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# EMERGING MARKETS FORUM

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## The Centennial Resilience Index: Expanding Its Coverage and Testing Its Predictive Power

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Discussion Paper

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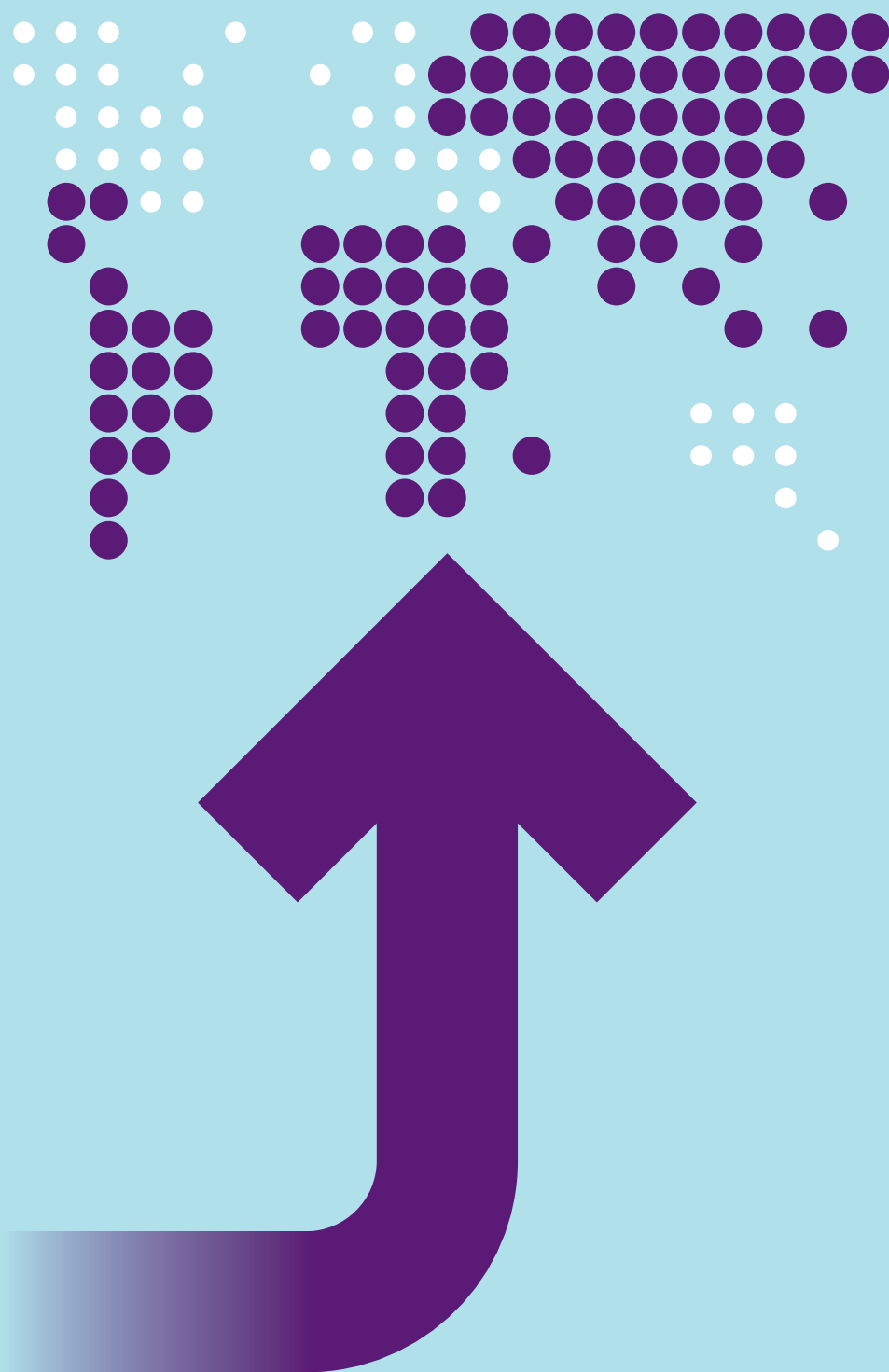
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# The Centennial Resilience Index: Expanding Its Coverage and Testing Its Predictive Power

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## Executive Summary

At the Emerging Markets Forum in October 2010, initial results were presented from an exercise that attempted to measure the resilience of emerging market countries (EMCs)<sup>1</sup> to deal with shocks to their economies. In an earlier paper, it had been argued that rather than de-coupling from the more developed economies, the EMCs - like the advanced countries themselves - were becoming ever more inter-connected within the global economic and financial system. Following the crises of the last five years, there is little if any argument that can be presented against this proposition. The crisis that emerged in the United States had immediate negative spillover effects on EMCs: exports, tourism, capital flows, remittances, etc. all declined sharply. This interdependence that now exists requires that countries have the capacity to counter the negative effects on their economies from adverse developments elsewhere. Even beyond that, at least for the larger of the EMCs, those countries can help support the global system in the face of weaknesses elsewhere—as they did in 2009. The index that was presented at the 2010 Forum attempted to measure that capacity, or what we refer to as Resilience.

The resilience of a country is a function of many factors. These include the quality of the government, and governance in general; the strength of its institutions, especially the economic and financial policy-making institutions in the country; the soundness of its banking sector—and the financial sector more broadly; the structure of the economy—including such things as its export dependency and diversity, its openness to global financial markets, and other such factors; and its policy-making space at any

given time, particularly in the areas of fiscal, monetary, and reserves policy.

In this paper, we report on the first results of recent efforts to improve the index and to expand its country coverage. Five things have been done:

- (1) some of the underlying variables that were included in the original index have been modified;
- (2) the number of countries for which the index is calculated has been significantly increased, including coverage of many advanced economies;
- (3) the capacity of the index to have identified the risks that were emerging in the advanced countries before the crisis in 2007/2008 is tested. Similarly, the index is used to explore whether it would have had predictive power to identify those countries in Europe worst affected by the euro area crisis and to highlight the major areas of vulnerability in those countries;
- (4) the impact on countries' resilience from the global crisis that began in 2007/2008, and their response to it, is examined;
- (5) the index is used to look forward, to identify countries and regions that appear to be at risk from low resilience in the face of current weaknesses in the global system.

The results of each of these efforts look promising.

First, it has been possible to modify certain variables to help them better capture potential vulnerabilities in various areas. For example, export diversity is now measured to capture diversity by product as well as by destination; the net international investment position of countries is included; and improvements

<sup>1</sup> The group of EMCs used in this paper are selected from the EMF list of emerging market countries, with the addition of Albania, Belarus, Bosnia and Herzegovina, Cambodia, Guatemala, and Moldova.



have been made to the measurement of private sector debt and other variables.

Second, the addition of the more advanced countries allows a new base of comparison between the resilience scores for those countries and the scores for EMCs. One fascinating result is the almost continuous - and significant - decline in the resilience score of the advanced countries since the start of the calculation period in 1997. This contrasts sharply with the steadily increasing resilience of the EMCs until the crisis that began in 2007 / 2008 in the United States.<sup>2</sup> As the charts for the underlying factors show, the decline in the resilience of the advanced economies before the crisis was driven by the rapid accumulation of both public and private debt in many countries, and the decline in external robustness.<sup>3</sup> The contrasting improvement in the resilience of the EMCs over that same period derived from a wide variety of factors: most importantly by stronger fiscal and monetary policies; increasing export diversity and international reserves; and — beginning around 2001 — a strengthening of their banking systems.

The resilience of both country groupings has declined sharply in the wake of the global crisis. In the advanced countries, this has been driven primarily by fiscal weaknesses and a severe initial decline in banking soundness. In the EMCs, the decline has resulted from fiscal weakness - partly the result of appropriately stimulative policies and the impact of slower growth on revenue, and an increase in private debt. The decline in the resilience of the advanced economies has been greater than that in the EMCs. Moreover, there are many EMCs, including Israel, Korea, Singapore, Peru, and others for which the

Resilience Indices have actually strengthened in the wake of the crisis.

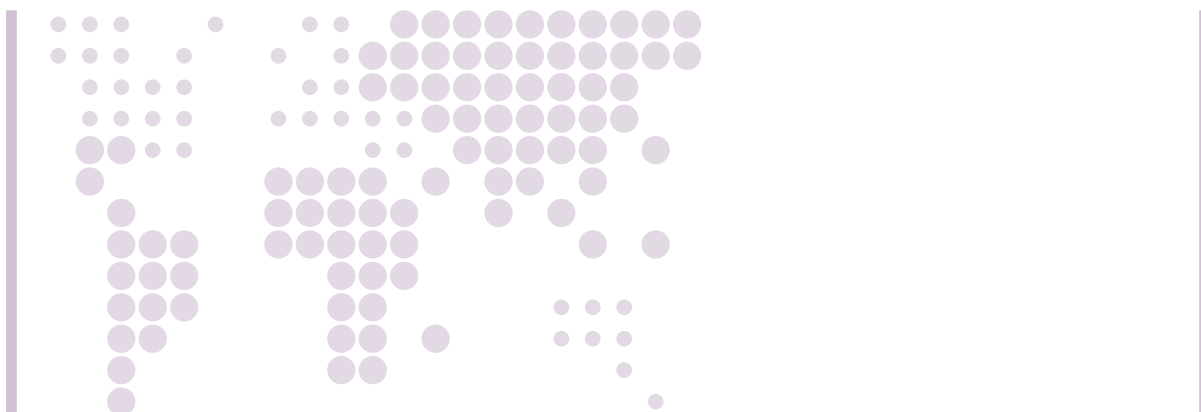
Third, the results for the countries in Europe that have been worst affected by the crisis there are dramatic. For more than a decade before the global crisis in 2007 / 2008, with the exception of a brief period around 2001 and 2002, each of those countries (Greece, Spain, Portugal, Italy, and Ireland) have seen an almost continuous, and uniquely sharp, decline in their resilience. The key elements responsible for this decline have been fiscal policy and banking sector soundness.

The global crisis itself helped to further weaken the resilience of these countries. The initial measures taken to deal with their own crises since 2010, and the resulting severe recessions in most of them, have also contributed to that decline. This is, not least, partly a reflection of the way in which the crisis in Europe has been handled.

Fourth, looking forward, the resilience of the largest countries (the United States, the United Kingdom, the Euro-zone countries other than the crisis countries, and Japan) has stabilized after the sharp declines associated with the global crisis. In Europe and Japan, resilience has begun to increase. Some regions and individual countries of the developing and emerging world, with the exception of emerging Europe and Sub Saharan Africa, have been able to retain or even strengthen somewhat their overall resilience. Latin America is pulled down by Venezuela, Argentina, and — to a lesser extent — Brazil, but overall, the region has retained most of its earlier resilience. Asia, as well as the Middle East and North Africa have managed to increase their resilience somewhat since the onset of the global crisis. In all regions, as would

<sup>2</sup> The latest WEO from the IMF confirms - with certain caveats - what it calls the "rising resilience" of the emerging market and developing economies. See IMF Survey, September 27, 2012.

<sup>3</sup> See Box 1 for the definition of the elements included in each of these factors.



be expected, there is a diversity of performance across countries.

What conclusions can be drawn from this work? The first is that the index appears to have the power both to identify economies that are heading for trouble,<sup>4</sup> and to isolate the specific policy areas of weakness that lie behind their increasing vulnerability.<sup>5</sup>

The second conclusion is the more troubling. There was an obvious failure by the various surveillance mechanisms in the global system to fully and accurately identify the major vulnerabilities that were emerging in so many countries. It is not that none of these emerging problems was seen. Obviously they were, including the housing bubbles in a number of countries - and the associated explosion in private sector debt; the fiscal problems in the U.S. and in some other countries; and, at least at the BIS, some of the problems developing in the global financial system, including those in some of the major financial centers. But in many instances, those analyses were either rejected or “the dots were not connected”, i.e., the implications of some of the vulnerabilities were not sufficiently explored. Many things were either missed, such as the depth of the perverse incentives that had developed in housing finance and in the securitization process in the U.S. Beyond that, some widely held beliefs about how to deal with asset bubbles and the power of private sector markets to

self-correct appears to have blinded many to the risks that were being run.

At the same time, even some of the emerging problems that were identified were left uncorrected. Partly, this reflected the existing consensus around the “Great Moderation”. In addition, the surveillance systems that are relied upon to induce corrective policies by countries at risk - the G7, the G20, Working Party 3 at the OECD, and, perhaps most importantly, the IMF - proved incapable of playing an effective role. These processes “lacked the teeth” necessary to encourage - or to force - corrective policy actions where needed. As the saying goes, peer protection in these forums took the place of effective peer pressure.<sup>6</sup>

The Resilience index can add to the tools of the surveillance process - at least as a device to help insure that vulnerabilities are surfaced, and deeper analysis is conducted to assess those vulnerabilities and suggest corrective policies. But that alone would still be insufficient. The recent report of the Palais Royal Initiative concludes, bluntly, that “Surveillance over countries’ economic and financial policies is inadequate”.<sup>7</sup> The report makes a number of suggestions to improve that process including the adoption of “norms” and remedial measures on countries that breach such norms.<sup>8</sup>

The Resilience Index shows clearly that emerging weaknesses in many economies were evident well before the global crisis and well before the crisis in Europe. What that implies, more than anything else,

4 See the regressions results given in *The New Resilience of Emerging Market Countries: Weathering the Recent Crisis in the Global Economy*, by Jack Boorman, Jose Fajgenbaum, Manu Bhaskaran, Harpaul Alberto Kohli and Drew Arnold, ADB Regional Forum: Impact of the Global Crisis on Asia: Lessons Learned, Policy Insights, and Outlook, November 2010.

5 The index relies on factor analysis to calculate the resilience scores for each country. There are no a priori constraints put on the analysis other than the choice of specific variables to include. Factor analysis permits the data sets to speak for themselves.

6 See the Report of the IMF Independent Evaluation Office: “IMF Performance in the Run-Up to the Financial and Economic Crisis: IMF Surveillance in 2004-07”, February 9, 2011.

7 Palais Royal Initiative - Reform of the International Monetary System: A Cooperative Approach for the 21st Century, in *Reform of the International Monetary System*, Edited by Jack Boorman and Andre Icard, Sage Publications and Emerging Markets Forum, 2011, page 13.

8 These could be similar to the measures that may be adopted under the proposed “Fiscal Pact among the euro-area countries.



is the need to pursue more actively many of the ideas that have been put on the table to improve surveillance processes - and, particularly, those of the IMF.

### Introduction

In a paper discussed at the 2010 Emerging Market Forum,<sup>9</sup> it was argued that there had been no decoupling of the EMCs from the advanced countries and that, to the contrary, all countries were becoming more inter-connected. That reality alone would have suggested a serious negative spillover to the EMCs from the 2007/2008 crisis that originated in the advanced countries. And we saw this happening through the adverse impact of the crisis on exports, tourism, remittances, capital flows, and the like. However, this negative impact was countered by the policy response of the EMCs that was made possible by the resilience that many of these countries had built through important reforms undertaken in the aftermath of their own crises during the mid-1990s and early 2000s (Figures 1 and 2). These reforms provided many of these countries with a capacity to respond to the crisis with stabilizing and stimulating policy measures that helped them either absorb the shock with limited adverse effects and/or to rebound strongly after a severe initial impact.

While the crisis affected individual EMCs in varying degrees, the ability of many of those countries to absorb the negative spillover effects of the crisis and to recover quickly was impressive. In an attempt to understand this newfound policy capacity of EMCs, we developed a Resilience Index. This index is intended to identify factors that have increased the ability of many EMCs to absorb external shocks and to respond effectively. The index is composed of a large

number of key factors that help explain why the more resilient countries would be able to absorb negative shocks, respond effectively, and recover faster than other countries. In addition to the typical economic and financial fundamentals, the Resilience Index includes structural and institutional aspects of the economies that provide the capacity and space that policy makers need to design a policy response to the crisis, the confidence to implement that response, and the credibility regarding the effectiveness of the response (Box 1).

The attractiveness of the Index resides in its comprehensive view of the factors that help determine the resilience of the economy, and on its ability to give policy makers clearer insight into the sources of their country's resilience and the specific areas where further strengthening is needed. Such strengthening is critical in view of the ever-growing and more complex interconnectedness between developments in the advanced countries and in the EMCs that has become evident in recent years.

The purpose of this paper is to assess the relevance of the Resilience Index — in terms of providing warning signals — in the lead up to the sovereign debt and private credit crises in the Euro-zone, as well as the continued sluggishness of the U.S. and Japanese economies.<sup>10</sup>

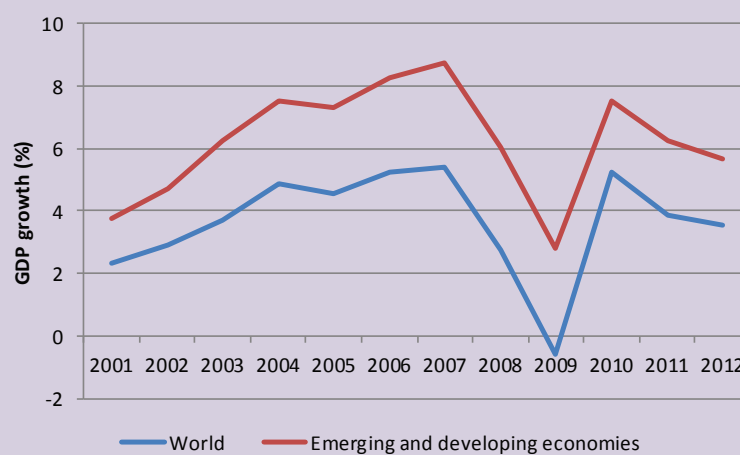
In addition, if Europe and the US were to have a double dip recession, will the EMCs be able to play the role they played in the aftermath of the global financial crisis of 2007/08? Put differently, have the stabilizing and supportive efforts of the EMCs in responding to the global crisis affected those countries'

9 See: The New Resilience of Emerging Market Countries: Weathering the Recent Crisis in the Global Economy, by Jack Boorman, Jose Fajgenbaum, Manu Bhaskaran, Harpal Alberto Kohli and Drew Arnold, Emerging Market Forum, October 2010.

10 Please note that this paper expands the sample of EMCs to 72 countries, from about 37 in the 2010 paper referred to above. In addition, it includes 25 advanced countries. The countries included in the sample are listed in Appendix 2.

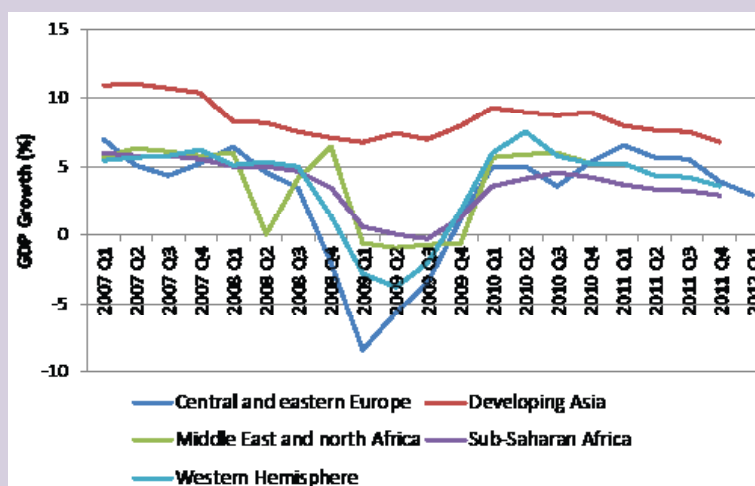


Figure 1  
Annual GDP Growth (In percent)



Source: IMF World Economic Outlook.

Figure 2  
Quarterly GDP Growth (In percent)



Source: IMF International Financial Statistics



## Box 1 | The Centennial Resilience Index and the Rationale for Each Element

The Centennial Resilience Index provides a measure of the capacity of an economy to cope with and bounce back after having been hit by an external shock.

The index groups its 56 input component variables into ten elements, as specified in Appendix 1. The rationale for each of its elements and components is briefly described below:

### **Fiscal Policy Soundness**

This represents the space policy makers have to adopt fiscal measures. Its components are the stock of public debt in relation to GDP as well as the rate (and direction) of change of this variable as a measure of the overall deficit. A higher debt ratio or overall deficit decreases the space.

### **Monetary Policy Soundness**

The greater the credibility the central bank has built up – for example, by such actions as controlling inflation — the more room the central bank has to ease monetary policy in a slowdown, thereby supporting activity in the economy. Its components are the difference between domestic inflation and G-7 inflation, whether an inflation targeting framework is in place (as it is typically associated with increased credibility), and a measure of the unpredictability of inflation, estimated by its historical standard deviation.

### **Government Effectiveness**

The stronger the capacity of government officials to react and design policies, the better and faster will be the implementation of these policies and thus the response of the economy. The greater the capacity of the government to follow through with its plans, the more likely the private sector will respond positively to stimulus measures, and thus the higher the country's resilience. Its components are the quality of the bureaucracy and the ability to consistently implement forward-looking policies.

### **Overall Governance**

Good governance is generally seen as a necessary underpinning to an efficient economy, with reliable and independent institutions, adherence to the rule of law (confidence in contracts, property rights, etc.), transparency, limits to corruption, press freedom, required bank and credit ratings, accounting disclosure, shareholder rights, and availability of both private- and public-sector standardized data. Its components are indices of corporate governance, legal system, and policy transparency, and are taken from the Index of Financial Development and Strength developed by Centennial Group International (see methodology).

### **Bank Soundness**

A sounder financial system with less risk of default, a strong capital base, well-provisioned assets, non-volatile income sources, and high profitability is less likely to amplify an external shock and thus makes the economy more resilient. Although this element represents predominantly banks, it also includes some non-bank financial institutions, and therefore measures the broader financial sector. Its components—all derived from the IMF's Financial Soundness Indicators Compilation Guide — are indices asset quality, capital base, and income risk, and are also taken from the Index of Financial Development and Strength developed by Centennial Group International.

### **Export Diversity**

The more diversified the export base, the more resilient the economy is likely to be. Its components measure export diversity by destination and product.

### **Export Independence**

The greater the dependence on exports, the less resilient to an external shock an economy is likely to be. Its component is the ratio of exports to GDP.

### **External Robustness**

The stronger the external sector, the more resilient an economy is likely to be. Its components are the current account balance as a proportion of GDP, the ratio of international reserves to short term debt, the stock of reserves in terms of months of imports, and a classification of the exchange rate regime.

### **Private Debt**

The private debt element includes components measuring both external debt and domestic debt. Much domestic debt consists of bank credit to the private sector, and its excessive growth leads to destabilizing asset bubbles. Regarding external debt, the faster the expansion of externally financed credit to the private sector, the less resilient an economy is likely to be to a sudden stop in capital flows. (Externally financed credit should not be seen as financial deepening, which involves credit growth mainly financed by domestic financial savings.) Its components are the ratio of private credit by deposit money banks to GDP, the change over three years of this ratio, the change in the ratio of loans from foreign banks to private credit by domestic banks, the ratio of claims on the





#### Box 1

### The Centennial Resilience Index and the Rationale for Each Element

country's residents by foreign banks to GDP, and the change in this ratio. It would have been helpful and appropriate to include currency composition of private sector debt, but the relevant data was not available.

#### International Reserves and Net International Investment

At least up to some limit, the higher the reserve holdings the stronger the self-insurance they offer; in addition, a high stock of reserves provides policy makers with room for maneuver and confidence to adopt expansionary policies in a downturn. Thus, a high stock of reserves constitutes a buffer against external shocks. While it would appear that the higher the stock of reserves, the better off the country is, there are important costs in such an approach. Moreover, a recent IMF study shows that the self-insurance aspect tapers off after a certain level of reserves. A positive international investment position also indicates room for maneuver for both the private and public sectors. The components of this element of the resilience index are the ratio of international reserves to GDP and the ratio of the net international investment position to GDP.

resilience and their capacity to counter further negative forces emanating from the industrial countries?

An equally important objective is to explore what the Resilience Index may be signaling about the capacity of certain EMCs and regions to respond to continued sluggishness in the U.S. economy and recession in Europe

#### The continued effects of the Global Financial Crisis and of the Euro-zone crisis on the EMCs<sup>11</sup>

In contrast to the sudden shock caused by the global financial crisis of 2007/08 manifest in the seizing up of global credit markets, recent difficulties in the advanced countries reflect the protracted and still ongoing effects of that crisis — including, most importantly, the de-leveraging necessitated by the earlier credit excesses and asset price bubbles. Moreover, the protracted nature of this adjustment has been accompanied by high volatility, arising from large swings in market perceptions about the adequacy, or lack thereof, of the measures adopted by the advanced countries to address their difficulties. As was the case

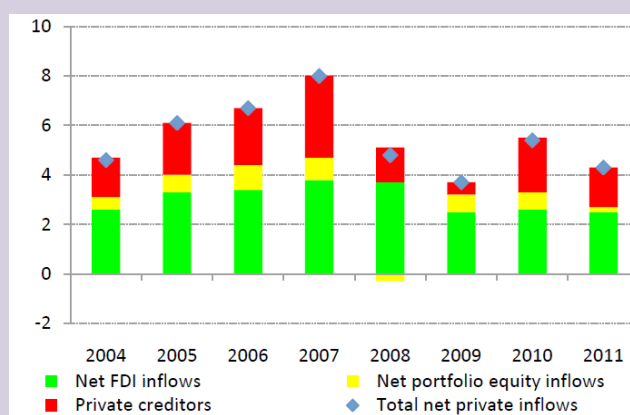
with the impact of the global financial crisis of 2008, the effects of these more recent developments on the EMCs also vary significantly among countries and regions.

While the transmission of developments in the advanced countries to the EMCs is coming through a number of channels — including on expectations and confidence — we focus on the financial and real activity channels.

#### 1. The financial channel

This section examines the impact of global shocks on the EMCs as a result of their exposure to financial flows. The financial channel impacts EMCs through portfolio allocation, foreign direct investment (FDI), and cross-border lending. Additional shocks could materialize from the slowdown in Europe, the continued sluggish recovery in the U.S., and, potentially, further decreased growth rates in China, India, and Brazil. A major feature of linkages between advanced economies and EMCs over the recent period has been the repeated risk-on/risk-off behavior of capital flows, alternating between inflow surges during optimistic periods and sudden stops or reversals

<sup>11</sup> The rationale for reviewing again developments that followed the onset of the global financial crisis is three-fold: to update the previous paper, to set the stage for using the revised index (see below) to test its capacity to see—before their crises—the worsening situation in the peripheral Euro-zone countries, and to predict which countries/regions now look at risk.

Figure  
3**Net Capital inflows to Emerging Market Economies (% of GDP)**

Source: World Bank.

Source: World Bank.

as optimism waned, adding an extra challenge to EMCs' policy makers.

**Net Capital Inflows to EMCs**

After a steady run-up in the period leading to the global financial crisis, capital inflows in EMCs have caused serious disruptions as the deleveraging process in the advanced economies has led to significant cutbacks, only temporarily reversed in 2010 (Figure 3). The steady worsening of the European situation has induced another round of risk aversion and total flows are now lower than at the beginning of the observed period (2004).

This adds up to a picture of lower and, as importantly, highly volatile inflows, complicating the adoption of a cohesive policy response by EMCs. Policy adjustments have been able to accommodate inflows by accumulating international reserves, helping alleviate excessive currency appreciation. They have also helped manage potentially bubble-inducing increases in liquidity. However, EMCs' policy makers

have found it difficult or cumbersome to manage the unwelcome sources of volatility associated with the sudden stops/inflows linked to the risk-on/risk-off behaviors of the capital markets and to monetary policy initiatives in the U.S. Asset prices and exchange rates were strongly impacted by the volatility of inflows, as illustrated in the following charts.

Volatility is the key word. As Figure 4 shows, starting in early 2009, a run-up in portfolio flows to EMCs was triggered by the steep decline in the level of interest rates in advanced economies and the ensuing quest for yield. By early 2011, net portfolio flows (equity and debt instruments) to EMCs had more than doubled compared to their level before the advent of the crisis. In stark contrast, there has been a marked decline more recently, as shown in the following figure, as risk appetite and exposure to EMCs, in particular from European investors, plummeted.

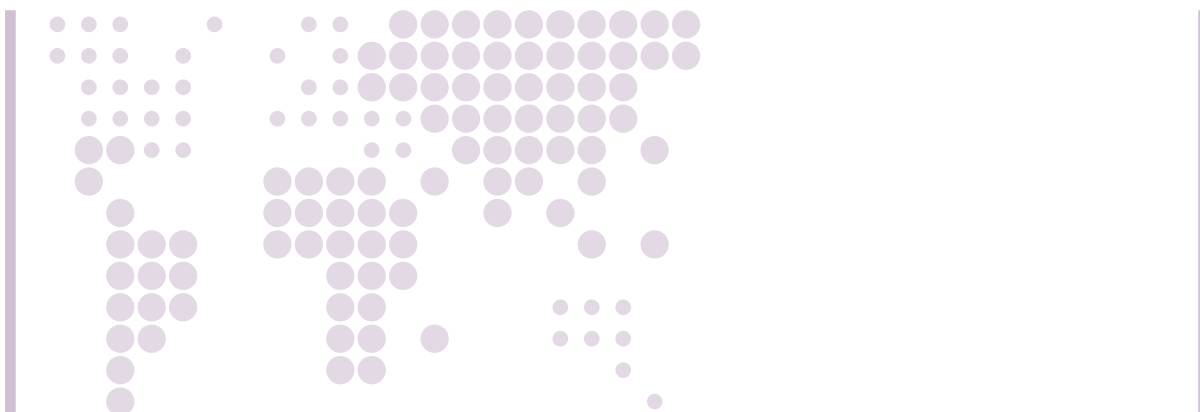
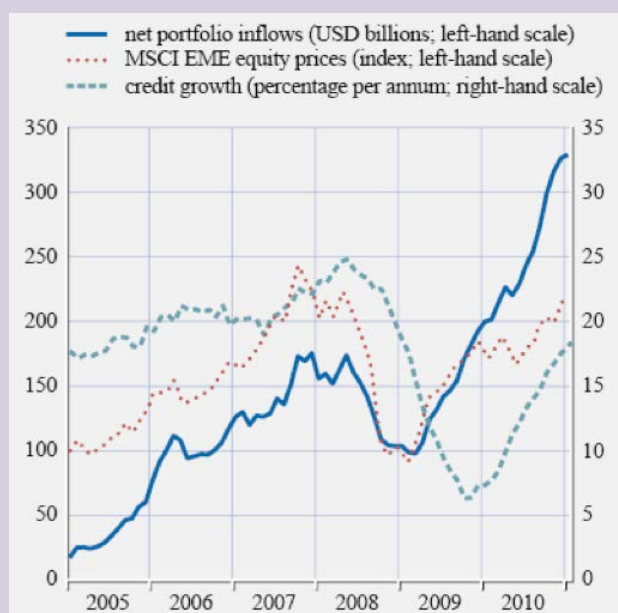


Figure 4  
**Portfolio flows and their impact on asset prices**



Source: EPFR, MSCI, IMF, ECB <http://www.ecb.europa.eu/pub/fsr/html/summary201106.en.html>

The recurring flare up of the Euro-zone crisis sharply curtailed global investors' risk appetite.

In the aftermath of the global financial crisis, changes in international capital flows, together with the fall in exports, tourist arrivals, and remittances (see below) led to considerable currency depreciations, in some cases, and to significant losses in international reserves in those countries that used their foreign exchange holdings to buffer the external shocks. The following table illustrates these losses for a selected group of Asian countries.

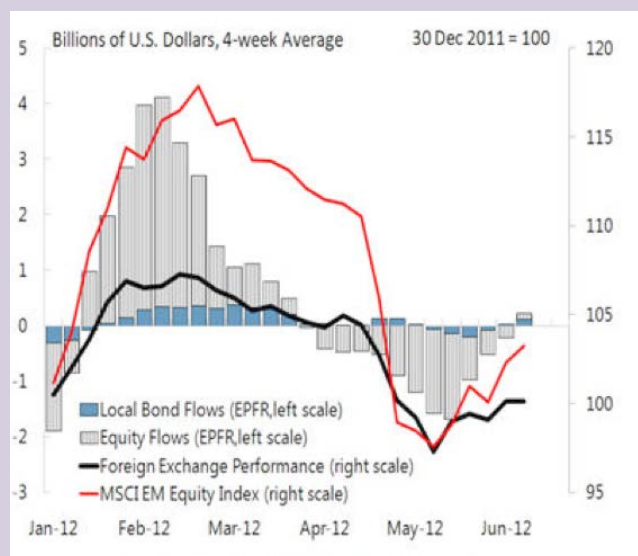
Subsequently, the currency depreciations and reserve losses were reversed in most countries, in

some cases by the resumption of strong portfolio capital inflows as shown in Figure 4.

### Foreign Direct Investment

Sensitivity to FDI flows can constitute an important challenge for EMCs, especially for the lower income ones. Looking across regions, exposure to FDI varies significantly. Within regions — and individual countries — FDI also varies significantly over time, as shown in Figure 5.

East Asia and Pacific (EAP), already a strong recipient before the crisis, is now the main FDI destination as Europe and Central Asia as well as South Asia have experienced significantly reduced inflows while EAP now benefits from higher inflows than before 2008. However, EAP could be especially exposed to reduced Chinese investments. South/South FDI (from

Figure  
5**Changes in International Capital Flows**

Source: IMF Global Financial Stability Report, July 2012 update.

Table  
1**Foreign exchange reserve and forward book drawdown in Asia in 2008-09**

	Peak month	Peak amount	Trough month	Trough amount	Net reserve drawdown
China	Sep-08	\$1,908	Nov-08	\$1,888	1%
Hong Kong	Sep-08	\$160	Oct-08	\$155	3.50%
India	Apr-08	\$322	Feb-09	\$238	26.20%
Indonesia	Jun-08	\$57	Feb-09	\$48	15.90%
Korea	Mar-08	\$286	Feb-09	\$190	33.50%
Malaysia	Apr-08	\$144	Apr-09	\$87	39.50%
Philippines	Feb-08	\$45	Oct-08	\$34	24.40%
Singapore	Apr-08	\$267	Feb-09	\$193	27.60%
Thailand	Apr-08	\$128	Nov-08	\$111	13.40%
Total ex CN, HK		\$1,250		\$901	27.90%

Source: International Monetary Fund, World Economic Outlook Database, April 2012 and own estimates

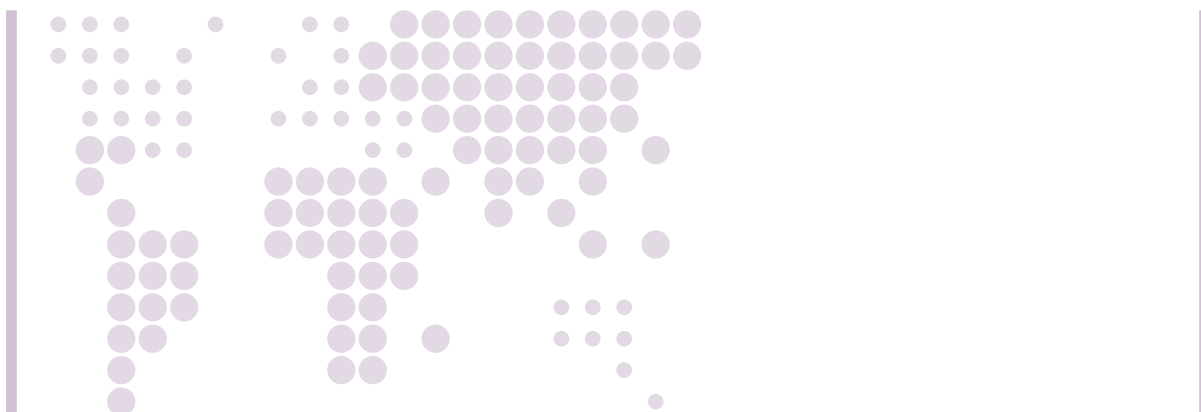
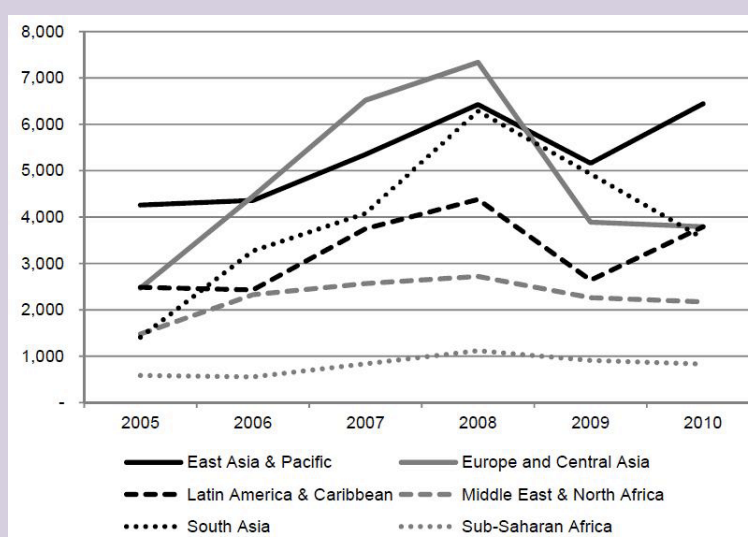


Figure  
6

### Average inward FDI flows by geographical regions (US\$ million), 2005–10



Source: UNCTAD, UNCTADstat database.

China, India, South Africa and Malaysia) has proven to be a major equilibrating factor as they picked up the slack created by advanced countries' deleveraging. China, in particular, has become a major player as regards FDI, as Chinese FDI to all emerging and developing countries increased more than 10-fold between 2005 and 2010, increasing the impact of a potential Chinese slowdown.

Such a slowdown is also likely to impact EMCs in two other ways: first, by reducing Chinese demand for commodities as the scale of its investment-led stimulus of 2009 may be difficult to be repeated; and second, through lower Chinese growth induced by a slowdown of exports, particularly to Europe.

In parallel, reduced outward European FDI may impact emerging and developing countries, as European investors account for the largest share of FDI to these countries, at 20–30% of the total, according to UNCTAD. While a decline in FDI could be problematic

for the EMCs, the major source of potential inflow volatility due to the European crisis is linked to cross-border and local-market banking activity.

### Cross-border and local-market banking activity

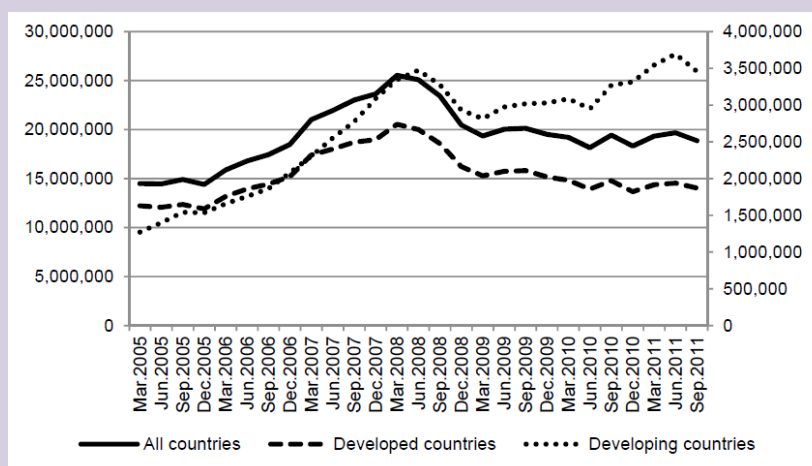
European banking activity in EMCs grew steadily until 2008, before experiencing a sharp contraction upon the onset of the crisis (Figure 6).

European bank lending to developing countries picked up fairly rapidly after the initial credit squeeze in 2008 and early 2009 (Figure 7).<sup>12</sup> However, since the worsening of the Euro-zone crisis (second half of 2011), borrowers in EMCs have felt a deterioration of funding conditions explicitly linked to the European situation, as indicated in global lending surveys by the Institute of International Finance (IIF). This

<sup>12</sup> Quoted in: The euro zone crisis and developing countries; Isabella Massa, Jodie Keane and Jane Kennan



Figure 7 **Cross-border bank lending from European banks (US\$ million), March 2005–September 2011**



Source: BIS Consolidated Banking Statistics. Quoted in *The euro zone crisis and developing countries*;

Isabella Massa, Jodie Keane and Jane Kennan

Note: Consolidated foreign claims of reporting banks, by nationality of reporting banks, immediate borrower basis. Developing countries data on secondary axis.

has particularly affected countries where European financial institutions command a large share of the domestic banking systems, such as in Central and Eastern Europe, as well as in some African countries. In some of these countries, European financial institutions hold more than 50 percent of banking assets. As the European banking system is highly leveraged (assets represent 16 to 18 times the capital base compared to about 12 times globally), the process of balance sheet shrinking is likely to require both capital increases and asset disposals, the latter possibly affecting EMCs access to funding.

The impact on EMCs of this deleveraging has remained contained thus far, at somewhere between €10 and €20 billion, equivalent to only 1 to 2 percent of total EMC credit extended by European banks (€1.35 trillion). Scenarios have tried to assess the ultimate impact of the planned deleveraging, with num-

bers varying greatly, depending on the assumptions on the respective shares of deleveraging achieved through capital increases and asset disposals, as well as the share of disposals affecting the loan book.<sup>13</sup> In the most likely scenario, where banks would increase their capital base by 20% and allocate only half of asset disposals to loans, EMCs' credit would drop by about 20 percent or as much as \$338 billion. While this could be offset in part by other investors, a net fall in European funding to EMCs may constitute a significant threat to growth in the coming period. This prospect makes a positive resolution to current

<sup>13</sup> Bank deleveraging: Causes, channels and consequences for Emerging Markets and Developing Countries. Erik Feyen, Katie Kibuuka, nci Okter-Robe



European travails of ultimate importance to the global economy.

## 2. The Real Activity channel

As demand in the advanced economies collapsed in the aftermath of the global financial crisis, so did exports from EMCs, although with considerable variation in timing and intensity. First, there was a major drop in exports from those EMCs that had become the largest exporters of manufactured goods to the advanced economies and from those EMCs that supplied those countries' export industries

(Table 2). Soon thereafter, exporters of commodities and intermediate goods experienced a similar shock. In this context, the IMF's index of commodity prices dropped by 56 percent from the peak experienced in mid-2008 to the trough in early 2009. Exports and commodity prices both gradually began to recover following the onset of the recession. Commodity prices fully recovered to 2007 levels by the end of 2011, but have declined somewhat in recent months,

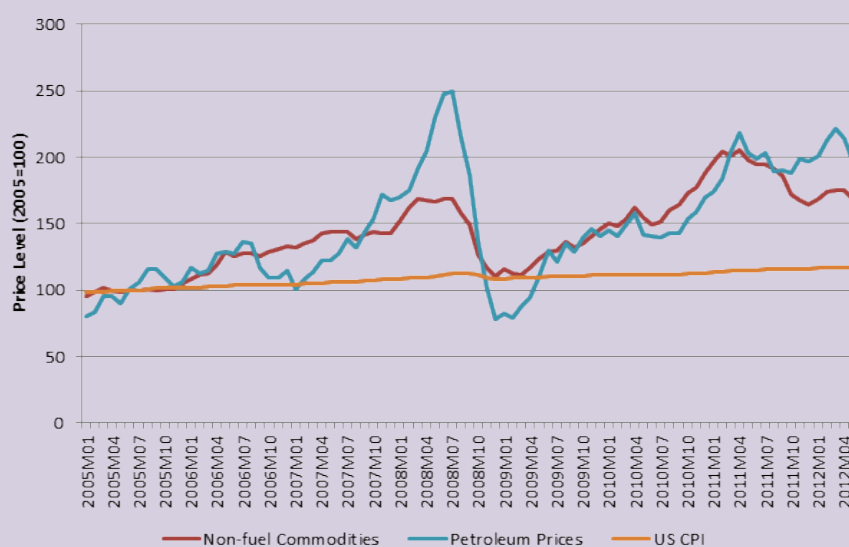
Table 2  
Export growth rates, by region (quarter-over-quarter)

	2007 Q1	2007 Q2	2007 Q3	2007 Q4	2008 Q1	2008 Q2	2008 Q3	2008 Q4	2009 Q1	2009 Q2	2009 Q3
Central and eastern Europe	0%	10%	4%	13%	7%	10%	-3%	-25%	-15%	5%	11%
Developing Asia	-4%	12%	10%	4%	-5%	15%	9%	-17%	-24%	10%	15%
Middle East and north Africa	0%	10%	7%	12%	16%	13%	9%	-31%	-35%	10%	17%
Sub-Saharan Africa	2%	10%	5%	17%	4%	18%	7%	-31%	-35%	15%	25%
Western Hemisphere	-3%	12%	6%	5%	-1%	15%	4%	-20%	-26%	12%	10%
	2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	
Central and eastern Europe	11%	-8%	5%	3%	13%	2%	7%	-1%	-2%	-3%	
Developing Asia	9%	-5%	16%	8%	6%	-3%	12%	8%	-5%	-7%	
Middle East and north Africa	8%	9%	4%	1%	8%	14%	10%	1%	-1%	3%	
Sub-Saharan Africa	11%	3%	8%	3%	3%	10%	12%	4%	-8%	2%	
Western Hemisphere	7%	-3%	15%	7%	4%	3%	15%	2%	-2%	-4%	

Source: International Monetary Fund, World Economic Outlook Database, April 2010. Argentina- unofficial estimates



Figure 8  
Commodity Price Indices



Source: IMF: Commodity Prices; and own estimates

reflecting a weakening in risk appetite as well as demand, particularly from Europe and the US.

Following the global financial crisis, many commodities exporters reaped the benefits of relatively strong demand from countries like China, both in terms of higher export quantities and higher prices. Countries that focus on manufacturing exports also saw a recovery, as demand increased gradually in the large advanced countries. However, exports have slowed and, in many cases, pulled back in recent quarters, owing to the sluggishness in growth and demand in some of the advanced countries and renewed recession in Europe. As happened in 2008–09, the decline, or growth slowdown, in export activity has been compounded by similar developments in

domestic demand, especially from a postponement of investment plans.

### Commodity prices

The drop in demand at the outset of the global financial crisis led to a sharp decline in commodity prices, as shown in Figure 7. As global demand recovered so did commodity prices, partly as a result of a significant increase in Chinese demand and speculation regarding its implications. This brought commodity prices above their pre-crisis peak by early 2011. However, this was followed by a correction since the summer of 2011. The partial recovery of the last few months mostly reflects energy and food prices, the latter affected by the US drought, while other commodity prices have remained way below their peak.

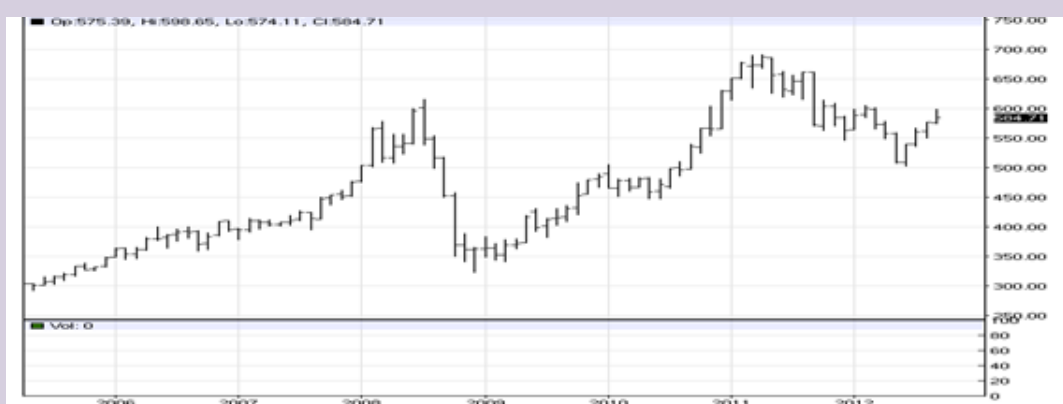
Figure 8 shows how the fluctuations in risk appetite, described in the financial channel section,





Figure  
9

### CRB commodity index (equally weighted index of 17 commodities)



Source: CRB

affected commodity prices. As commodities have become an asset class in their own right over the last decade, their prices reflect not only final demand from the real sector but also investment demand. This last component is heavily impacted by future price expect-

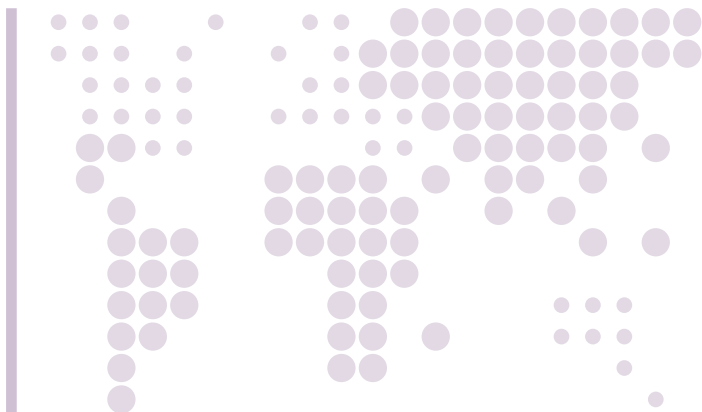
tations, which add to the volatility linked to the business cycle. Moreover, the extended seesawing of a

Table  
3

### Remittances to Emerging and Developing Countries (in US\$ billion)

Remittances (US\$ billion)	2006	2007	2008	2009	2010	2011	2012 (f)
East Asia and Pacific	58	71	85	86	95	107	115
Europe and Central Asia	97	51	45	36	37	41	45
Latin America and Caribbean	59	63	64	57	57	62	66
Middle East and North Africa	26	31	36	34	40	42	45
South Asia	43	54	72	75	82	97	104
Sub-Saharan Africa	13	19	22	20	21	22	24

Source: IMF SDDS, BIS Working paper 382: Risk-on/risk-off, capital flows, leverage and safe assets; Robert McCauley, July 2012



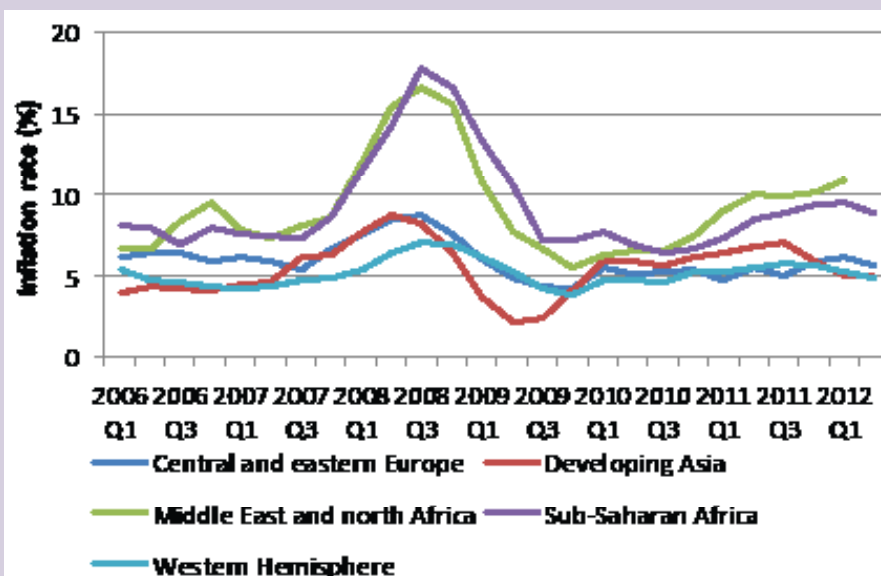
major source of EMCs' income is an added challenge for policy makers in resource-dependent economies.

**Remittances and tourism** flows to EMCs were considerably affected by the global financial crisis, although with a lag in the case of the former. The magnitude of the decline in remittance receipts appears to have been closely linked to the fall in activity in the countries of origin. For instance, remittances from the U.S. to Mexico experienced an exceptional drop. Remittances to East Asia, however, went relatively unscathed (Table 3). Following a recovery in 2010, remittances to all developing regions continued to grow and have now surpassed their pre-crisis levels. A similar development seems to have affected tourism, with tourist arrivals in Asia and the Pacific, as

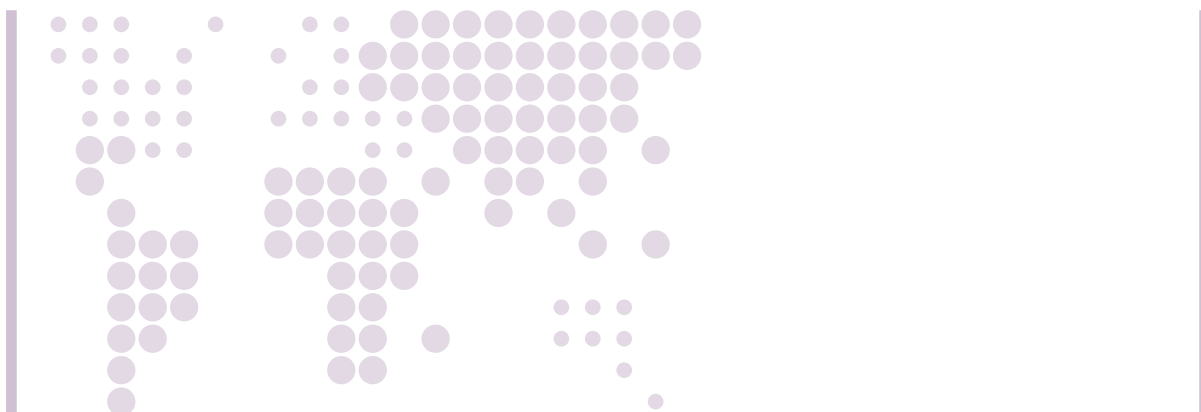
well as in the Americas, falling considerably in early 2009, but subsequently recovering.

**Inflation** in many EMCs rose considerably in 2007 and early 2008, owing to increases in commodity prices, particularly for food and fuel, as well as booming credit and monetary expansion (Figure 9). However, that pattern was reversed in late 2008, as price pressures receded with the collapse in global demand. Following an initial pickup in economic growth, mainly associated with relatively expansionary macroeconomic policies, inflationary pressures resumed in many EMCs in 2011, along with the rise in commodity prices. While many advanced economies continued to implement expansionary monetary policies, a number of EMCs, particularly in Asia, began tightening monetary policy with a view to reduce inflationary pressures. However, global growth has

Figure 10 Inflation rate (In percent)



Source: IMF World Economic Outlook



since weakened, bringing down growth and inflation in EMCs. This, in the context of slow domestic and foreign demand and low external interest rates, allowed policy makers to relax or reverse the tightening of monetary policies. In contrast to 2011, when monetary policy was contractionary in EMCs and expansionary in advanced economies, monetary policy is now once again largely expansionary around the world, as it was in 2009 (Figure 9).

In recent years, *public finances* of many advanced countries have worsened dramatically, owing primarily to the decline in revenue caused by sluggish economic activity, especially in the U.S. and Europe. Fiscal stimulus packages also contributed somewhat to that worsening. For some countries with large stocks of debt outstanding before the crisis, higher borrowing costs have also affected their fiscal situations. The uncertainty associated with these debt issues has since contributed to lower demand in the advanced countries, which in turn has hurt the recoveries of the EMCs through all channels.

Moreover, the protracted difficulties faced by the advanced countries and their associated sluggish recovery, together with constraints in the EMCs themselves, limited the ability of EMC policy makers to unwind more rapidly the stimulus measures they had implemented in the aftermath of the global financial crisis. In these circumstances, relative to 2008, public finances have weakened in most EMCs, monetary policies have remained relatively expansionary—leading to asset bubbles in some countries (Brazil, China)—and the soundness of financial systems has deteriorated. This, in turn, has reduced the

room EMC policy makers have to respond to external developments.

### III. The Resilience Index

As noted above, by the time of the global financial crisis, EMCs had clearly increased, in varying degrees, their ability to absorb and recover from an external shock. In an attempt to understand this increased ability or resilience, we developed a Resilience Index. “In contrast to the traditional vulnerability elements, which can explain the susceptibility to shocks, the Resilience Index intends to identify the factors that have increased the capacity of many EMCs to absorb external shocks and to respond effectively. Put differently, while individual EMCs may be confronted with similar external shocks, the more resilient ones will be expected to be able to absorb the shock, respond effectively, and recover faster than the others.”<sup>14</sup>

The Resilience Index includes the macroeconomic policy and financial soundness elements of typical vulnerability exercises as well as important structural and institutional aspects of the economy, such as the quality of the civil service, governance, export dependency and diversity, externally financed private debt, and the relative size of reserves (see Box 1). While the first group of elements provides a measure of the capacity and space for policy makers to adopt corrective policies, the second group provides a sense of the capacity or flexibility of the economy to respond effectively to such policies. The combination of these two groups of elements gives a comprehensive view of the resilience of an economy. For instance, for two countries with roughly the same fundamentals, the

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14 See: The New Resilience of Emerging Market Countries: Weathering the Recent Crisis in the Global Economy, by Jack Boorman, Jose Fajgenbaum, Manu Bhaskaran, Harpaul Alberto Kohli and Drew Arnold, Emerging Market Forum, October 2010. Page 12.

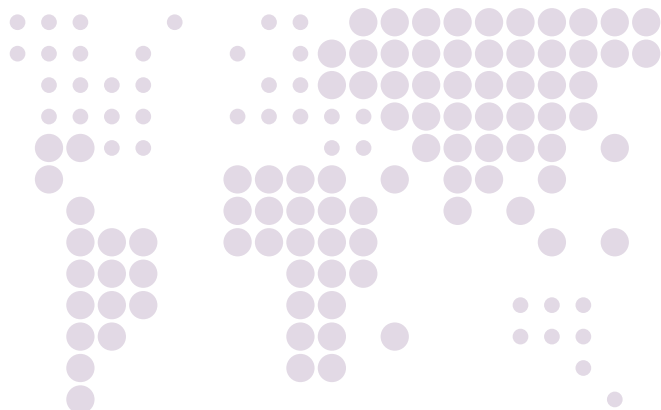
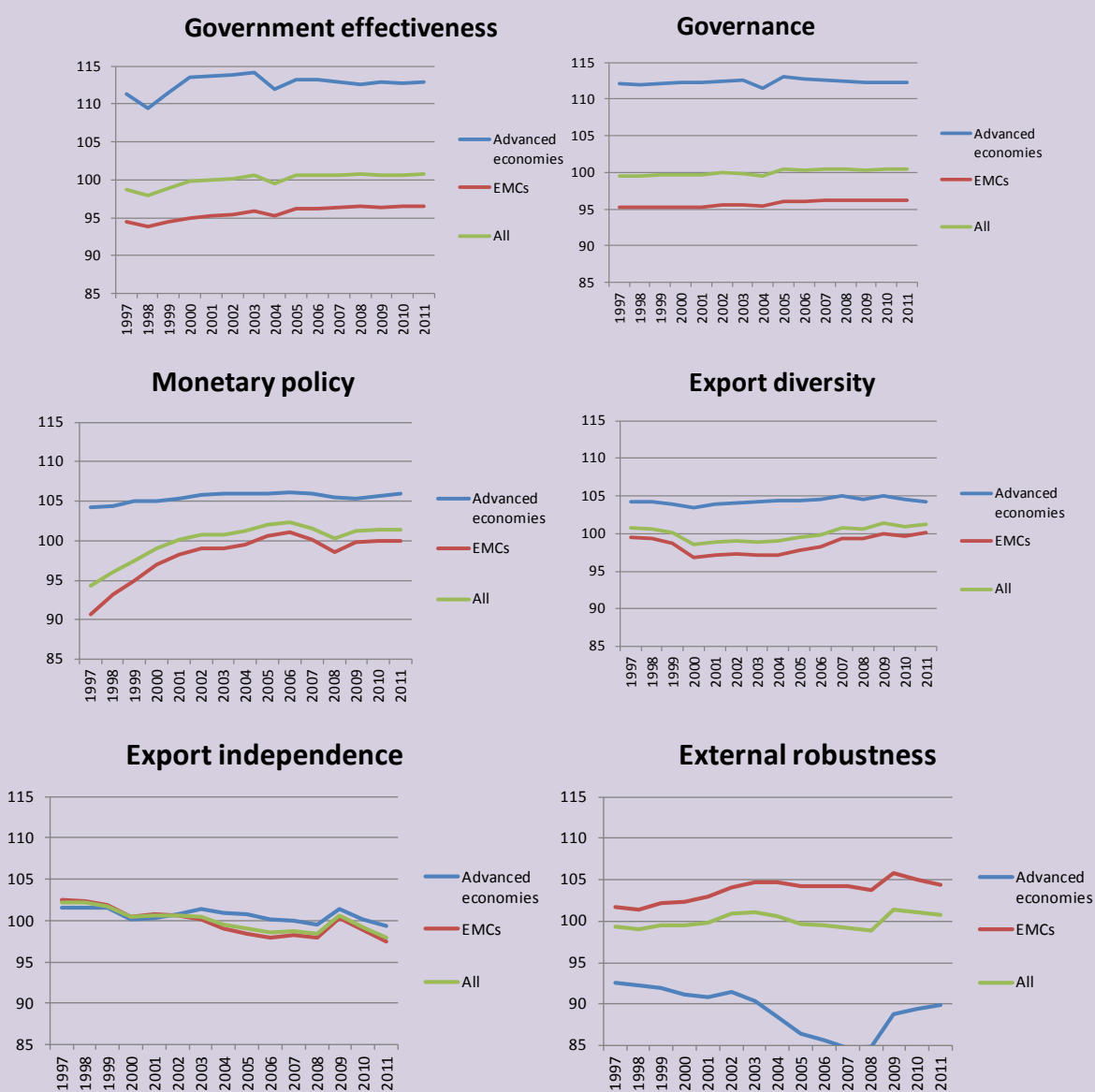


Figure 11 Elements of the resilience index by groups of countries



Source: Centennial Group International, Resilience Index.

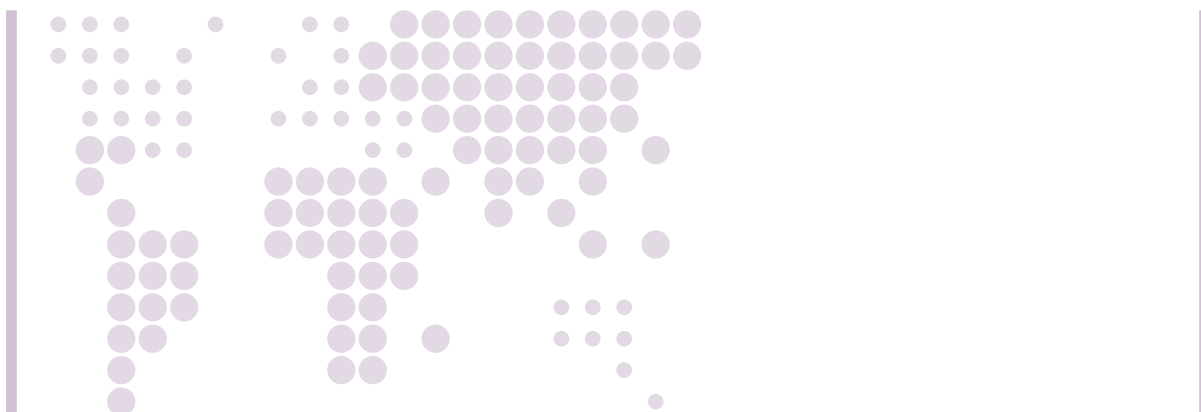
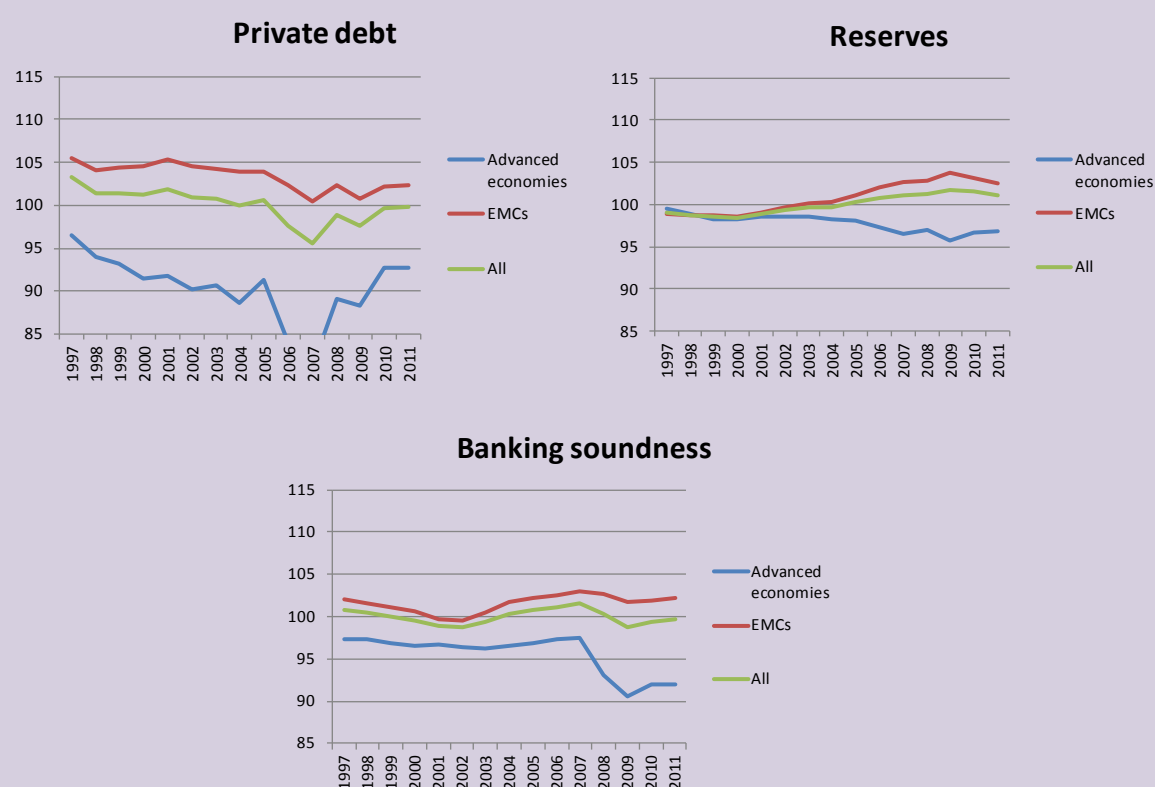


Figure 11 | Elements of the resilience index by groups of countries



Source: Centennial Group International, Resilience Index.

one with the stronger structural features will likely be more resilient.

As indicated earlier, the number of EMCs for which the Index is calculated has increased from about 30 to 72.<sup>15</sup> In addition, Euro-zone countries and other advanced countries (25 countries in total) have been added in an attempt to assess, inter alia, whether the Resilience Index could have predicted

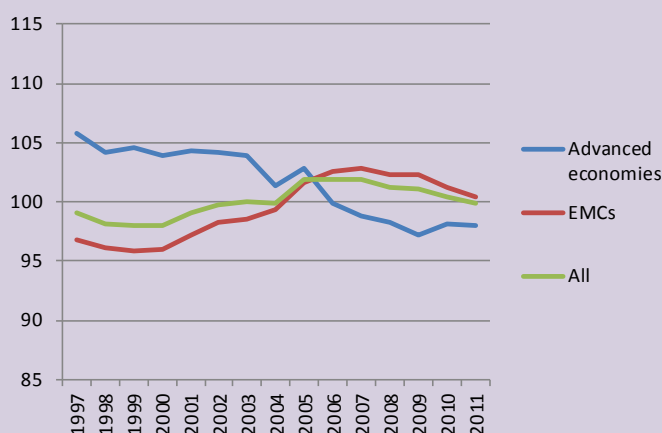
the difficulties affecting some of the countries of the zone.<sup>16</sup>

<sup>16</sup> While the causes of the difficulties of these countries are domestic, i.e., the asset bubbles (particularly Ireland and Spain) and subsequent bail out of the banking system by the governments, and the large sovereign debts and weak fiscal policies (Greece, Italy, and Portugal), they were triggered or compounded by the global financial crisis. The inclusion of other advanced countries in addition to the Euro-zone countries reflects the need to provide the factor analysis model a balanced and comprehensive data set for the factor analysis to identify positive and negative associations between component variables in order to distinguish between good and bad. If the only observations used to generate it are from only the poor performers, it will not be possible to properly distinguish good from bad.

<sup>15</sup> Appendix 2 includes a list of the countries covered in this paper.

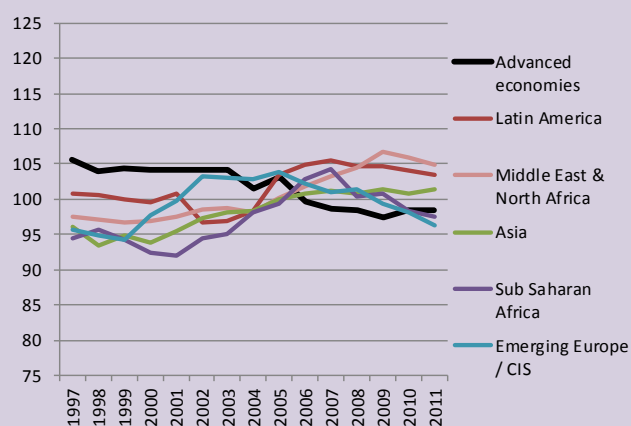


Figure 12 Resilience Score



Source: Centennial Group International, Resilience Index.

Figure 13 Resilience Score for selected groups of countries



Source: Centennial Group International, Resilience Index.

In the context of this update, the original Index (see Appendix 1) was slightly modified by including variables that add increased relevance to some elements of the Index. For instance, the degree of concentration of exports by product has been added

to the existing diversity by export destination; the net international investment position in relation to GDP has been added, partly to address the relative lack of significance of International Reserves for the Euro-zone countries; and banking system credit to



Figure 14 | Fiscal Policy Score for selected groups of countries



Source: Centennial Group International, Resilience Index.

the private sector and its rate of change have been added to have a more comprehensive measure of private credit expansion and its possible effects on asset bubbles.

#### IV. Results of the update

The updated—though preliminary—estimates of the Resilience Index for EMCs and new calculations for the advanced countries are summarized in Figure 11. They confirm that many EMCs had significantly strengthened their resilience to external shocks prior to the global financial crisis. They also show a considerable steady deterioration in the Resilience Index of the advanced countries, particularly since 2003 (Figure 12 and 13).

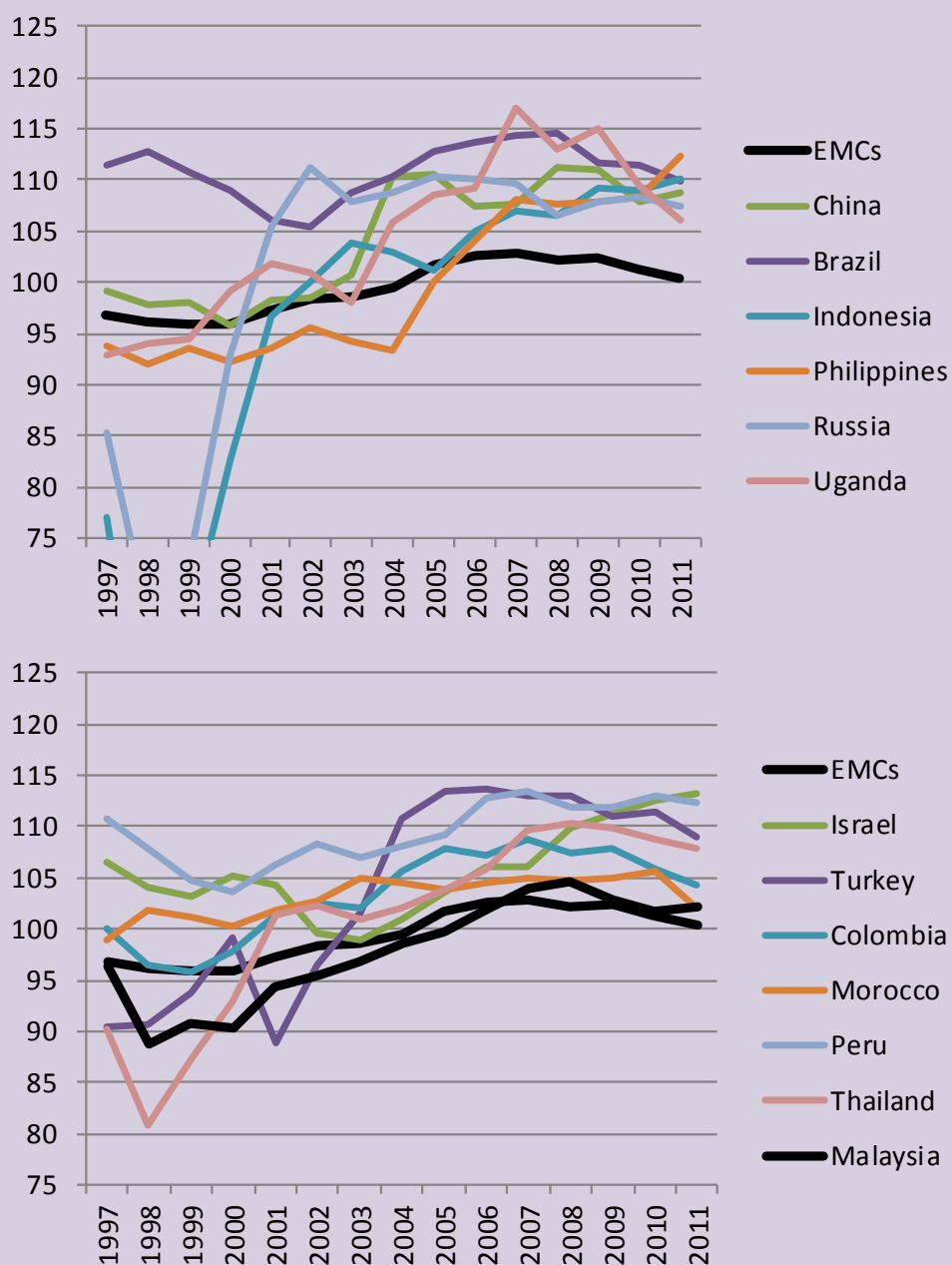
Not surprisingly, the major decline in the Fiscal Policy element since the global crisis stands out for all groups of countries (Figure 14). This decline reflects the revenue weakness associated with the recession

and continued sluggishness of economic activity as well as the impact of the fiscal stimulus packages adopted by a great number of countries. The revenue declines, in particular, have led to large increases in public debt, a key input for this element. In many cases, these increases have resulted in considerable public finance difficulties, which are leading to, or threatening to lead to, major crises in certain countries. It should be noted, however, that policy makers of many EMCs slowed the anticipated unwinding of the fiscal stimulus packages in the face of weak economic growth resulting from the continued sluggishness in the demand for their exports.

Turning to the EMCs, Figure 15 presents the Resilience Indices for a number of selected countries that had strengthened their resilience significantly



Figure 15 | Selected EMCs with strong resilience scores before the crisis



Source: Centennial Group International, Resilience Index.



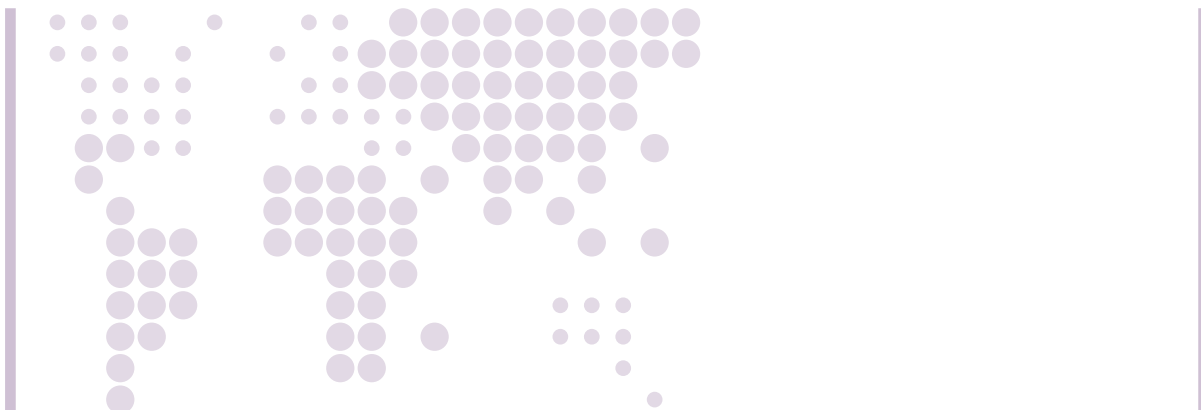
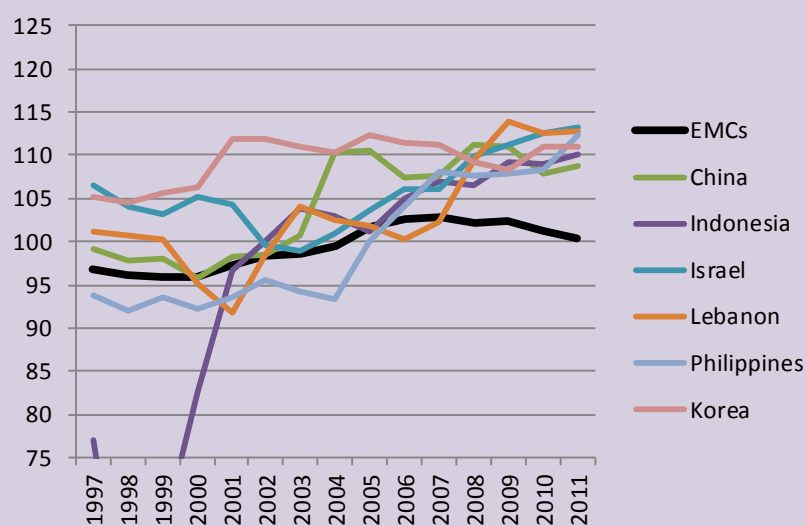


Figure  
16

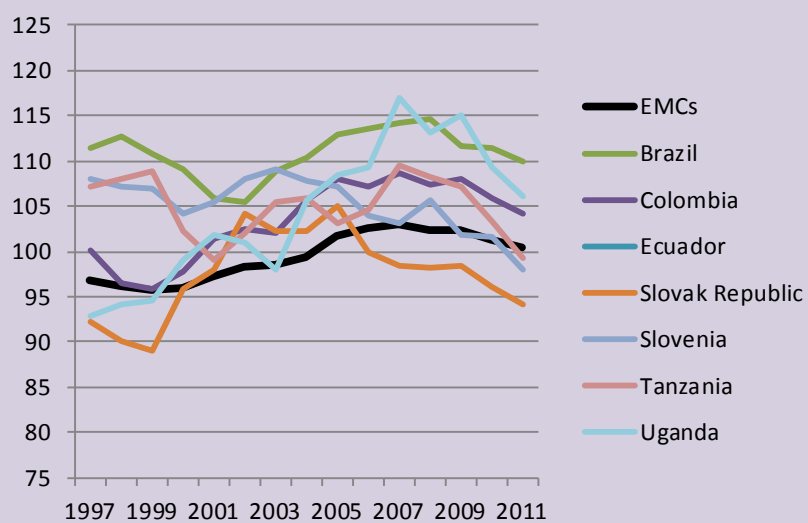
### Selected EMCs with strengthening resilience scores after the crisis



Source: Centennial Group International, Resilience Index.

Figure  
17

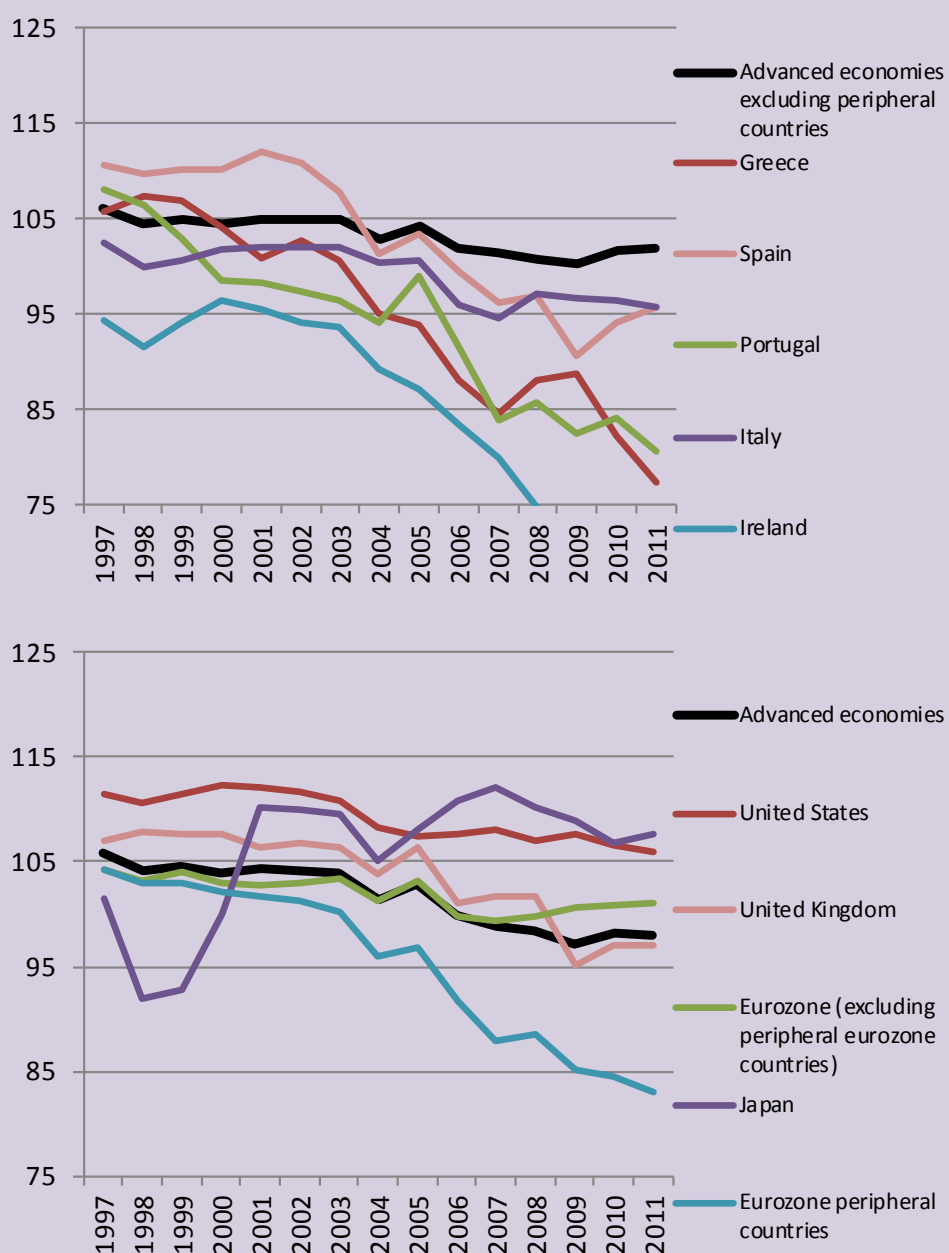
### Selected EMCs with weakening resilience scores after the crisis



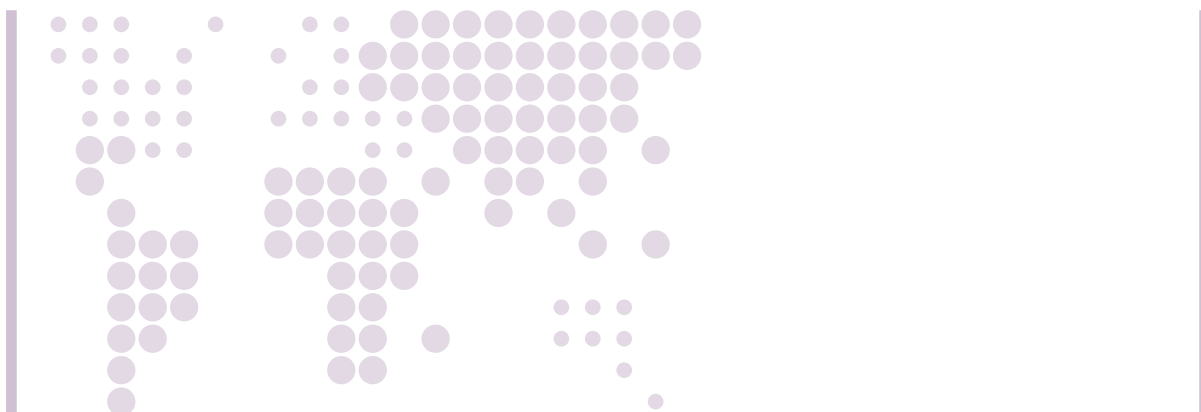
Source: Centennial Group International, Resilience Index.



Figure 18 | Selected EMCs with significant deterioration in resilience scores



Source: Centennial Group International, Resilience Index.



above the average for this group of countries in the period prior to the global financial crisis.

Importantly, a significant number of these countries have further strengthened their resilience in recent years (Figure 16). This was achieved by reinforcing the elements that underlie their scores for Monetary Policy, Bank Soundness, External Robustness, and, in some cases, Reserves, while reducing vulnerabilities, such as excessive Private Debt increases.

However, the resilience of many EMCs has been eroded since the onset of the global crisis (Figure 17 shows a sample of these countries), reflecting a considerable weakening in the Fiscal Policy element in most cases, as well as a deterioration in the Bank Soundness and Export Independence elements. Moreover a significant number of EMCs appear to be at risk from low resilience, in the face of the current weaknesses in the global environment. This suggests that policy makers need to strengthen the frail elements of their countries' Resilience Index.

But what is most interesting is the above-mentioned considerable and steady decline in the resilience of the sample of advanced countries since 2003.<sup>17</sup> This decline reflects a generalized weakening in the Fiscal Policy and Bank Soundness elements (Figure 18), offset in part by improvements in the External Robustness element that had weakened considerably in earlier years. Similarly, some countries (Iceland, Norway) show an increase in the Export Independence element in recent years. A number of advanced countries, particularly those that had experienced asset bubbles and/or are having sovereign debt difficulties, show a strengthening of the Private

Debt element, which had greatly deteriorated prior to 2008, reflecting the effects of deleveraging.

Of course, the aggregate masks the severe deterioration in the Resilience Index of a relatively small group of countries. Not surprisingly, the group includes Greece, Ireland, Italy, Portugal, and Spain (see Figure 18). While still at or above the average resilience indices for advanced economies, the UK, and to a lesser extent the US and Japan, have shown a considerable weakening of their resilience. The key elements responsible for this deterioration have been Fiscal Policy and Bank Soundness while External Robustness has helped strengthen resilience (except in the case of Portugal). Similarly, reductions in Private Credit expansion since 2007–08 (associated with deleveraging and loan defaults) appear as having helped strengthen resilience.

## V. Conclusion

The resilience of a country is a function of many factors. These include the quality of the government, and governance in general; the strength of its institutions, especially the economic and financial policy-making institutions in the country; the soundness of its banking sector—and the financial sector more broadly; the structure of the economy—including such things as its export dependency and diversity, its openness to global financial markets, and other such factors; and its policy-making space at any given time, particularly in the areas of fiscal, monetary and reserves policies.

In this paper, we report on the first results of efforts to improve the index and to expand its country coverage. Five things have been done: (1) some of the underlying variables that were included in the original index have been modified; (2) the number of countries for which the index is calculated has been significantly increased, including coverage of

<sup>17</sup> It should be noted, however, that Denmark and Norway have shown steady improvements in their Resilience Index during the period under review, while the Netherlands, New Zealand, and Sweden show improvements since 2007 and Iceland shows a significant turn around since 2010.



many advanced economies; (3) the capacity of the index to have identified the risks that were emerging in the advanced countries before the crisis in 2007/2008 is tested. Similarly, the index is used to explore whether it would have had predictive power to identify those countries in Europe worst affected by the euro-area crisis and to highlight the major areas of vulnerability in those countries; (4) the impact on countries' resilience from the global crisis that began in 2007/2008—and their responses to it, is examined; (5) the index is used to look forward, to identify countries and regions that appear to be at risk from low resilience in the face of current weaknesses in the global system.

What conclusions can be drawn from this work? The first is that the index appears to have the power both to identify economies that are heading for trouble and to isolate the specific policy areas of weakness that lie behind their increasing vulnerability. The second conclusion is the more troubling. There was an obvious failure by the various surveillance mechanisms in the global system to fully and accurately identify the major vulnerabilities that were emerging in so many countries. It is not that nothing of these emerging problems was seen. Obviously they were, including the housing bubbles in a number of countries—and the associated explosion in private sector debt; the fiscal problems in the U.S. and in some other countries; and, at least at the BIS, some of the problems developing in the global financial system, including those in some of the major financial centers, but the implications of some of the vulnerabilities were not sufficiently explored.

The Resilience Index shows clearly that emerging weaknesses in many economies were evident well before the global crisis and well before the crisis in Europe. The Resilience index can add to the tools of the surveillance process—at least as a device to

help insure that vulnerabilities are surfaced, and that deeper analysis is conducted to assess those vulnerabilities and suggest corrective policies.



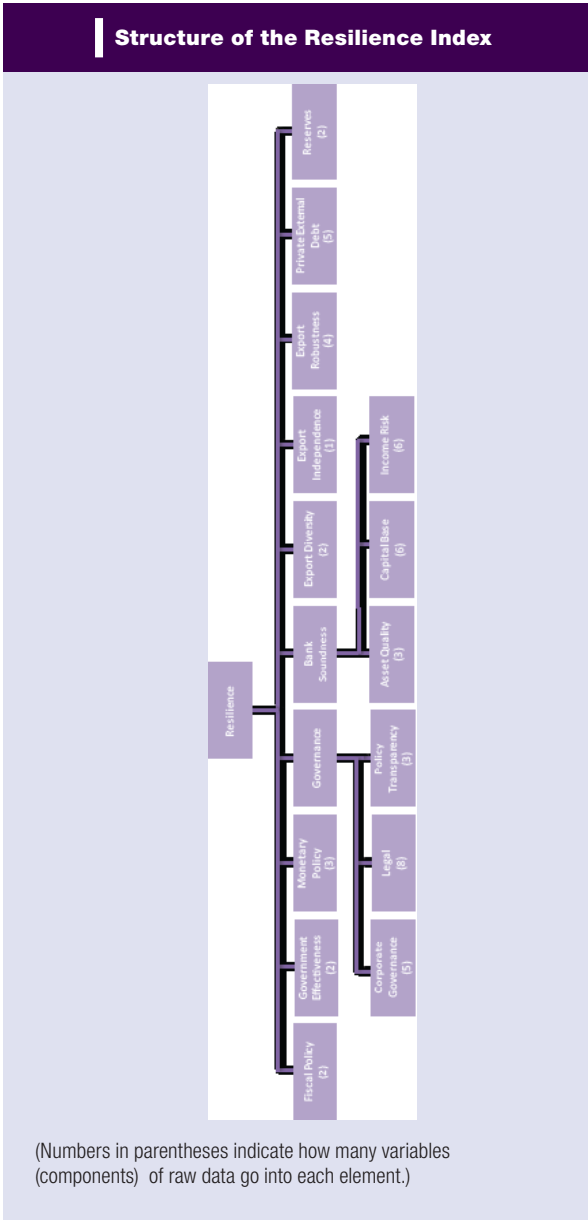
# Appendix 1

As shown in the diagram, the Resilience index is calculated by aggregating ten subindices, each of which aggregates underlying variables. The number in parentheses states how many underlying variables are used to compute that element (where there is no number in parentheses, that element equals the average of the sub-elements beneath it, which have been normalized).

Unless there is only one variable in an element, factor analysis is used to generate the score. The data sample for which scores are calculated and later analyzed (97 countries from 1997–2011) is the same as the sample used to generate the factors. We use the principal-component factor method to identify the unobserved latent variables, with the constraint that the factor analysis should not use more than two such factors. Then, except in the case of income risk, we perform a varimax rotation. drop the second factor and take the first factor to be the element score.

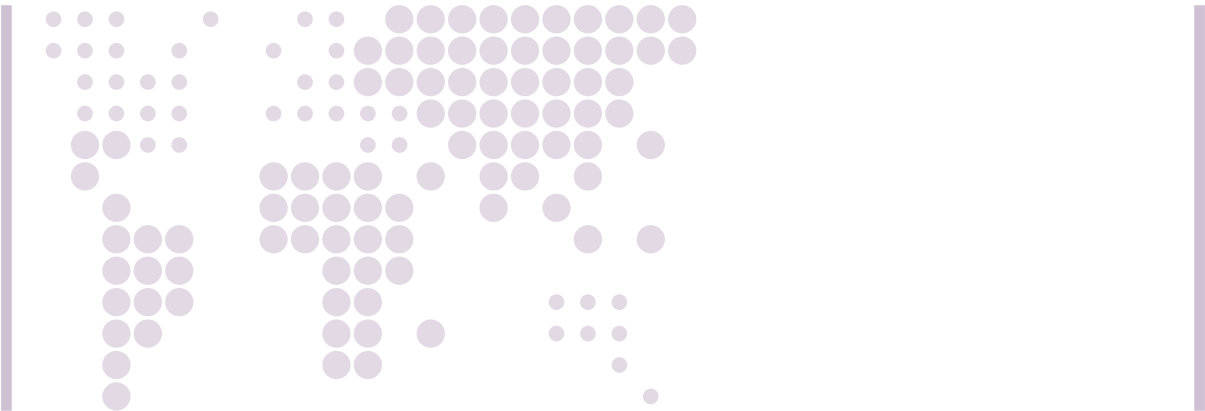
We also generate standard errors for each measurement so that users may identify which differences in scores are meaningful and which are not. For all of these, we use a maximum-likelihood factor analysis, a varimax rotation, and a bordered information matrix with analytic derivatives. These standard errors incorporate two uncertainties: The first reflects our imperfect estimates to fill in missing data. The second reflects how well the factor model fits the indicators: this derives from the intrinsic problem, even with perfect data, of measuring such difficult-to-pin-down concepts as resilience on a single numerical scale with necessarily imperfect indicators.

For a more detailed explanation of the statistical methodology and coding, see the Centennial Index



of Financial Development and Strength, from which these are taken.<sup>18</sup>

18 Sundararajan, V. S., H. A. Kohli, C. Loser, H. Kohli, & A. Goldstein. (2008). "Centennial Group and Emerging Markets present The 2008 FDS Index: Index of Financial Development and Stability." Emerging Markets Newspaper, Euromoney, 2008/10/10.  
Kohli, H. (2009). "Centennial Group & Emerging Markets present The 2009 FDS Index: Index of financial development & strength." Emerging Markets Newspaper, Euromoney, 2009/10/06.



Resilience Index Variables and Sources (Sorted by Element)

Abbreviations for data sources

BIS	BIS Quarterly Review
BKSC	Bankscope
CBI	Central Bank of Iceland: "New Inflation Targeting Countries"
CIRI	Cingranelli Richards Human Rights Database
DB	Doing Business
DOT	IMF's Direction of Trade Statistics
EIU	Economist Intelligence Unit
ERF	Economic Research Forum: Working Paper 395
EST	Centennial Estimate
EV	Econviews
FHFP	Freedom House's Freedom of the Press
FIEFW	Fraser Institute's Economic Freedom of the World
FSD	World Bank's "A New Database on Financial Development and Structure"
GFSR	IMF's Global Financial Stability Report
GIBR	Global Insight Business Risk and Conditions
HBSB	Harvard Business School Case: "Brazil 2003: Inflation Targeting & Debt Dynamics"
HF	Heritage Foundation's Index of Economic Freedom
IAERTR	International Advances in Economic Research: "Taylor Rule in Practice: Evidence from Turkey " (2008)
IFS	IMF's International Financial Statistics
IMFDSBB	IMF's Dissemination Standards Bulletin Board
IMFFX	IMF's Classification of Exchange Rate Arrangements and Monetary Frameworks
IMF267	IMF's Occasional Paper 267
IMFS	IMF Survey Magazine
IRAE	International Review of Applied Economics: J. Jim (2008)
ITK	Yangu: Inflation Targeting in Kenya?
JMIB	Journal of Money, Investment, & Banking 2009: "Is Nigeria Ready for Inflation Targeting?"
PAC	Packard 2007: "Monetary Policy in Viet Nam"
PRS	Political Risk Services
RJEF	Romanian Journal of Economic Forecasting: Daianu & Kallai (2008)
ROU	Roubini Global Economics
SG	Siregar & Goo 2008: "Inflation Targeting Policy"
UNC	UNCTADstat
TI	Transparency International
WBBR	World Bank's Banking Regulation Survey
WDI	World Bank's World Development Indicators
WEO	IMF's World Economic Outlook (April 2010)
WGI	Worldwide Governance Indicators

\* / \*\* indicates that a log transformation was applied to the variable: \* represents  $\log_{10}(1+x)$  and \*\* represents  $\log_{10}(x)$

Fiscal Policy Soundness

- WEO, EIU, IFS, WDI, & EST: Public debt to GDP\*
- WEO, EIU, IFS, WDI, & EST: Change in Ratio of Public debt to GDP (Average over past 3 years)\*

Government Effectiveness

- PRS: Score for Bureaucratic Quality, as calculated by the WGI for their Government Effectiveness subindex
- GIBR: Average of 2 scores: Policy Consistency/Forward Planning and Bureaucracy, as calculated by the WGI, as above

Monetary Policy

- WEO & EV: Inflation (Year-End CPI) minus the Average Inflation in G7 Countries\*
- WEO & EV: Standard Deviation of Inflation (Year-End CPI) over past 3 years\*
- IMFS, IMF267, ITK, CBI, HBSB, PAC, IRAE, SG, RJEF, ROU, ERF, IAERTR, IMFFX, & EST: Is the country inflation targeting?

Corporate Governance

- WBBR: Sum of 2 questions: Must Banks Disclose Their Risk Management Procedures or Off-Balance Sheet Items to the Public?



## Resilience Index Variables and Sources (Sorted by Element)

- WBBR: Do Regulations Require Credit Ratings for Commercial Banks?
- DB: Credit Depth of Information Index
- FHFP: Sum of two Press Freedom Indicators: Economic Environment and Political Environment
- WBBR: Are the Following Bank Activities Rated? Bonds Issuance, Commercial Paper Issuance, Other activity (Certificates of Deposit, Pension & Mutual Funds, Insurance Companies, Financial Guarantees, etc)

### Legal

- GIBR: Red Tape & Bureaucratic Corruption score, as calculated by WGI for their Corruption sub-index
- GIBR: Average of 2 scores: Business Legislation & Tax Effectiveness, as calculated by WGI for their Regulatory Quality sub-index
- GIBR: Average of 2 scores: Judicial Independence & Business Crime Risk, as calculated by WGI for their Rule of Law sub-index
- CIRI: Independence of Judiciary
- DB: Legal Rights of Borrowers and Lenders Index
- HF: Property Rights
- FIEFW: Legal Structure and Security of Property Rights
- DB: Sum of two Doing Business Indicators: Shareholder Suits & Director Liability

### Policy Transparency

- TI: Corruption Perceptions Index
- FHFP: Laws & Regulations Influence on Media Content
- IMFDSBB: Does the country subscribe to the IMF's Special or General Data Dissemination Standards

### Asset Quality

- BKSC, GFSR, & WDI: Bank Nonperforming Loans to Total Loans\*
- BKSC: Impaired Loans to Equity\*
- BKSC, GFSR, & WDI: Bank Nonperforming Loans Net of Provisions to Total Loans\* (floor set at -20%)

### Capital Base

- WBBR: Does accrued, though unpaid, interest/principal enter the income statement while the loan is still non-performing?
- BKSC: Equity to Total Assets\*
- BKSC: Equity to Net Loans\*
- BKSC: Equity to Liabilities\*
- BKSC: Equity to Deposits and Short-Term Funding\*
- BKSC: Tier One Ratio (Aggregate)\*

### Income Risk

- FSD, GFSR, & BKSC: Bank Return on Assets
- BKSC: Pre-Tax Operating Income to Average Assets\*
- BKSC: Other Operating Income to Average Assets\*
- BKSC: Net Interest Revenue to Average Assets\*
- BKSC: Interest Margin to Gross Income\*
- FSD & BKSC: Net Interest Margin (Accounting value of bank's net interest revenue as a share of its interest-bearing assets)\*

### Export Diversity

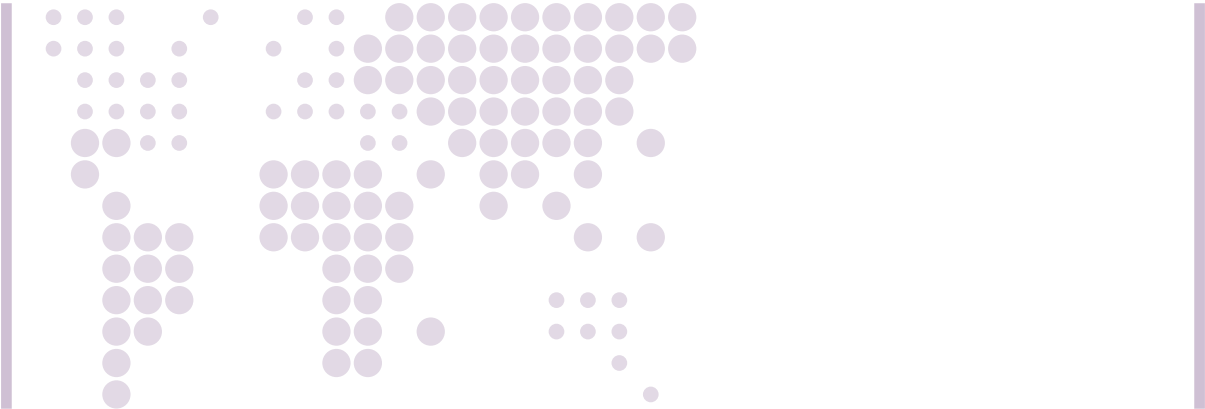
- DOT & EST: Coefficient of Variation of Export Shares by Destination\*\*
- UNC: Merchandise Exports: Concentration Index

### Export Independence:

- IFS & WEO: Exports to GDP\*

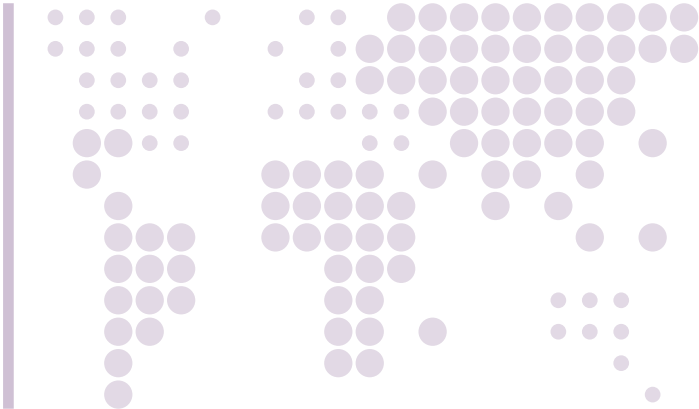
### External Robustness

- WEO: Current Account Balance to GDP\*
- BIS, IFS, & EST: Reserves to Short-Term Debt\*\*
- IFS & EIU: Import Cover: Total Reserves Minus Gold to Months of Imports\*\*
- IMFFX, WEO: Measure of Exchange Rate Regime's Ability to Weather Crisis (Exchange Rate Regime adjusted for Reserves)



Resilience Index Variables and Sources (Sorted by Element)
<b>Private Debt</b> <ul style="list-style-type: none"><li>BIS &amp; WEO: Change Over 3 Years in the Ratio of Total Foreign Claims of BIS-Reporting Banks to GDP* (floor set at -20%)</li><li>BIS &amp; WEO: Total Foreign Claims of BIS-Reporting Banks to GDP*</li><li>BIS, IFS, &amp; EST: Change Over 2 Years in the Ratio of Loans from BIS-Reporting Banks to Private Credit by Domestic Deposit Money Banks* (floor of -20%)</li><li>IFS, WEO, &amp; EST: Private Credit by Deposit Money Banks to GDP*</li><li>IFS, WEO, &amp; EST: Change over 3 years of the Ratio of Private Credit by Deposit Money Banks to GDP*</li></ul>
<b>Reserves</b> <ul style="list-style-type: none"><li>IFS, WEO, &amp; EIU: Total Reserves Minus Gold to GDP*</li><li>IFS &amp; WEO: Net International Investment Position to GDP*</li></ul>
<p>Note: A two-year moving average was applied to all Asset Quality, Capital Base, and Income Risk variables. A three-year moving average was applied to the first and third Private External Debt variables.</p> <p>Note: The types of financial firms included in the Bankscope search criteria used for all Bankscope data are Commercial Banks, Savings Banks, Cooperative Banks, Real Estate and Mortgage Banks, Islamic Banks, Other Non-Banking Credit Institutions, Micro-Financing Institutions, and Credit Card, Factoring, and Leasing Finance Companies.</p>





## Appendix 2

### List of Countries

**Advanced countries:** Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States

**Central & Eastern Europe:** Albania, Bosnia & Herzegovina, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Turkey

**Commonwealth of Independent States:** Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Moldova, Russia, Ukraine

**Developing Asia:** Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam

**Middle East and North Africa:** Algeria, Bahrain, Egypt, Jordan, Lebanon, Morocco, Saudi Arabia, Tunisia, United Arab Emirates

**Sub-Saharan Africa:** Botswana, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Mauritius, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia

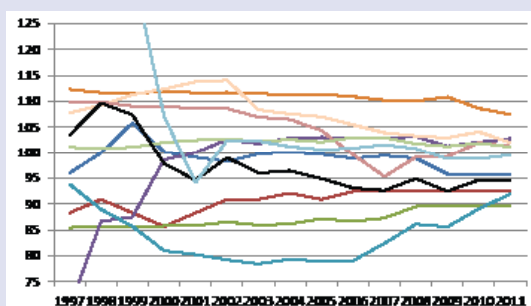
**Western Hemisphere:** Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Mexico, Panama, Peru, Trinidad and Tobago, Uruguay, Venezuela



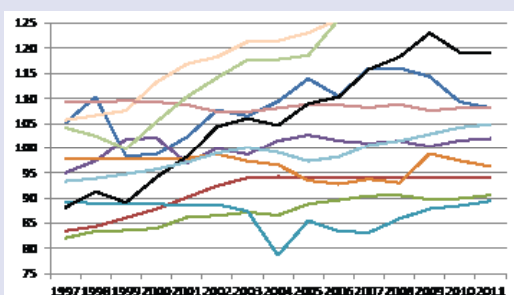
## Resilience Index and Element Scores by Country over Time

**Resilience index**  
**Fiscal policy**  
**Government effectiveness**  
**Governance**  
**Monetary policy**  
**Export diversity**  
**Export independence**  
**External robustness**  
**Private debt**  
**Reserves**  
**Bank soundness**

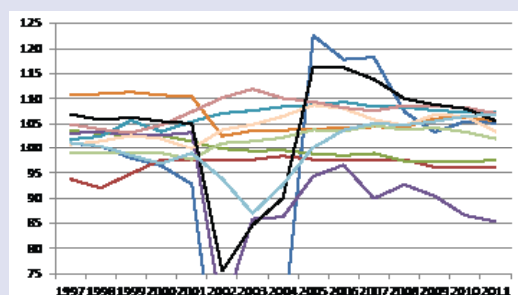
## Albania



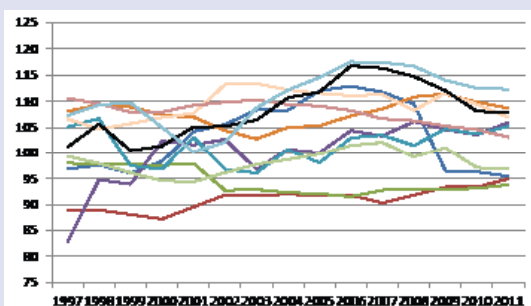
## Algeria



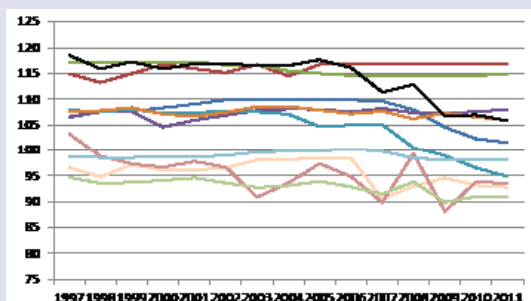
## Argentina



## Armenia

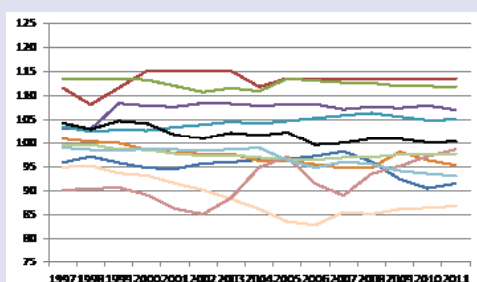


## Australia

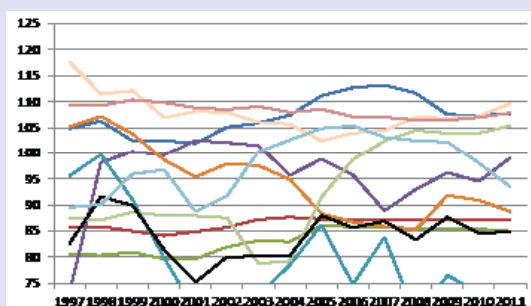




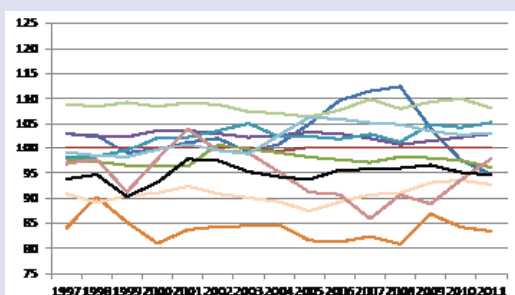
## Austria



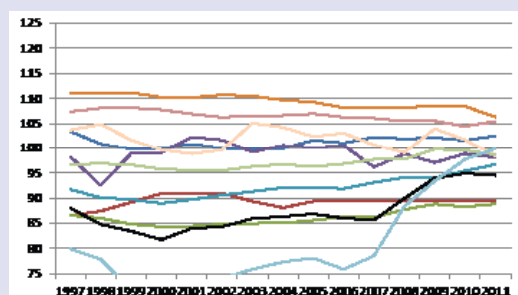
## Azerbaijan



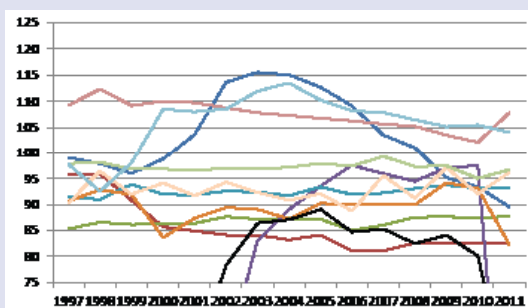
## Bahrain



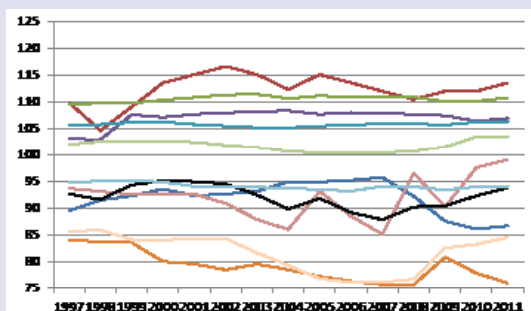
## Bangladesh

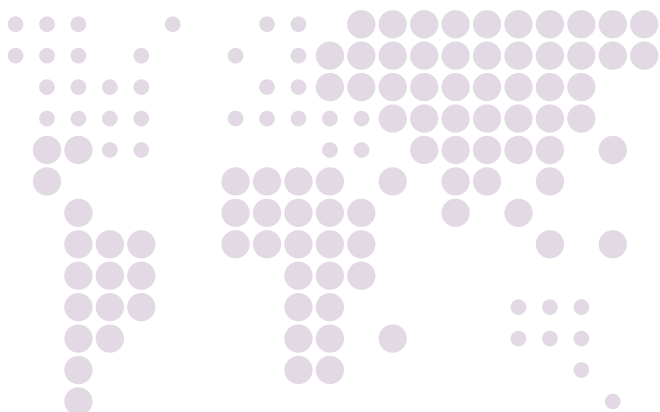


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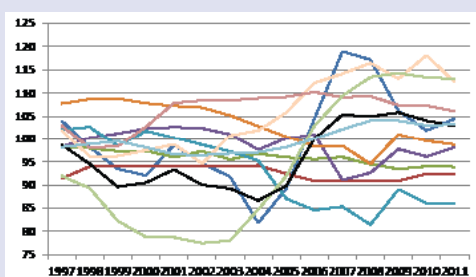


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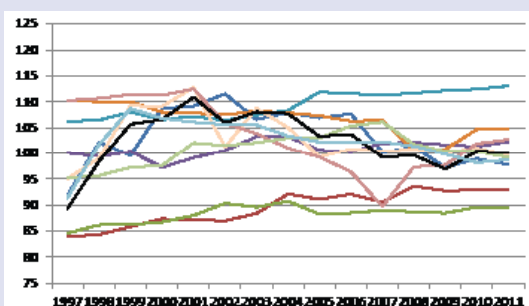




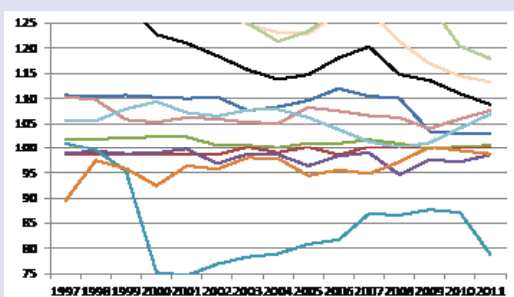
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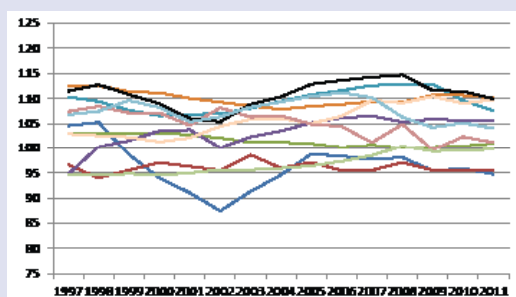
### Bosnia & Herzegovina



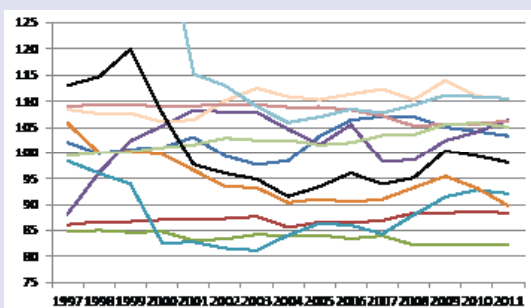
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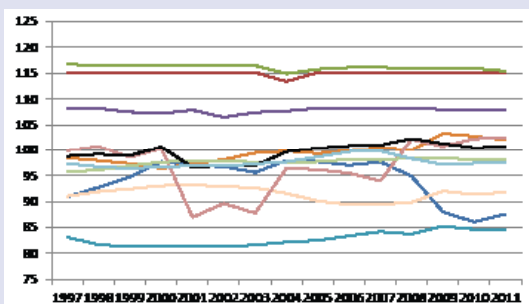
### Brazil



### Cambodia

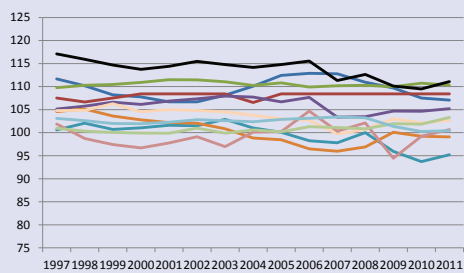


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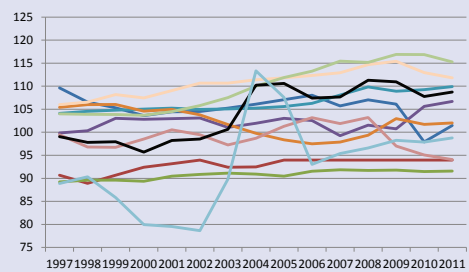




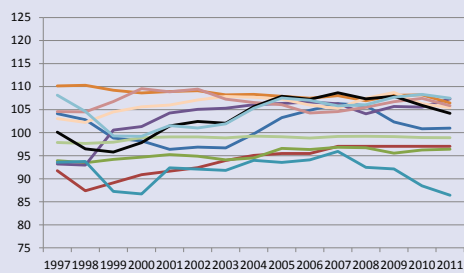
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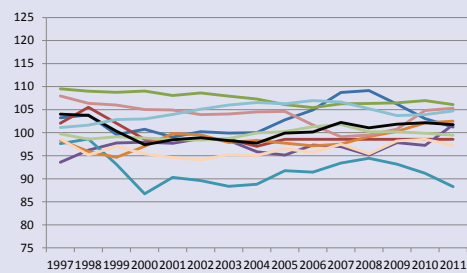
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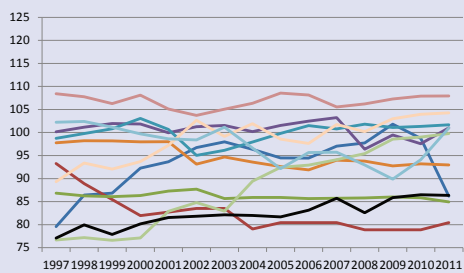
## Colombia



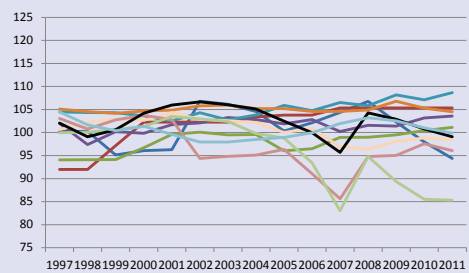
## Costa Rica



## Côte d'Ivoire

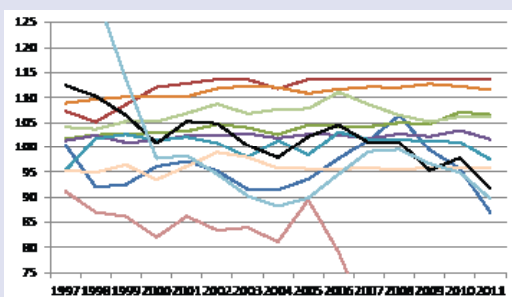


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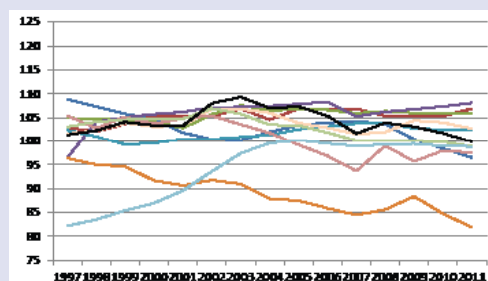




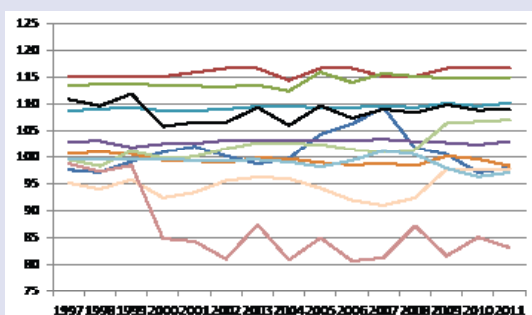
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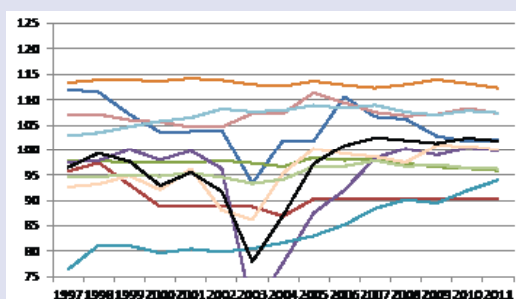
### Czech Republic



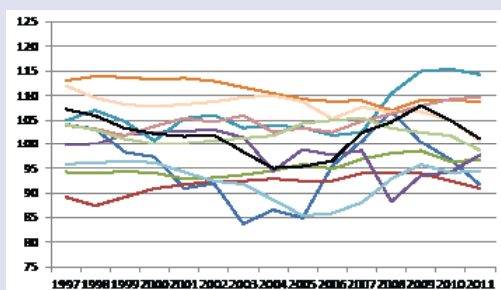
### Denmark



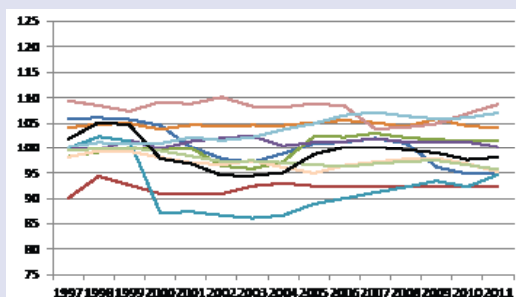
### Dominican Republic

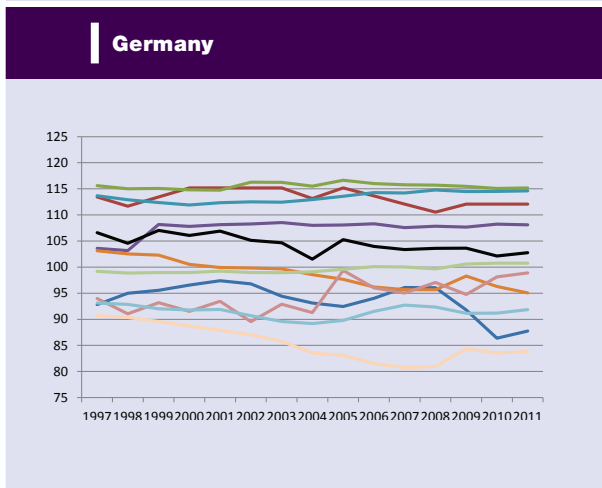
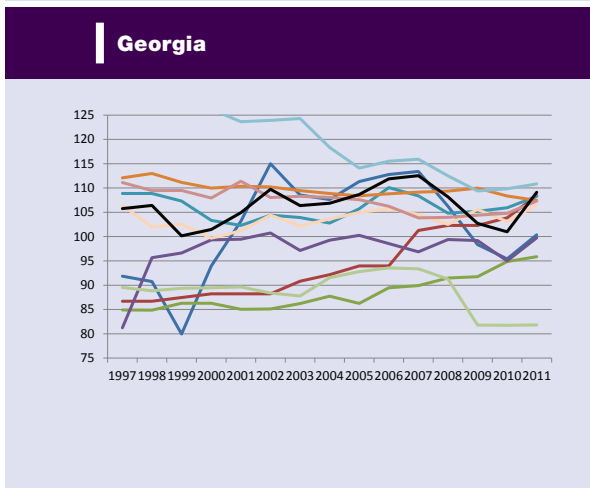
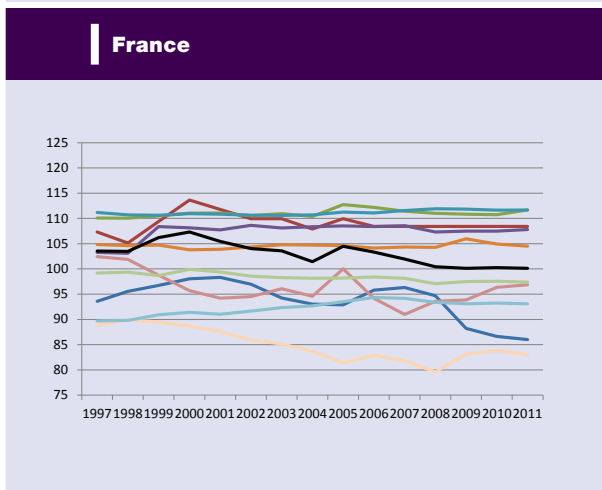
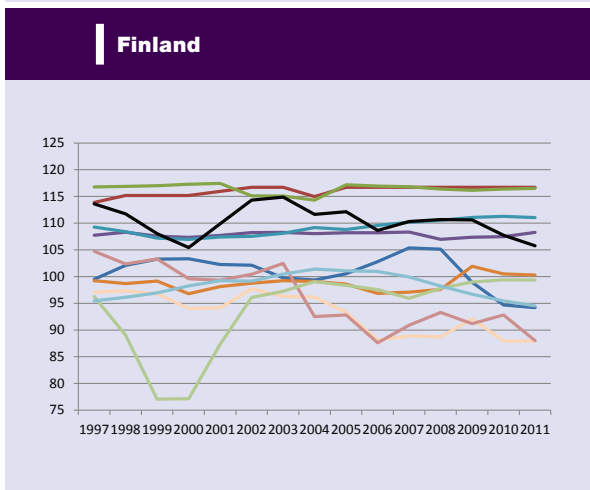
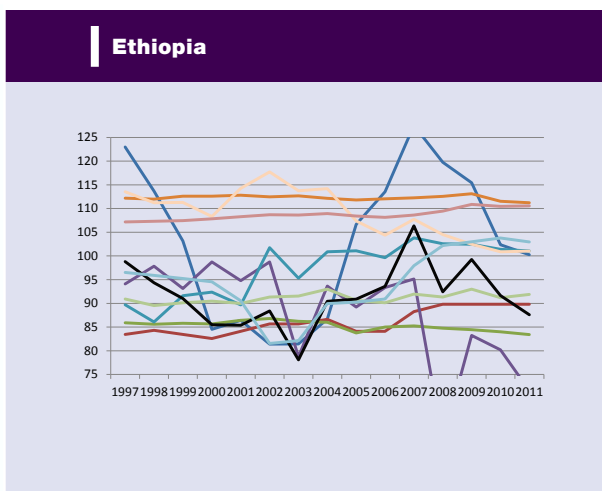
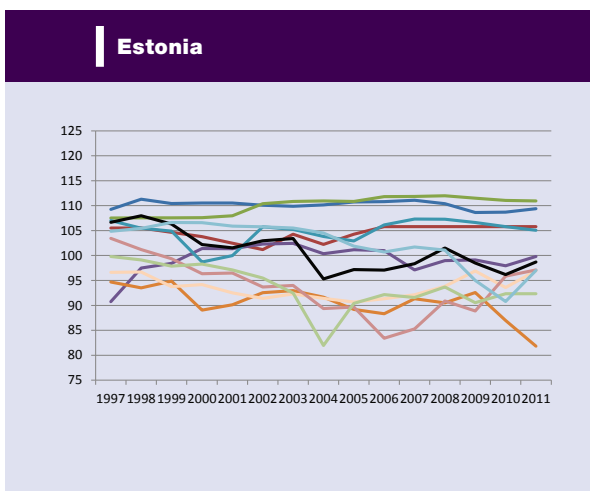
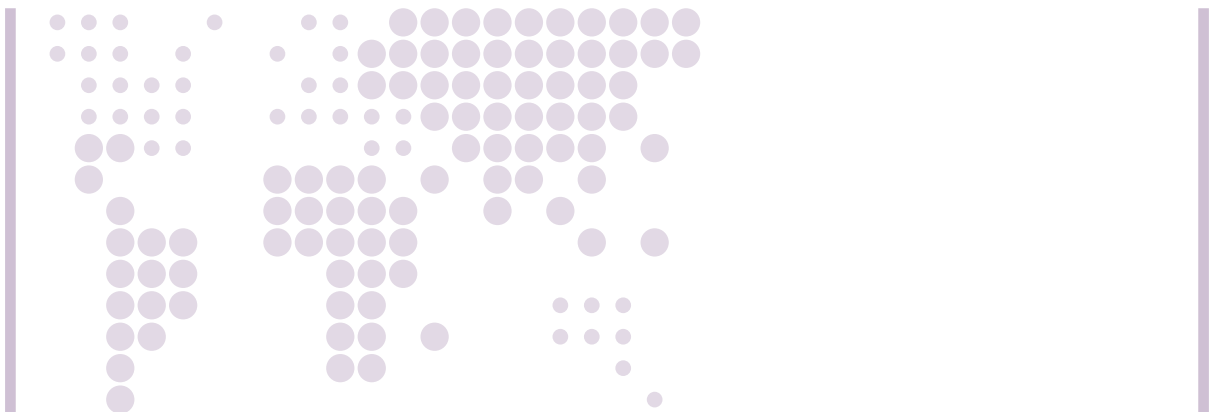


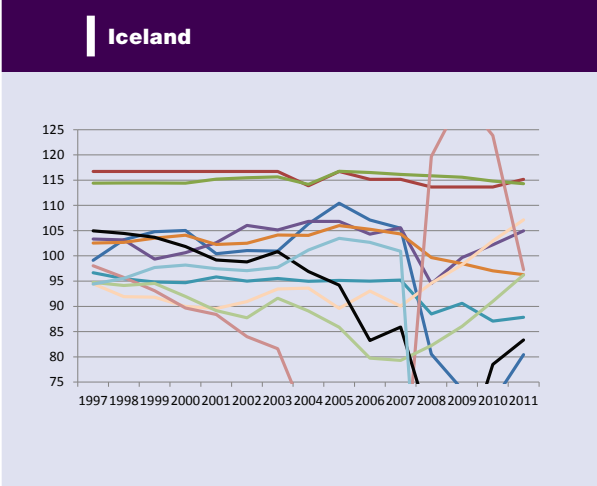
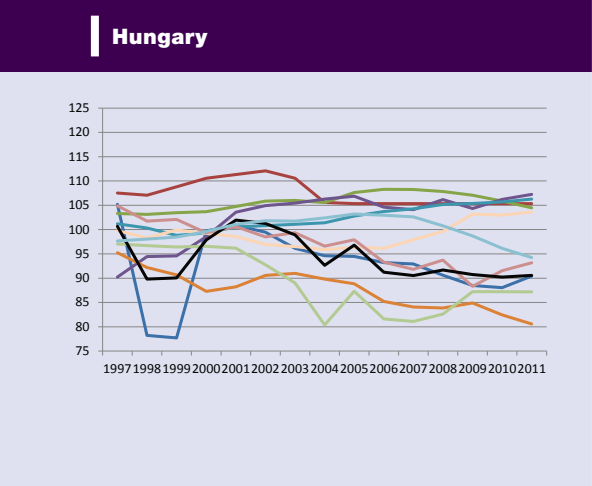
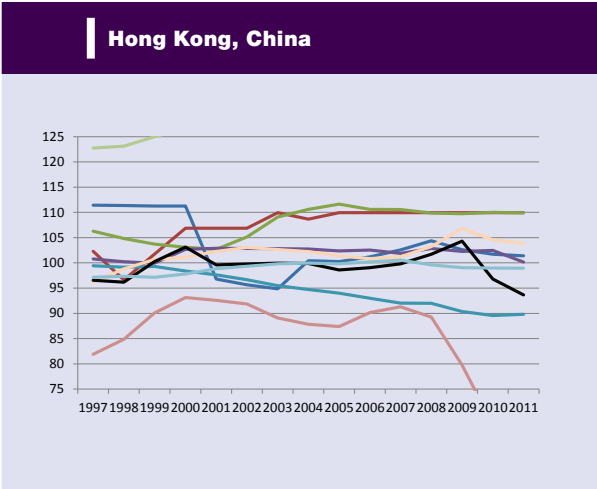
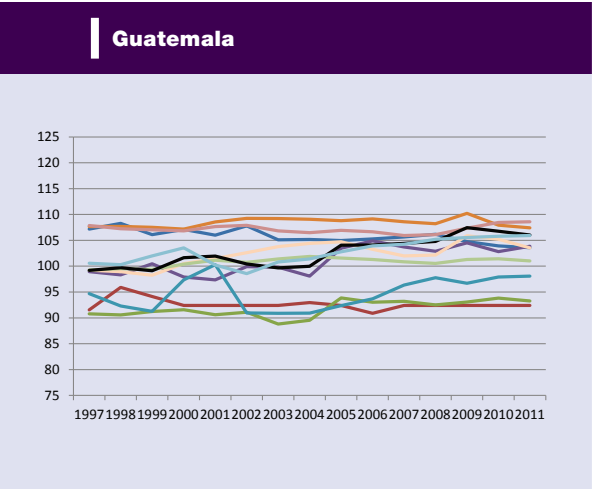
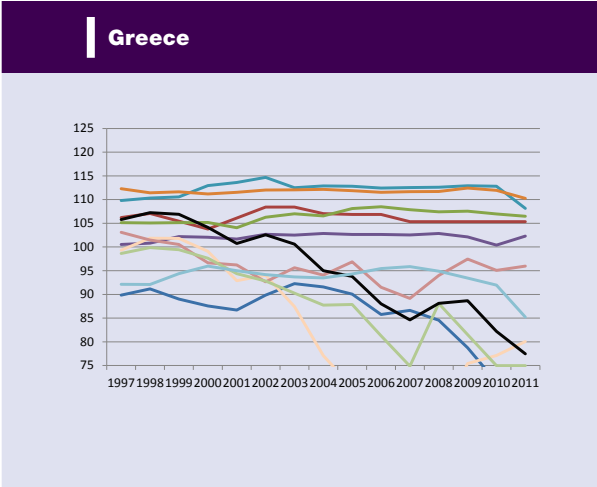
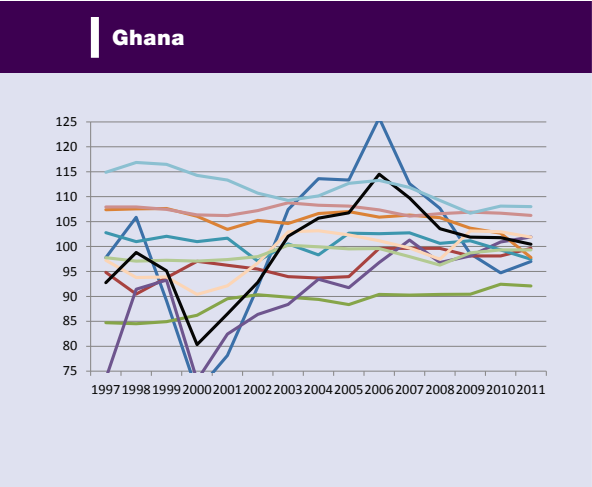
### Egypt



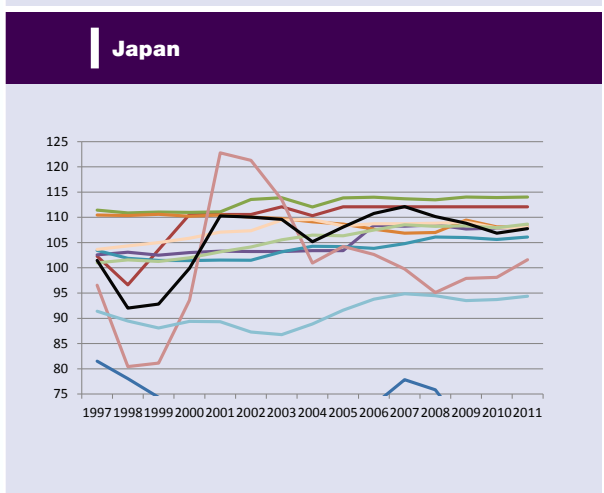
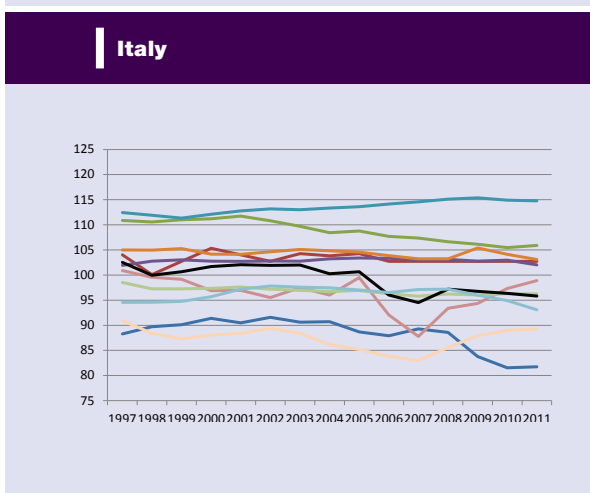
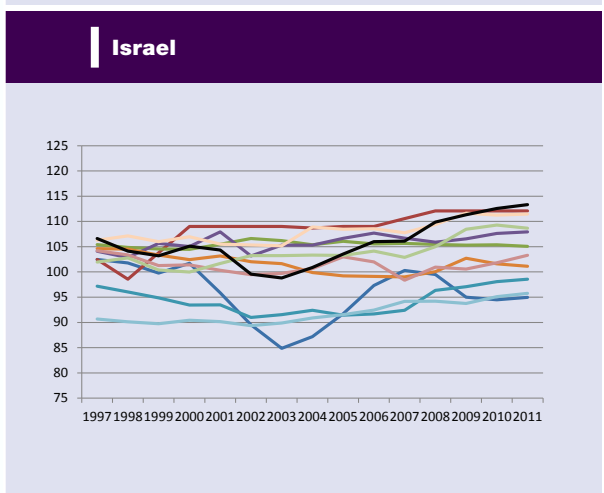
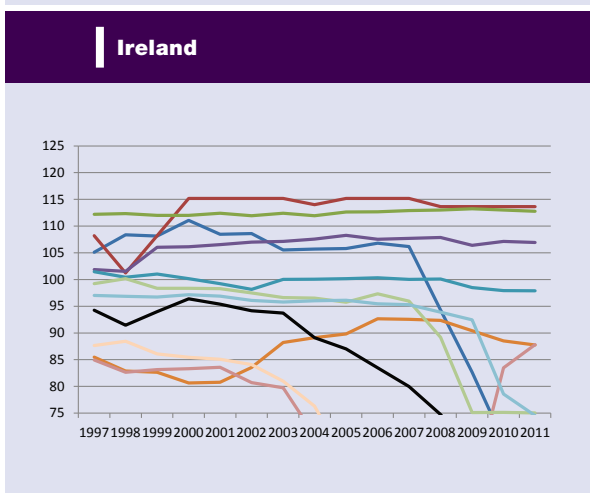
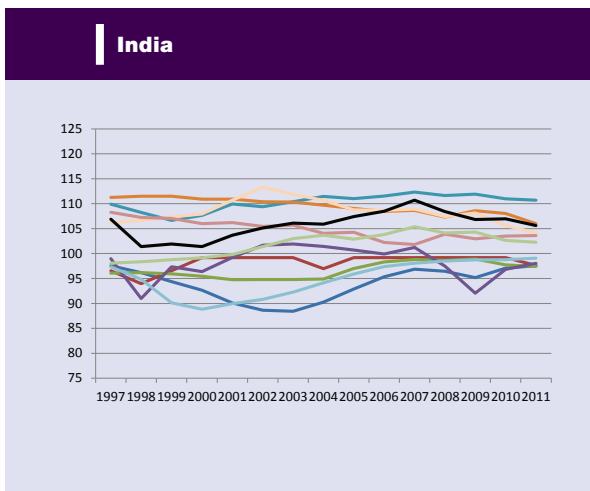
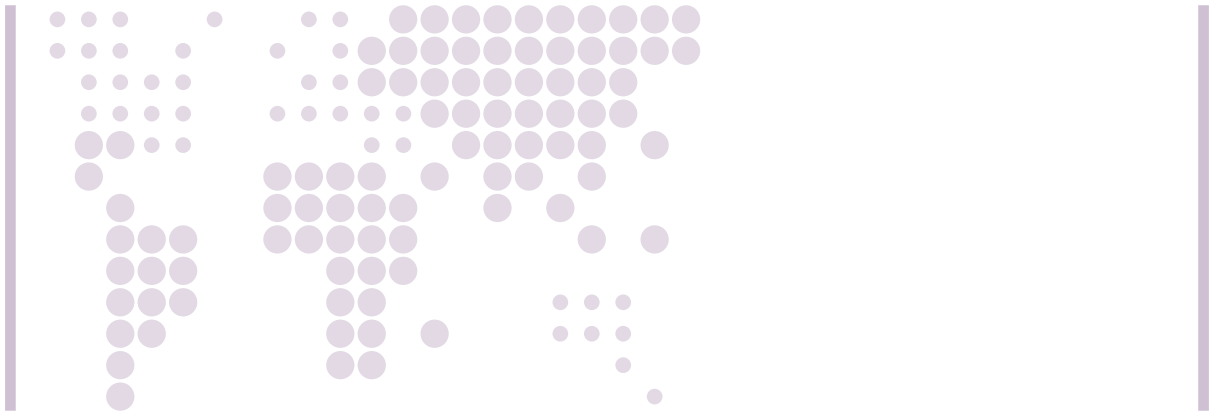
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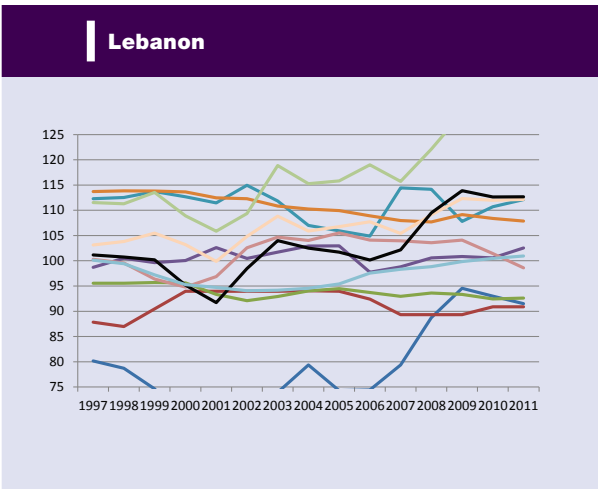
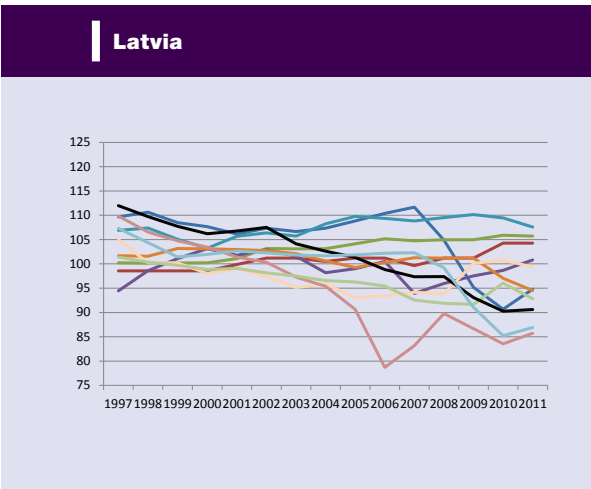
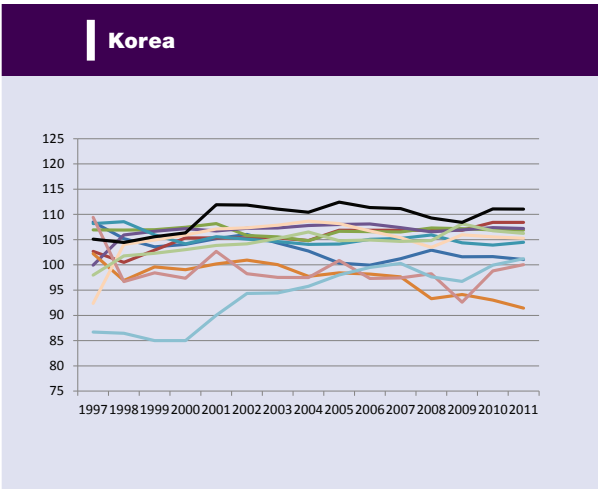
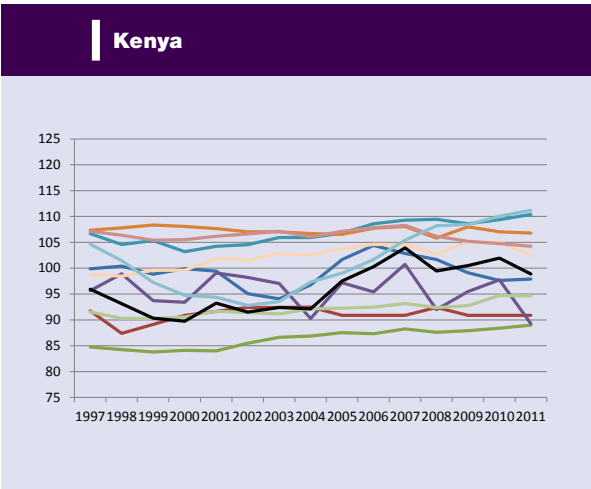
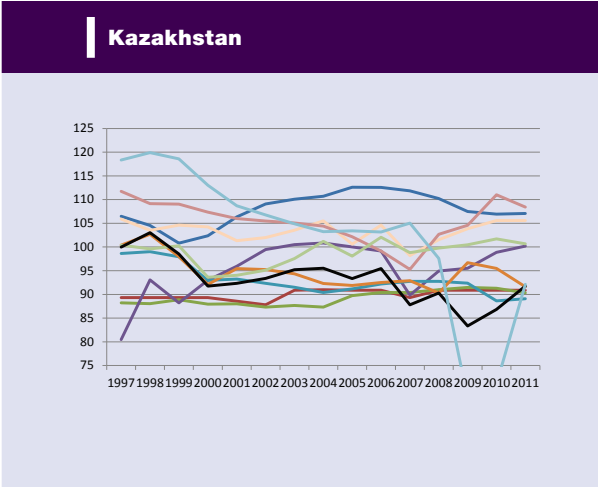
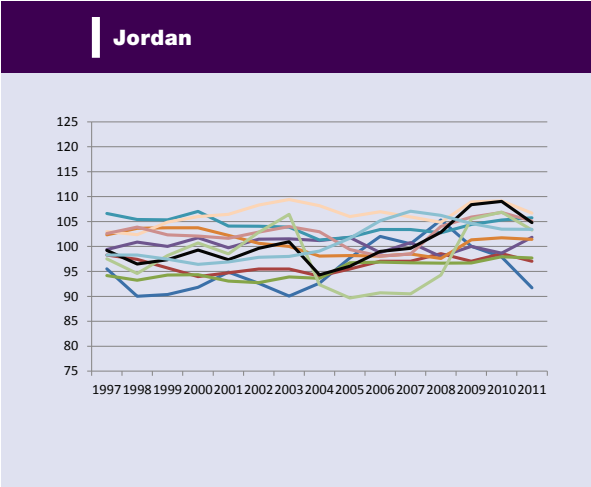






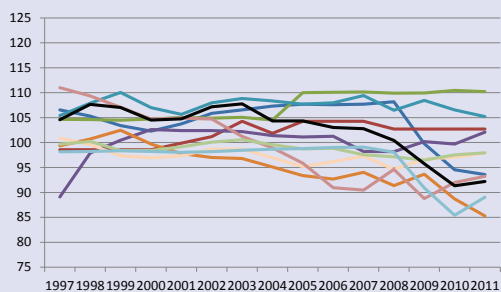




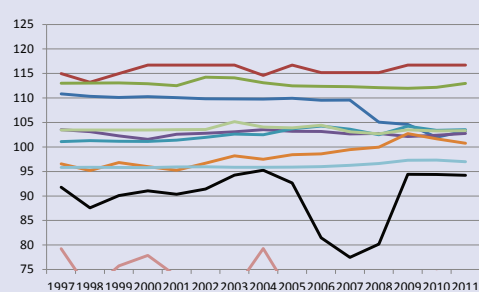




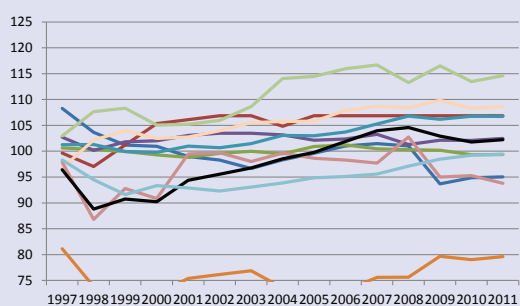
## Lithuania



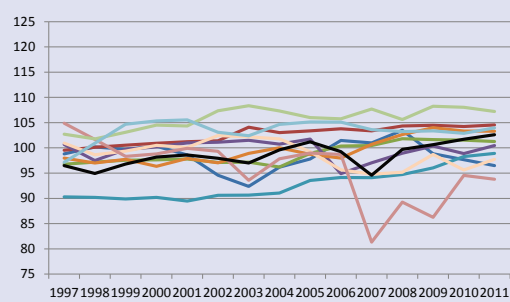
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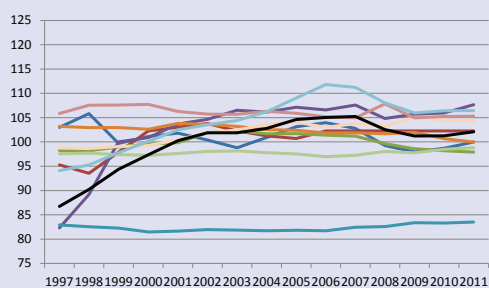
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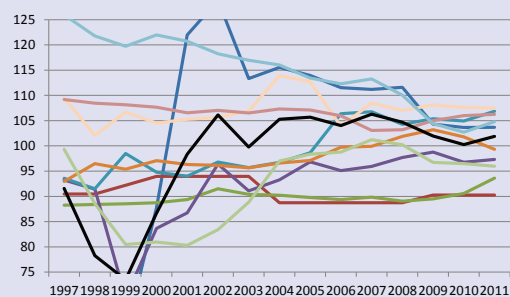
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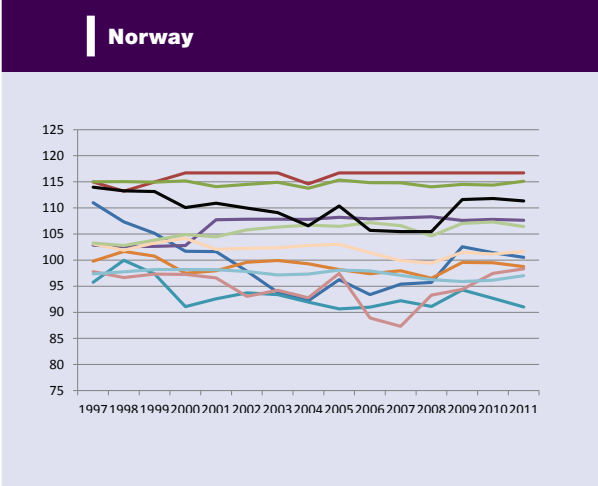
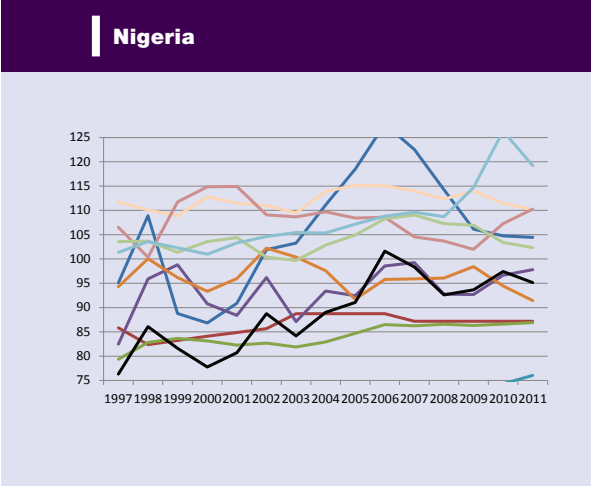
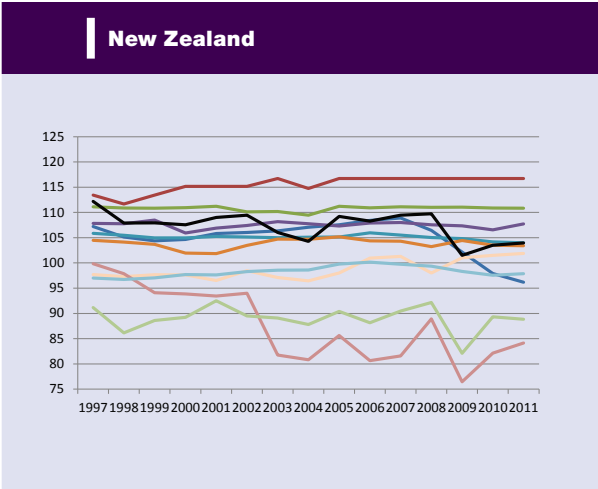
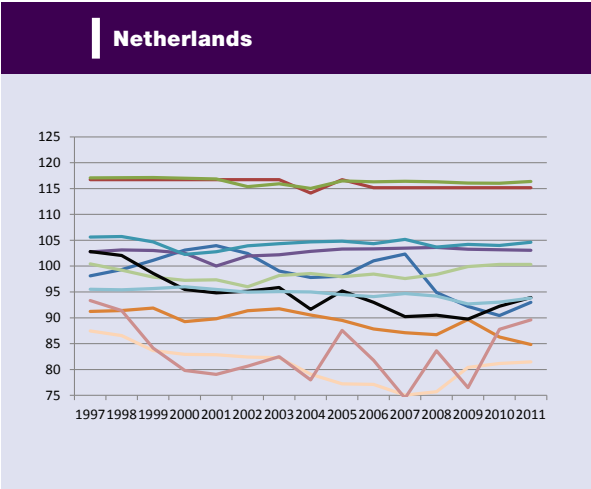
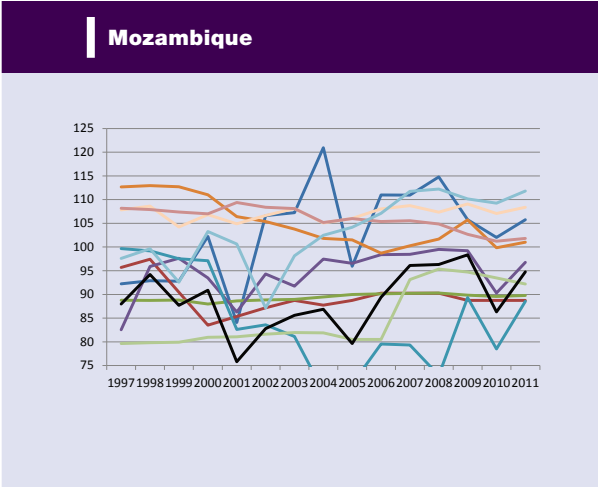
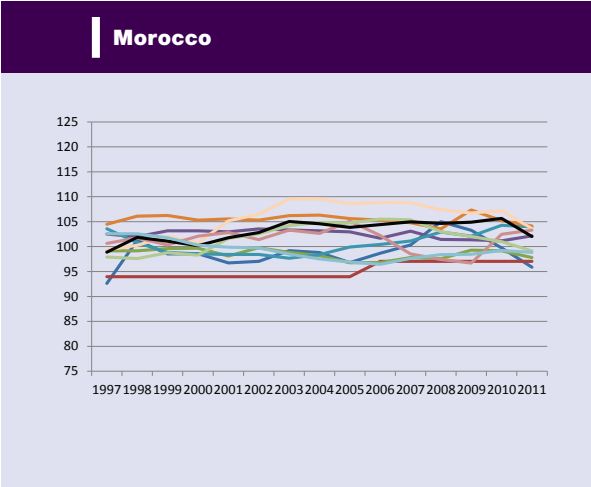
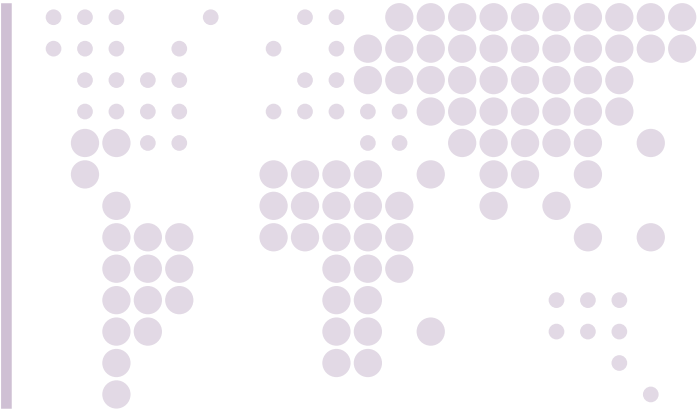


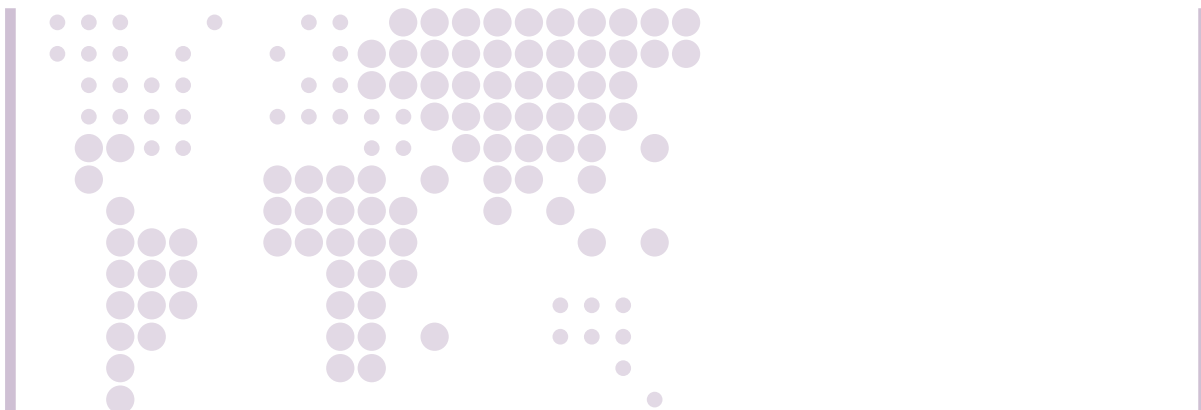
## Mexico



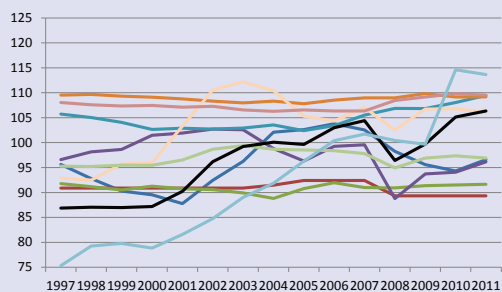
## Moldova



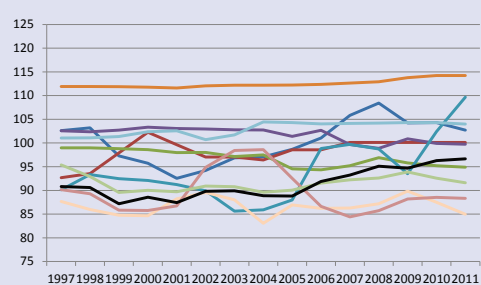




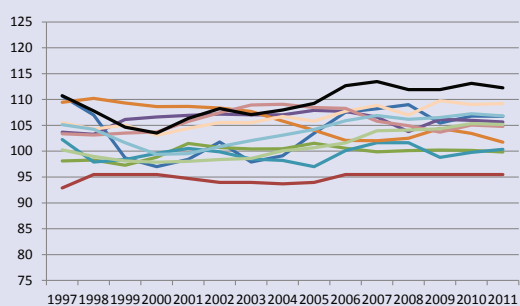
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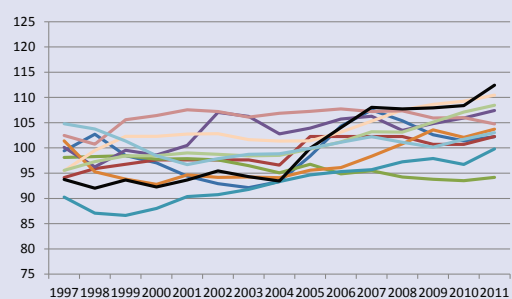
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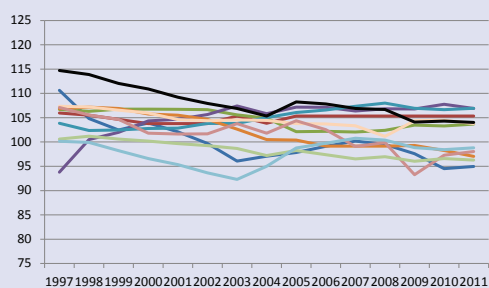
## Peru



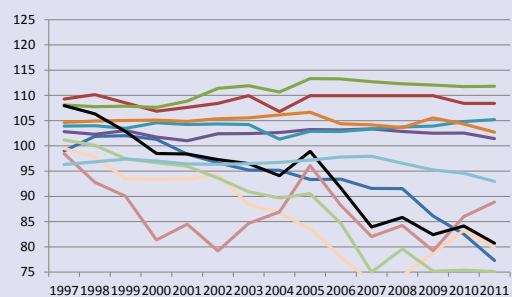
## Philippines



## Poland

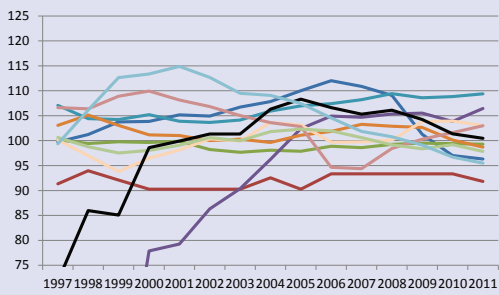


## Portugal

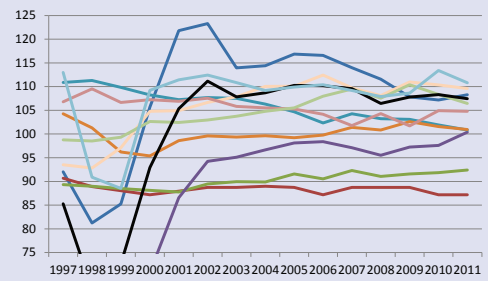




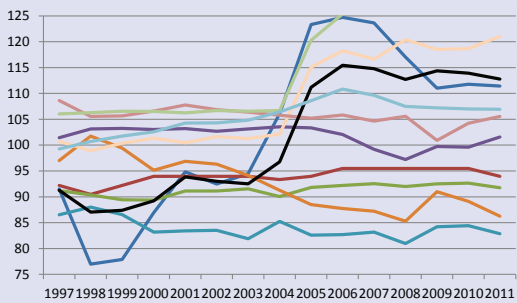
### Romania



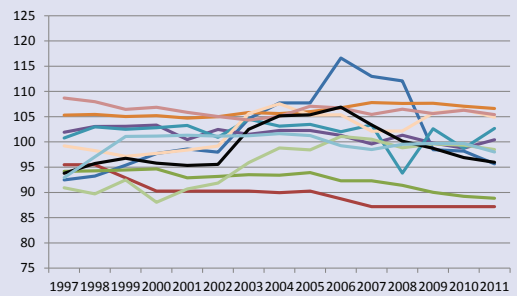
### Russia



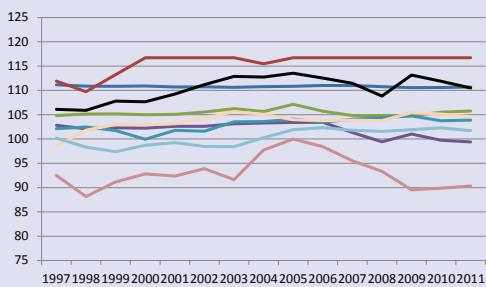
### Saudi Arabia



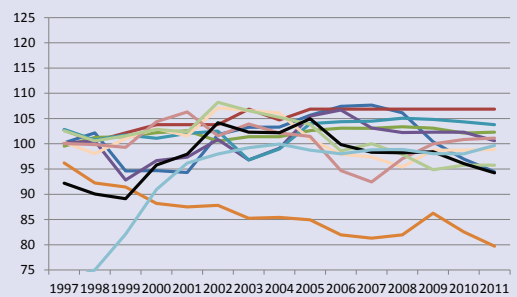
### Senegal



### Singapore

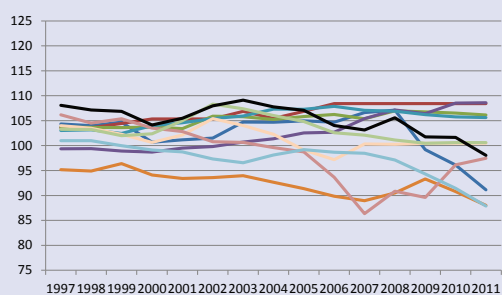


### Slovak Republic

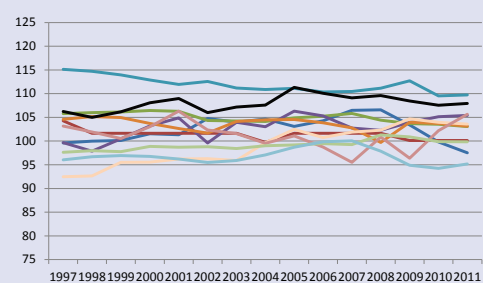




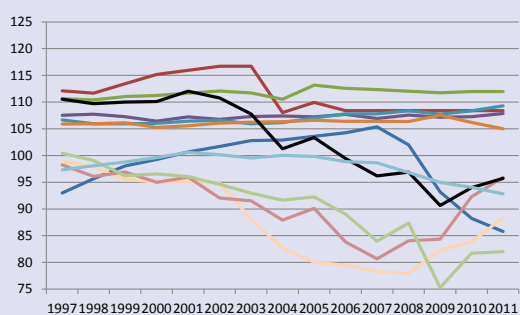
## Slovenia



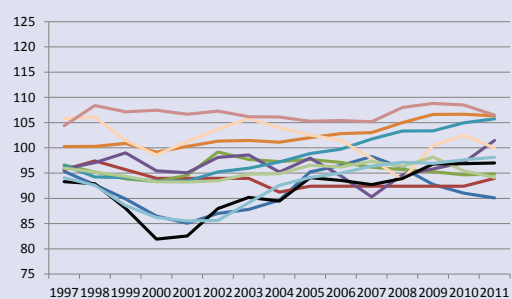
## South Africa



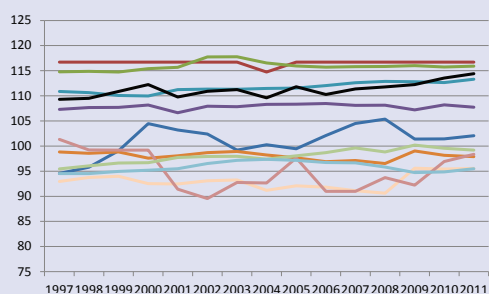
## Spain



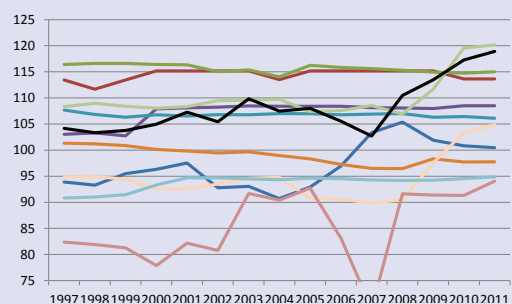
## Sri Lanka

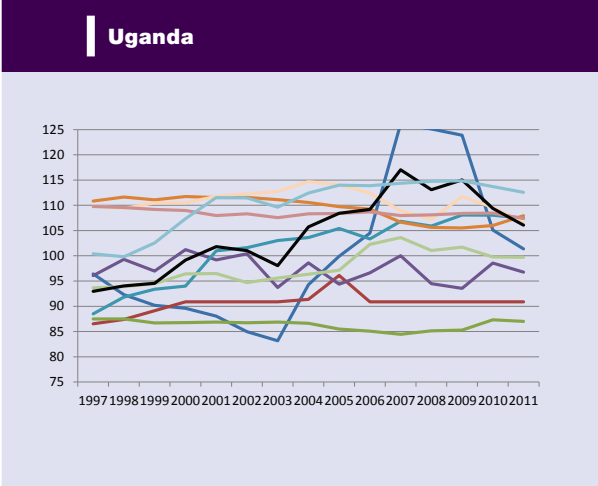
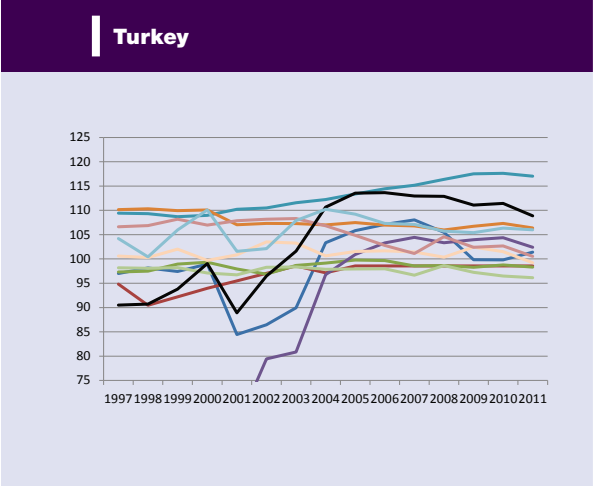
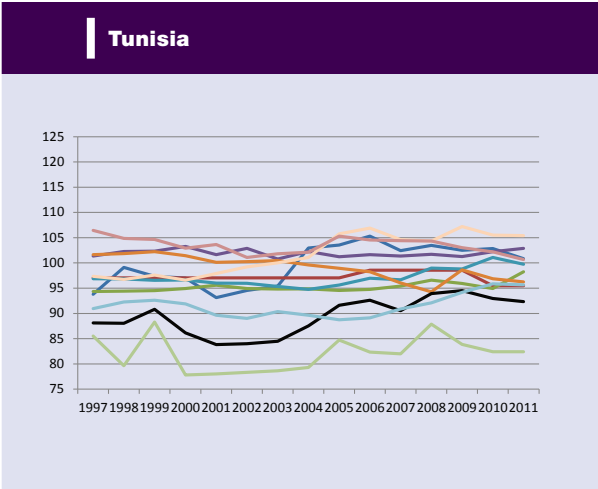
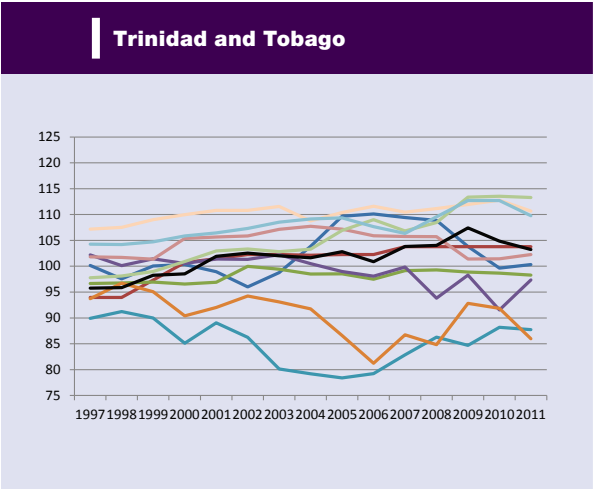
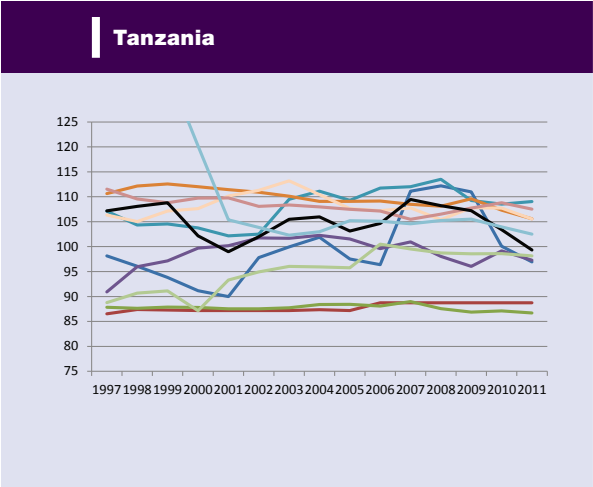
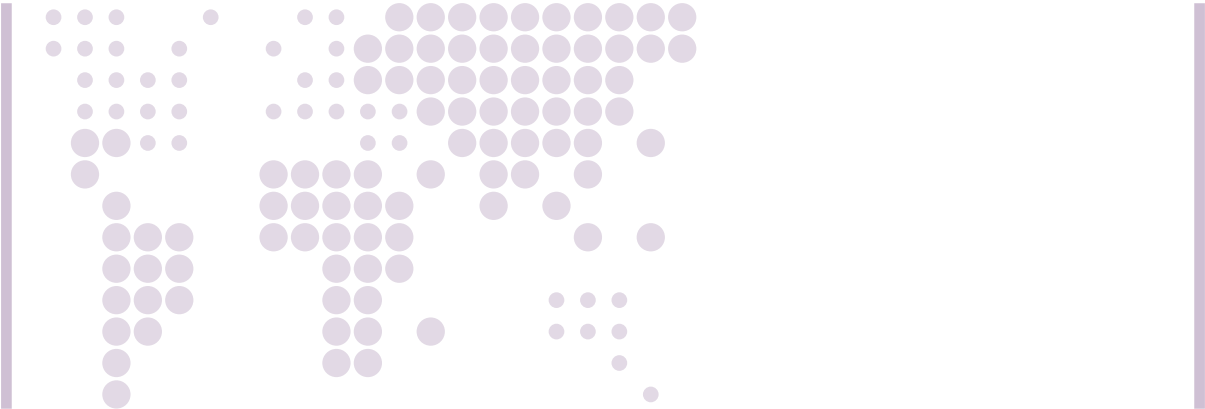


## Sweden



## Switzerland

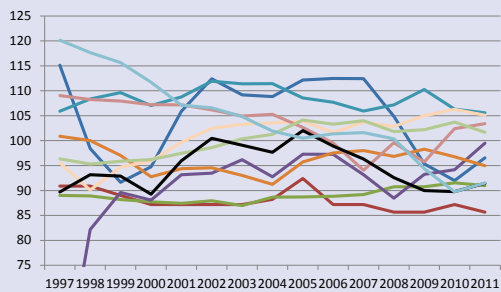




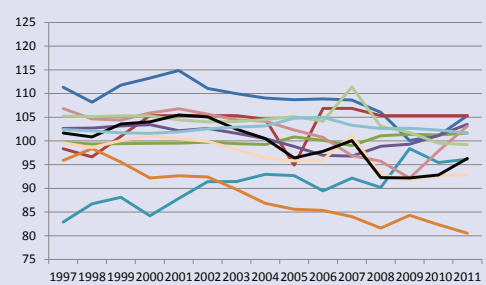




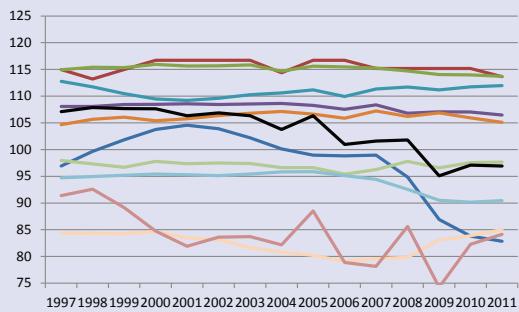
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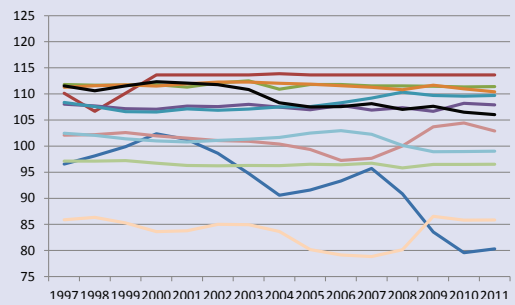
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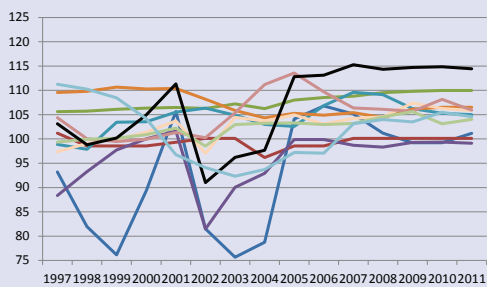
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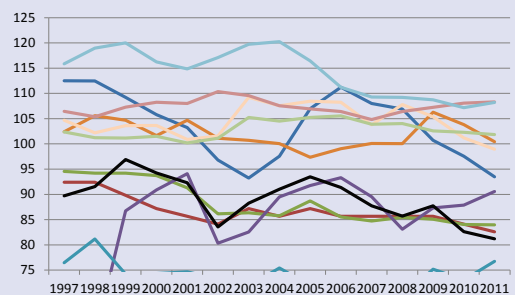
### United States

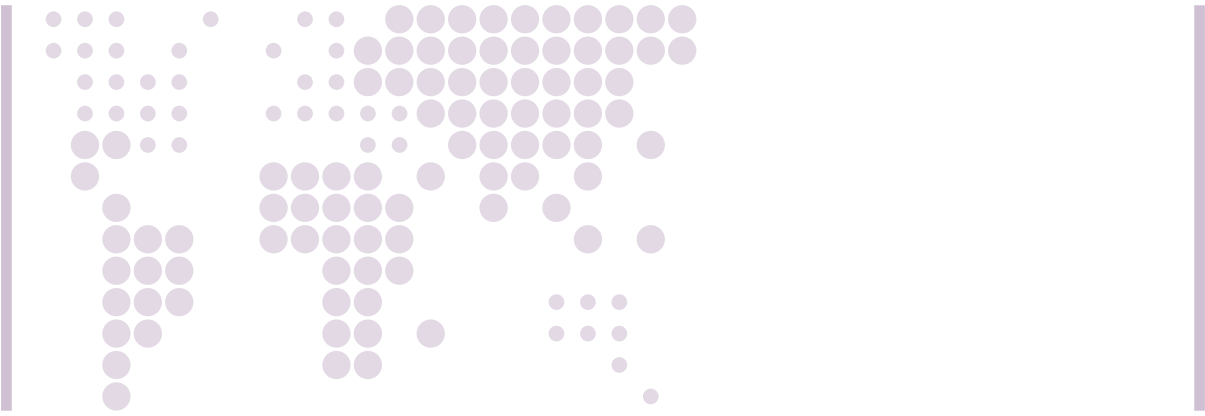


### Uruguay



### Venezuela





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