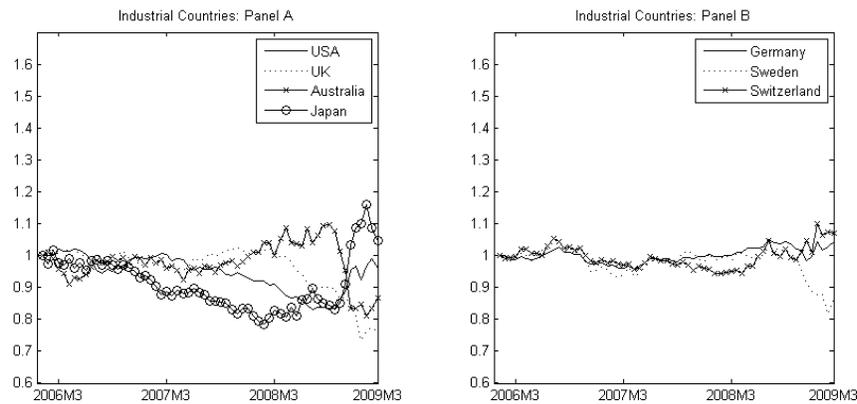
**Table 1. Foreign Exchange Market Outcomes Since End 2008****Measures Taken Since End 2008** (Indicative, non exhaustive list)

<b>Exchange Rate</b>		
<b>Date</b>	<b>Country</b>	<b>Measure</b>
Oct. 2008	Iceland	Failed attempt to introduce currency peg as capital flight lead to heavy depreciation
Dec. 2008	Angola	Devaluation (10%)
Dec. 2008	Ukraine	Devaluation (30%)
Jan. 2009	Belarus	Devaluation (20%)
Feb. 2009	Argentina	"Managed (gradual)" Depreciation
Feb. 2009	Russia	"Managed (gradual)" Depreciation
Feb. 2009	Kazakhstan	Devaluation (18%)
Mar. 2009	Armenia	Devaluation (30%)
Mar. 2009	Switzerland	Devaluation (5%)
Mar. 2009	Vietnam	Widening of Exchange Rate Band
Apr. 2009	Singapore	Lowering of the trading band (<2%)
Apr. 2009	Fiji	Devaluation (20%)
<b>Capital Account and Forex</b>		
<b>Date</b>	<b>Country</b>	<b>Measure</b>
Oct. 2008	Iceland	Controls restricting foreign exchange purchases for essential items such as food, fuel and medicine. If foreign currency acquired by domestic parties must be submitted to a domestic financial undertaking within two weeks. Other restrictions on capital movements.
Dec. 2008	Ukraine	Restriction on Forex Sales and Purchase. Parliament has voted in a first reading for a law that would force all exporters to convert their foreign currency earnings back into hryvnias.
Feb. 2009	Nigeria	Prevent foreign exchange dealing between banks
Feb. 2009	Venezuela	Limits on purchase of "Travel" Dollars
Mar. 2009	Angola	Tightening of Forex Controls
Mar. 2009	Kazakhstan	Approval of reading of new law in parliament on capital controls
Mar. 2009	Zambia	Ban on foreign borrowing in local currency and on the use of US dollar or other forex in domestic transaction.
Mar. 2009	Vietnam	"Punishment" for bank trading outside the exchange rate band
Mar. 2009	Uzbekistan	Bank clients must use all foreign currency within seven days after purchasing it, otherwise they are obligated to sell it back to the banks.
Mar. 2009	Argentina	Lift of former capital controls from 2005
Apr. 2009	Bolivia	Bolivia's Central Bank is banning banks from buying or selling U.S. dollars for much more or less than the official exchange rate.
Apr. 2009	Kazakhstan	Limitation on forex trading at exchange offices.

In general the variability of industrial countries' ECIs have been moderate. So have been the ECIs of countries that peg to the US dollar (China, Hong Kong, Saudi

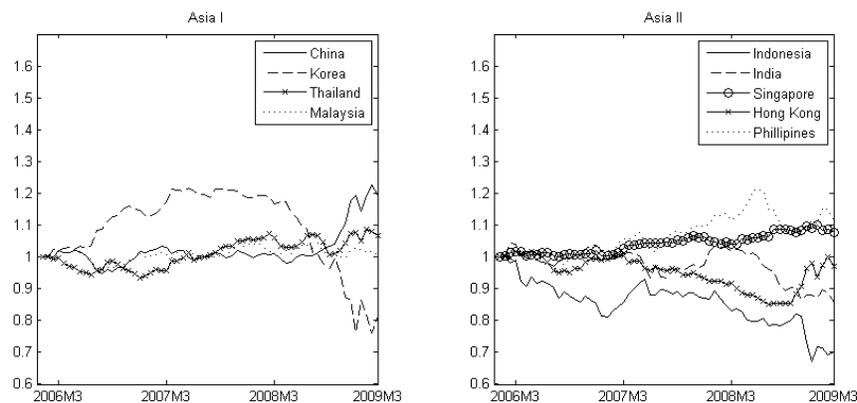
Arabia). However, towards the end of the period it becomes clear that Germany, Switzerland and the US have lost in competitiveness since other countries have been depreciating heavily (like the UK, Sweden and Australia). Hence, the latter countries gain in competitiveness has heightened the others incentive to weaken their own currency. However, in no instance do the measures imply an extremely high loss of competitiveness for industrial countries. The exception is Japan that saw its ECI value climb by more than 20% in the last months of 2008 reflecting to some extent its appreciation against the US dollar but also the appreciation with respect to major trading partners in Asia, in particular Korea which after the US and China is the most important export market of Japan. Hence, even though Korea's depreciation was market driven it has increased the contagion risk for Japan to devalue.

**Figure 9: ECI values for selected Industrial countries**



A similar pattern can be observed in other Asian countries that did not experience a depreciation. In particular China, Singapore and Hong Kong and the Philippines have lost competitiveness in the last months of 2008. This may induce them to follow their regional competitors, which depreciated strongly including South Korea and Indonesia and to a lesser extent India.

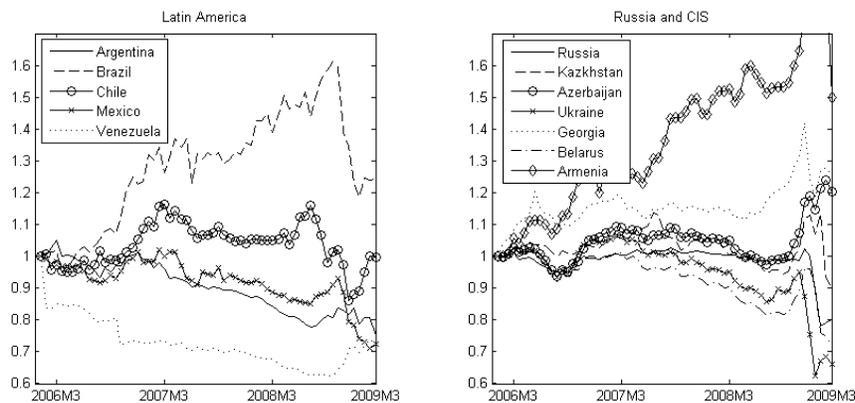
**Figure 10: ECI values for selected Asian countries**



For Latin American countries, ECI values have dropped strongly throughout 2008 and in particular the second half of 2008. Brazil's competitiveness has recently improved but not enough to fully offset earlier losses from the disinflation years. Chile, Venezuela and Argentina have rather low ECI values. Similarly, the recent

depreciation of the Mexican peso contributed to a relatively low ECI. Hence, from Mexico and major exporters from Latin America there seems to be stemming no risk of contagion via the exchange rate devaluations since they have already a relatively competitive exchange rate with respect to their direct competitors.

**Figure 11: ECI values for selected Latin American and CIS countries**



From the major export nations stems only limited contagion incentives. These tend also to be limited to Asia. However, if Japan and China were jointly to devalue ECI values for several non-Asian countries, in particular Mexico, Canada and most Latin American countries would increase significantly. This is due to the high share of Japan and China in US imports (>20%) and the high importance of the US market for Mexico, Canada and Latin American countries with a share that exceeds often 80% of total exports. Hence, the highest risk of contagion stems from these two countries since they both have an incentive and are big enough to trigger retaliation by other countries.

#### 4.2. Bottom-up contagion

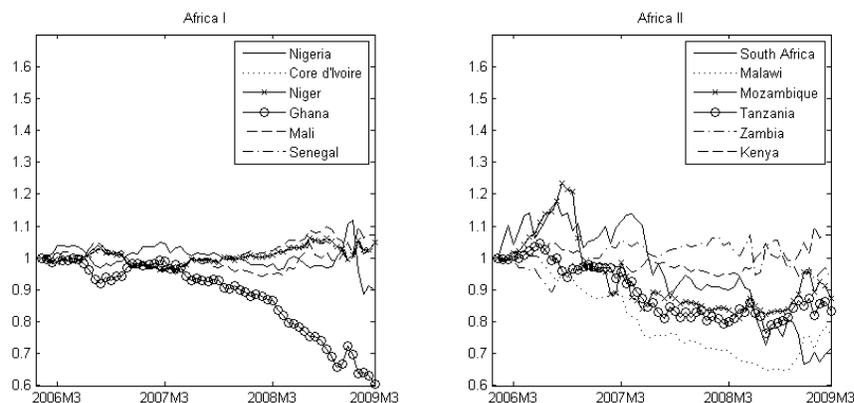
While a devaluation by a major nation is more likely to trigger contagion, smaller nations may also be at the root of the process. Countries that are minor players in global trade can tip of a depreciation process via third market competition effects. This could cumulate to take on a global significance once a crucial mass is reached. Since the end of 2008 several non-systemically important countries have been devaluing their currency, as Table 1 illustrates. These countries have been primarily raw material exporters.

A few developments in non-systemically important countries indicate that the threat of contagion remains relevant. The developments in Russia and the CIS provide an example of how contagion takes place and may continue. The managed depreciation of the rouble and the devaluation of Ukraine raised the two countries' competitiveness (Figure 11). As consequence, Armenia, Georgia, Azerbaijan and Kazakhstan lost between 10-30% of competitiveness as indicated by the jump in their ECI value. Belarus devalued in January followed by Kazakhstan in February and, Armenia in March 2009. Azerbaijan and Georgia did not follow suite yet, but their situation has become increasingly uncomfortable, with ECI values, being relatively high.

In Africa, the two largest economies have undergone sharp exchange rate fluctuations. After Nigeria's currency appreciated in 2008, leading to a loss of competitiveness, the central bank *allowed* the Naira to depreciate heavily (ca. 25%) in the beginning of

2009. Nigeria is an important exporter to various Western African states. The latter saw their ECI values increase with the one of Nigeria before the heavy depreciation of Nigeria. With the depreciation of the Naira several countries in the region lost somewhat in competitiveness, which increases in turn their incentive to devalue.

**Figure 12: ECI values for selected African countries**



South Africa has also been depreciating by close to 25% since the end of 2007. Given South Africa's importance in many Southern African markets, like Mozambique, Malawi, Namibia, Zimbabwe and Zambia and to a lesser extent Tanzania and Kenya a change in the value of the South African Rand directly impacts the respective countries competitiveness.<sup>15</sup> This is since South Africa is both a major destination for exports from other Southern African countries but makes also up for a major share in imports in these countries. In fact in the last three months of the sample the ECI value of South Africa drops heavily while the respective values of Malawi and Mozambique rebounded upwards. Zambia and Kenya, though less affected by the recent changes remain less competitive.

With the exception of the CIS there has been no other contagion yet. However, the exchange rate changes by some regionally important countries have put other small countries under increasing pressure. If such a trend will continue the step to another regional contagion is not big and may trigger even reactions outside the region given the inter-linkages of trade patterns across the globe.

## 5. Conclusions exploring possible policy responses

Few countries so far have used direct foreign exchange interventions and there has only been one, regionally contained, case of contagion. Most of the recent strong exchange rate variations have been brought about by market forces and have not been the result of competitive devaluations. Nevertheless, some of these sharp exchange rate changes create difficulties for partner countries by altering adversely their competitiveness. However, it is close to impossible to give precise recommendations regarding the desired exchange rate movements due to the combination of a numerous factors that require exchange rate adjustments and of very limited knowledge of what drives exchange rates and how they affect the economy.

### 5.1. Exchange rate regimes

<sup>15</sup> However, some countries peg to the South African Rand including Namibia.

The old case for flexible exchange rate has been controversial for so long that there is no hope to draw firm conclusions. Paradoxically perhaps in the midst of extreme financial market dislocation, flexible currencies have tended to move in the right direction, if not by the right amount. Misalignments are more prevalent among defacto fixers. On the other side, if we fear beggar-thy-neighbor behavior, lack of activism among the fixers could be seen as reassuring, unless it leads to deeper duress as the recession sets in.

An additional advantage of fixed exchange rates in the current situation is that allows external observers to identify deliberate actions by the authorities. This allows the IMF to use the surveillance mechanism to discuss the issue with the authorities and, hopefully, to thwart or reduce damaging beggar-thy-neighbor actions.

Finally, exchange rate stability stands to enhance fiscal policy effectiveness. If as argued in Section 2.2 fiscal policy is going to be the main countercyclical instrument, stabilizing exchange rates is desirable.

## **5.2. Global imbalances**

Comparing recent changes and the initial current account position, there is no clear sign that exchange rates have moved to eliminate the global imbalances. Strong surplus countries have often seen their currencies depreciate or deliberately devalued them. The awkwardness of the situation is that while a depreciating dollar would be helpful in the adjustment of global imbalances, at the same time there is resistance to a depreciating dollar since it implies a loss in national wealth for the surplus countries that have accumulated dollar-denominated assets. A dollar depreciation would also raise the adjustment burden for the euro zone and Japan.

This means that there can well be a trade-off between exchange rate changes required to alleviate the crisis and those that would move in the direction of resolving the global imbalances. If one believes that the global imbalances are the source of the crisis, then the priority should go in this direction. If one sees the global imbalances as a separate problem resulting from fundamental disequilibria, the guiding principle should be in helping to bring effectively the world to the end of the recession.

## **5.3. Allocation of exchange rate adjustments**

Because there is simply no way to allocate desirable exchange rate changes across countries, no such effort should be undertaken. Even among the key leading exporters, agreeing on an efficient burden sharing is unlikely to be feasible in theory, not to mention political considerations. On the other hand, our review of incentives to depreciate suggest that the risk is high that some authorities resort to beggar-thy-neighbor policies. Even though, so far, large exchange rate changes have not triggered any contagion (with the exception of the CIS), the risk that they will may well rise as governments run out of better options. To reduce the odds of conflictual use of exchange rates, some form of coordination is needed. We consider three possibilities.

First, all countries that operate a flexible exchange rate regime should agree to refrain from non-conventional monetary easing via the foreign exchange market. Similarly, countries with fixed exchange rates – no matter how fixed they are – should not undertake any depreciation without in-depth consultations with the IMF.

Second, when market pressure threatens a currency, whether the exchange rate floats or is fixed, IMF support should be sought and provided. Lending should come along with the conditions that ensure a behavior that is consistent with the external balance and repayment capability, but should not be encompassing any other dimension. If conditionality is too broad, many countries could be reluctant to opt for IMF support and could prefer instead to act unilaterally. The recently created Flexible Credit Facility should be offered to most countries that had achieved a reasonable degree of policy discipline before the crisis.

Finally, capital controls need to be monitored to avoid measures which interfere with trade and may backfire. Capital controls have been used partly to complement the exchange rate adjustments (Iceland, Ukraine, Kazakhstan, Vietnam and Angola) and partly as a substitute for such adjustments (Nigeria, Venezuela, Zambia and Bolivia). In the first case, the controls often serve as a mean to defend the newly established exchange rate value while, in the second case, they serve to limit market pressure and to avoid a rapid depletion of foreign exchange reserves. If effective, temporary capital controls can be helpful. But they can also cause disruptions and hamper the allocation of funds. Indeed, black markets have been on the rise in most of the nations that implemented the capital controls, undermining the controls and supporting illegal activities leaving little but a premium on the transaction behind. Additionally, controls that require exporters to convert foreign currency revenues within a short period into local currency are likely to disrupt trade in an environment where revenues and expenditures do naturally not coincide and where exporters are paying part of their imports and required services in foreign currency. Capital controls can be beneficial if geared at short term financial capital outflow (like liquidation of equity investment) but may be doing more harm than good if affecting the regular foreign currency requirements of exporters and importers.

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## Appendix

### A. Data Sources

Data comes from various sources.

Variable	Source	Variable	Source
<b>Tables</b>		<b>Annual data for the Regression</b>	
Exports		REER, CPI and Reserves	IFS
Current Account		RER	Own calc. (IFS)
Public Debt	CIA Factbook	CA Openness	Chinn and Ito
Interest Rates	Central Banks	Gov. Share	
Infl. and GDP growth forecast	EIU	GDP, P-Level, Trade Open.	WB WDI
Reserves and Nom. Ex. Rate	IFS	<b>ECI computation</b>	
NEER and REER	BIS	Bilat. Trade	COMTRADE
Current GDP and GDP growth	IMF WEO	Nom. Exchange Rate	IFS

### B. The Estimation of the Real Equilibrium Exchange Rate

The estimation of the real equilibrium exchange rate is based on an extended PPP approach similar to Cheung et al (2008). The particular approach chosen here is based on the consideration that the evolution of the real exchange rate is a function of (slow moving) factors affecting the equilibrium exchange rate  $X_{it}$  and factors which in the short- to medium run lead to a deviation from the equilibrium rate of which we attempt to explain a part by policy variables  $Z_{it}$  and consider the remainder as random unexplained part ( $\varepsilon_{it}$ ):

$$RER_{it} = \alpha_i + \beta X_{it} + \gamma_i Z_{it} + \varepsilon_{it}$$

However, we do not impose slope homogeneity on the policy variable, but let it instead vary by country.<sup>16</sup> The equilibrium rate is given by

$$RER_{it} = a_i + bX_{it} + y_i \underline{Z}_i$$

where  $\underline{Z}_i$  is the average value of the policy variable for country  $i$ . The standard misalignment measure is given by:

$$MISA_{it} = RER_{it} - RER_{it} = y_i(Z_{it} - \underline{Z}_i) + e_{it}$$

or in percentage, reflecting the extent of misalignment (i.e. overvaluation):

$$SMISA_{it} = (RER_{it}/RER_{it} - 1) * 100 = 100 * [y_i(Z_{it} - \underline{Z}_i) + e_{it}] / RER_{it}$$

For the empirical implementation we use the following controls  $X_{it} = (PROD_{it}, OPEN_{it}, KAOPEN_{it}, GOV_{it})$ .  $PROD_{it}$  is the traditional Balassa-Samuelson effect; that the equilibrium rate moves with increased development, since the tradable good sector is driving growth. The measure we employ is the GDP per capita in current US Dollars relative to the US.<sup>17</sup>  $OPEN_{it}$  stands for the extent to which the country is integrated in the world market allowing for cheaper imports and hence a lower price level. Our

<sup>16</sup> This is similar to an analysis in which we would have discarded the policy variables altogether from the estimation (as is done in most applications) and then analyze the error country by country. The problem with such an approach is that it leads to a missing variable bias and can not be performed by simply correlating the residual with the policy variable in a second step.

<sup>17</sup> We also employed the PPP measure as robustness check without finding any major difference. More information on the estimation and the results are available on request.

proxy is the sum of exports and imports over GDP.  $KAOPEN_{it}$  is the index by Chinn and Ito (2006).  $GOV_{it}$  stands for the size of the government which is assumed to increase the relative importance of non tradeables in domestic consumption leading to a more appreciated exchange rate. We measure  $GOV_{it}$  by the government consumption share in GDP. The policy variable is given by  $Z_{it}=RES_{it}$ , which stands for the reserve to GDP ratio. All variables are in logs except for the  $KAOPEN_{it}$  index.

Estimation Results:

X:\ RER:	P-Lev.	P-Level	P-Level	RER	<b>RER</b>	REER	REER
PROD	0.22***	0.59***	0.63***	0.39***	<b>0.44***</b>	0.36***	0.34***
OPEN	-0.11***	-0.17***	-0.13***	-0.24***	<b>-0.24***</b>	-0.25***	-0.21***
GOV	0.08***	0.04***	0.04***	0.06***	<b>0.07***</b>	0.08***	0.07***
KAOPEN	0.00	0.02***	0.01***	0.004*	<b>0.00</b>	0.01*	0.00
Z	No	No	Yes	No	<b>Yes</b>	No	Yes
Fixed Ef.	No	Yes	Yes	Yes	<b>Yes</b>	Yes	Yes
N. of Obs.	2900	2900	2868	3287	<b>3249</b>	1928	1914
N. of Ctry	(152)	(152)	(151)	(153)	<b>(152)</b>	(89)	(89)
R <sup>2</sup> (within)	0.68	0.68	0.84	0.46	<b>0.64</b>	0.45	0.58

**C. The External Competitiveness Index (ECI)**

The external competitiveness index is similar to the concept of a nominal effective exchange rate. But rather than contrasting the relative competitiveness of exports to imports it compares the competitiveness of the own exports relative to the exports of the competitors in third markets. The value is computed in two steps. In a first step the competitiveness in all major export markets  $k$  is determined by subtracting from country  $i$ 's appreciation against currency  $k$  the weighted appreciation of all other exporters' appreciation against currency  $k$

$$\Delta MCI_t^{i,k} = \Delta E_t^{i,k} - \left( \frac{1}{1 - \mu_{i,k}} \right) \sum_{j \neq i} \mu_{j,k} \Delta E_t^{j,k}$$

where the weights are given by the respective market share of exporter  $j$  in market  $k$  adjusted by the market share of country  $i$  in market  $k$  such that the sum of the shares adds up to unity. The overall index change is the weighted relative appreciation in the export markets as given by:

$$\Delta ECI_t^i = \sum_{k \neq i} \omega_{i,k} \Delta MCI_t^{i,k}$$

where the weights are given by the relative importance of market  $k$  for total exports of country  $i$  which sum to unity. The depicted index is calculated by defining a base year at which all indicators are normalized to unity and then computed according to:

$$ECI_{T_0,T}^i = \prod_{t=T_0}^T (1 + \Delta ECI_t^i)$$

The weights are computed using constant 2006 trade shares. The sample includes 137 exporting/importing countries.