# HOW POLICY ACTIONS AFFECT SHORT-TERM POST-CRISIS RECOVERY?*

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**ABSTRACT**

This paper investigates which factors determine how countries recover after crises, on a sample of 47 financial, currency and sovereign debt crises in 22 countries from the last thirty years, including the recent Great Recession. Several findings emerge. First, the most important factors which are associated with higher post-crisis growth are expansionary monetary and fiscal policy, exchange rate depreciation and prudent banking regulation. Second, the Great Recession does not seem to differ from the other crises in terms of how the policy actions affect the recovery, and the recovery after it is slower than after previous crises due to the global nature of this crisis, not due to the weaker policy support. Third, the fiscal multiplier does not seem to be smaller during episodes of high public debt, and public debt does not seem to affect the speed of recovery through channels other than the government spending, which can be consdered as an argument in favour of pursuing expansionary fiscal policy during crises even in highly leveraged countries.

**JEL classification:** E52, E62, E63, G01

**Keywords:** crises, recovery, monetary policy, fiscal policy, banking regulation

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# I. Introduction

Although no country was spared from the recent Great Recession, different countries were affected by it in different ways. Many studies investigated which factors determined these differences - Berglof et al. (2009), Berkmen et al. (2009), Giannone et al. (2010), Lane and Milesi-Ferretti (2009), Rose and Spiegel (2009), Blanchard et al. (2010), IMF (2010), Cecchetti et al. (2011), Crespo Cuaresma and Feldkircher (2012). Now, in the aftermath of the crisis, it is evident that different countries are recovering differently. While policy makers seem to be well aware of these differences in the speed of recovery (see, for instance IMF, 2011), there is a lack of research on the factors that explain them.

On the other hand, several existing studies have investigated which factors have affected how countries have been recovering from some previous crises - Park and Lee (2003), Hong and Tornell (2005) and Abiad et al. (2009). However, these studies fail to provide a clear answer to the question about the role of the policy decisions for the recovery.

The present study will try to fill in these gaps. It will investigate which factors affect short-term GDP growth after economic crises, focusing on the policy actions, i.e. on the monetary policy, fiscal policy and banking regulation and supervision policy, and on the role of the public debt. It will analyse both the 2008 crisis and several other crises that happened in the last three decades all over the world. Pooling the recent global crisis together with some smaller crises from the past will enable us to test whether the recent crisis is different from the previous crises in terms of how countries recover. These findings can be linked to the present debate in the literature on the uniqueness of the Great Recession (for instance, Reinhart and Rogoff, 2009b, and Laeven and Valencia, 2010, argue that there are many similarities between the 2008 crisis and the previous crises, in terms of the causes and the policy responses, while Imbs, 2010, claims that the 2008 crisis was rather unique).

The empirical approach that will be used is standard in the empirical crises literature - post-crisis GDP growth will be regressed on a set of explanatory variables that measure monetary policy, fiscal policy, regulatory policy, and other factors that may affect short-term GDP. From econometric point of view, this approach poses two problems. The first one is that many factors affect cross-country growth rates (recall all the literature on the empirics of growth), so that omission of some of these factors can bias the results. The second one is the problem of reverse causality - output growth can affect some of the explanatory variables, as well. For instance, if policy reaction and output are measured contemporaneously, positive coefficient on the policy variable can be obtained because policy really

affects output growth positively, but also because higher output growth allows more supportive policy. Reverse causality, again, can lead to wrong inference.

Careful modelling strategy will help us alleviate, if not completely avoid these problems. Regarding the omitted variables problem, the dependent variable will be defined as growth after the crisis, *minus average long-run growth rate.* In this way the unobserved country heterogeneity will be wiped out, so that the remaining variability can be attributed to the policy actions. Certain variables which can affect short-run growth (like capital inflows) will not be removed by this de-meaning. Because of that, a set of control variables, measuring post-crisis exports, FDI and portfolio investment flows, and certain structural reforms, will be included as well.

Regarding the second problem, the timing of our variables will help us avoid reverse causality. Namely, the dependent variable, output growth, will be measured *after* the crises, while the policy variables will be measured *during or before* the crises. Hence, it is unlikely that economic policies during the crisis are more supportive because output growth after crisis allows them to be, simply because policy makers during crises do not anticipate that output will start growing soon. The Euro Area experience during the 2008 crisis suggests that this is likely to be the case: the GDP of the Euro Area started growing (on a quarterly basis) in the third quarter of 2009; on the other hand, the European Central Bank, in the second quarter of 2009 (the last quarter before GDP started growing), expected GDP to start increasing one year later, i.e. in mid-2010 (see ECB, 2009, p. 2).

Another form of endogeneity is also possible in the analysis - the one that emerges from the expectations. For instance, expectations that economic activity will be subdued can indeed result in slow output growth, and will, at the same time, result in expansionary policy. In our case, however, even if present, this channel will push the coefficients in the opposite direction of the true effect (because expectations are positively correlated with future economic outcomes, and negatively correlated with policy support), which means that the true effects of the policy variables can only be higher than the estimated. Unavailability of data on policy makers' expectations does not allow us to control for this effect. However, when some proxy variables for policy makers' expectations are included (the projected GDP growth for the next year, from the International Monetary Fund's World Economic Outlook), the results remain roughly unchanged, yielding further support to our findings.

The most important findings can be summarised as follows. First, all the three policy variables appear to be significant determinants of the post-crisis recovery - more supportive monetary and fiscal policies during the crisis and more prudent banking regulation and supervision before the crisis, are

associated with higher GDP growth after the crisis. Second, the 2008 crisis does not seem to be different from the previous crisis in terms of how the policy response affects the recovery. Therefore, the slower recovery after the 2008 crisis can be linked to the global nature of this crisis, not to the policy response. Finally, the effect of the fiscal policy on the recovery does not appear weaker in highly-indebted countries, and government debt does not appear to affect the recovery *per se,* but only through the government spending. That implies that fiscal policy during crises should be expansionary even in highly-indebted countries, in order to ensure solid recovery.

The paper is structured as follows: section II overviews the existing related literature, section III presents the analysed crises and describes how crises and recoveries are defined, section IV presents the empirical analysis and section IV concludes.

## II. Related literature

Rich literature investigates economic growth after crises. Some of the papers include Barro (2001), Cerra and Saxena (2008), Reinhart and Rogoff (2009), Reinhart and Reinhart (2010), Lopez-Salido and Nelson (2010), Howard et al. (2011), Bordo and Haubrich (2012). However, these studies investigate mainly whether post-crisis growth is higher when the crisis is more severe, and whether crises have permanent or transitory effects. On the other hand, very few papers investigate *determinants* of post-crisis recoveries.

Park and Lee (2003) analyse which factors influence *short-term* output growth after *currency* crises, on a sample of 176 crisis episodes between 1970-1995. They claim to find that depreciation of the exchange rate and supportive monetary and fiscal policy help post-crisis recovery. Still, their study may have endogeneity problems, as output growth and policy variables are measured over the same period, which may imply that their findings can be treated only as indicative.

Similarly, Hong and Tornell (2005) investigate how countries recover from *currency* crises, on a sample of around 100 countries. They regress output growth after crises on various variables, including credit growth and reserve adequacy before the crisis (as initial conditions) and credit growth and government deficit after the crisis (as policy variables). They find that credit expansion and reserve inadequacy before the crisis depress growth after the crisis, but fail to find any clear relationship between policy variables and recovery. As the very authors point out, their policy variables can be criticised for being endogenous, since they are included with values contemporaneous with the

dependent variable.

On a sample of 88 *banking* crises from the last four decades, Abiad et al. (2009) analyse *medium-term* behaviour of output after crises. Amongst other things, they investigate which factors are correlated with higher post-crisis medium-term growth, using both Ordinary Least Squares and Bayesian Model Averaging. They find evidence that expansionary fiscal policy (measured through real government consumption) is correlated with higher growth, but only limited evidence about the role of monetary policy (measured through the interest rate and the real exchange rate depreciation). As the authors themselves point out, the way they define their variables does not eliminate the endogeneity problem - they are both defined for the post-crisis period: the dependent variable is defined as the average growth rate in the 4th to 8th year after the crisis, minus the average growth before the crisis, while the policy variables are defined for the crisis year and the following three years. Although their dependent and policy variables are defined over different time periods, they are both from the post-crisis period, which implies that higher spending today can be because policy makers anticipate higher growth in the future.

To our knowledge, no paper yet analyses cross-country differences in GDP growth after the 2008 crisis in a rigorous econometric manner. Dwyer and Lothian (2012) provide some evidence that the recovery after the 2008 crisis has been slower than after previous crises and that the monetary expansion during the crisis has helped the post-crisis recovery, but their analysis is mainly descriptive and based on stylised facts. Aizenman and Pasricha (2010) analyse certain aspects of the recovery after the 2008 crisis, but their analysis is focused only on the financial sector, not on overall economic activity.

The present paper, therefore, contributes to the existing literature in several ways. To begin with, it will juxtapose the 2008 crisis against some previous crises, with the aim to investigate if the Great Recession is unique in terms of the factors that determine how countries recover from it. Also, differently from the existing studies which use annual data, this study will use quarterly data, which will enable better measurement of the recovery and better identification of the policy measures. Finally, by the careful definition of the variables that measure the recovery and the policy reactions, our study will arguably avoid the endogeneity problem.

# III. Analysed crises

The analysis will be done on a sample of 47 *economic* crises that happened in 22 economies since 1980. The crises are taken from Leaven and Valencia (2008), where around 150 *banking, currency and sovereign debt* crises from 1970 onwards are listed. From the Laeven and Valencia (2008) list, we took only crises in countries for which quarterly GDP data are available. After adding the 2008 crisis for these countries, we ended up with 47 crises in 22 countries, shown in Table 1. Due to certain data unavailability, in most of our regressions we will operate with around 40 observations. It is not uncommon in this type of analyses to work with low number of observations (see, for instance, Blanchard et al., 2010, who use 29 observations).

The relatively low number of observations will not allow us to distinguish between different types of crises in our analysis. Hence, we would assume that there are no systematic differences in the effects of policy variables on post-crisis recoveries for different types crises. We will just allow for different effects of the central bank's interest rate on recovery for currency crises, since it is well known that central banks are forced to increase the interest rate during currency crises, in order to defend their currencies, differently from other crises, when central banks usually decrease the interest rate, in order to support the economy.

Table 1: Analysed crises

| | |
|---|---|
| **Argentina** | 1994, 1998, 2008 |
| **Belarus** | 1995, 2008 |
| **Bulgaria** | 1996, 2008 |
| **Chile** | 1981, 2008 |
| **Colombia** | 1998 |
| **Croatia** | 1998, 2008 |
| **Czech Republic** | 1997, 2008 |
| **Finland** | 1990, 2008 |
| **Indonesia** | 1998 |
| **Jamaica** | 1996, 2008 |
| **Japan** | 1997, 2008 |
| **Korea** | 1998, 2008 |
| **Malaysia** | 1998, 2008 |
| **Mexico** | 1982, 1995, 2008 |
| **Norway** | 1991, 2008 |
| **Peru** | 1982, 1988, 2008 |
| **Philippines** | 1983, 1998, 2008 |
| **Russia** | 1998, 2008 |
| **Slovakia** | 1998, 2008 |
| **Sweden** | 1991, 2008 |
| **Thailand** | 1997, 2008 |
| **Turkey** | 1994, 2001, 2008 |

The crises are dated akin the conventional peak-to-trough logic, according to which a crisis starts when the GDP is on the peak and it ends when the GDP is on the bottom. More precisely, the crises are dated by observing the quarter-on-quarter growth rates of the seasonally-adjusted GDP: a crisis starts when GDP falls for two consecutive quarters; a crisis ends when the GDP records the first positive growth rate after which there are no consecutive declines. While our definition for the start of the crisis is fairly standard, our definition for the end of the crisis differs from some other studies. For instance, Cechetti et al. (2009) define the end of a crisis as the first quarter when the GDP reaches the pre-crisis peak. This definition is, however, problematic for the 2008 crisis, since there is evidence of a slowdown in the potential output after the 2008 crisis (see, for instance, Benes et al. 2010), which may imply that it will take a long time until the GDP reaches its pre-crisis peak for some countries. On the other hand, our definition of crises is simple and plausible - it defines a crisis as a time when the GDP declines continually. The recovery period refers to the three years following the end of the crisis; the three-year horizon is chosen because the primary objective of this paper is to assess the effects of the policies on the recovery, and because these effects are usually believed to last for 2-3 years. The starting and ending dates of each of the crises are shown in Table 9 in the Appendix.

Some facts about the severity of the analysed crises and the pace of recovery after them are shown in Table 2. It can be seen that the crisis in Argentina in 1998-2001 lasted longest (15 quarters). The most severe crisis in terms of the GDP decline during the crisis was the crisis in Peru in 1988, when GDP at the end of the crisis was 39% lower than the GDP at the begining of the crisis. The most severe crisis in terms of the GDP decline per quarter of the crisis was the crisis in Turkey in 1994, where the annualized GDP decline per quarter was around 27% (the GDP fell by 13.4% in just two quarters). The fastest recovery after the crisis was in Turkey, after the 2008 crisis, when the annualized post-crisis GDP growth is 9.8%. The highest average GDP growth for the whole period belongs to Korea - 6.1%. Comparing the 2008 crisis with the other crises from the past, it is interesting to note that the GDP decline during the Great Recession was actually smaller than during the previous crises - the average GDP decline during the 2008 crisis was around 7% of the pre-crisis level, whereas it was 12% during the previous crises. On the other hand, the Great Recession is characterised by a weaker recovery - the average annualized GDP growth in the 12 quarters after the crisis is around 4.9%, vis-a-vis 5.5% during the past crises.

Table 2: Some facts about the analysed crises

| Crisis | Fall in GDP at end of crisis, relative to GDP before the crisis, in % | Duration of the crisis, in quarters | Annualized GDP fall per quarter during the crisis, in % | Average annualized GDP growth in the 12 quarters after the crisis, in % | Average annualized GDP growth since 1980, in % | Crisis | Fall in GDP at end of crisis, relative to GDP before the crisis, in % | Duration of the crisis, in quarters | Annualized GDP fall per quarter during the crisis, in % | Average annualized GDP growth in the 12 quarters after the crisis, in % | Average annualized GDP growth since 1980, in % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| arg94 | -15.57 | 6 | -10.38 | 6.48 | 4.60 | rus98 | -11.41 | 3 | -15.22 | 8.92 | 4.32 |
| arg01 | -22.80 | 15 | -6.08 | 8.16 | 4.60 | rus08 | -11.28 | 4 | -11.28 | 4.22 | 4.32 |
| arg08 | -2.15 | 3 | -2.87 | 8.64 | 4.60 | tha97 | -15.00 | 5 | -12.00 | 4.56 | 3.84 |
| blr95 | -17.50 | 4 | -17.50 | 8.40 | 5.72 | tha08 | -7.25 | 4 | -7.25 | 5.83 | 3.84 |
| blr08 | -2.40 | 3 | -3.20 | 6.64 | 5.72 | tur94 | -13.44 | 2 | -26.89 | 9.08 | 4.32 |
| chi81 | -22.00 | 5 | -17.60 | 4.76 | 4.40 | tur01 | -9.31 | 4 | -9.31 | 8.12 | 4.32 |
| chi08 | -4.70 | 4 | -4.70 | 5.84 | 4.40 | tur08 | -15.54 | 4 | -15.54 | 9.80 | 4.32 |
| col98 | -7.04 | 5 | -5.63 | 3.00 | 3.28 | jpn97 | -3.30 | 5 | -2.64 | 1.28 | 2.12 |
| ind98 | -18.40 | 4 | -18.40 | 4.28 | 3.72 | jpn08 | -10.25 | 4 | -10.25 | 2.40 | 2.12 |
| jam96 | -4.00 | 3 | -5.33 | 0.44 | 0.44 | bul96 | -20.80 | 5 | -16.64 | 6.92 | 3.0 |
| jam08 | -6.10 | 9 | -2.71 | 4.00 | 0.44 | bul08 | -7.70 | 5 | -6.16 | 1.96 | 3.0 |
| kor98 | -8.80 | 2 | -17.60 | 8.08 | 6.12 | cro98 | -6.9 | 6 | -4.60 | 8.8 | 3.2 |
| kor08 | -4.20 | 3 | -5.60 | 4.68 | 6.12 | cro08 | -9.36 | 9 | -4.16 | 1.36 | 3.2 |
| mal98 | -11.60 | 3 | -15.47 | 5.72 | 6.00 | cze97 | -2.94 | 6 | -1.96 | 1.8 | 3.28 |
| mal08 | -6.60 | 3 | -8.80 | 6.68 | 6.00 | cze08 | -7.17 | 3 | -9.56 | 2.28 | 3.28 |
| mex82 | -6.64 | 6 | -4.43 | 1.56 | 2.52 | fin90 | -14.3 | 13 | -4.40 | 3.96 | 2.28 |
| mex95 | -9.67 | 2 | -19.35 | 6.20 | 2.52 | fin08 | -10.5 | 5 | -8.40 | 3 | 2.28 |
| mex08 | -9.96 | 4 | -9.96 | 5.44 | 2.52 | nor91 | -1.44 | 2 | -2.88 | 4.64 | 2.56 |
| peru82 | -12.84 | 6 | -8.56 | 7.09 | 3.20 | nor08 | -4.5 | 6 | -3.00 | 2.2 | 2.56 |
| peru88 | -39.29 | 11 | -14.29 | 6.61 | 3.20 | svk98 | -3.78 | 7 | -2.16 | 4.96 | 4.6 |
| peru08 | -2.60 | 3 | -3.46 | 7.91 | 3.20 | svk08 | -6.6 | 2 | -13.20 | 3.76 | 4.6 |
| phi83 | -18.63 | 9 | -8.28 | 6.00 | 3.12 | swe91 | -4.59 | 9 | -2.04 | 3.88 | 2.32 |
| phi98 | -2.26 | 2 | -4.53 | 4.00 | 3.12 | swe08 | -7.55 | 5 | -6.04 | 5.6 | 2.32 |
| phi08 | -1.51 | 2 | -3.02 | 5.22 | 3.12 | | | | | | |

# IV. Econometric analysis

## *IV.A. Model and methodology*

The model that will be employed is along the lines of the standard New Keynesian models of the business cycle, which usually explain short-term output movements by the monetary and the fiscal policy, the financial sector and the external sector (see, for instance, Smets et al. 2010 for overview of the two main state-of-the-art New Keynesian models used at the European Central Bank). The main regression can be expressed as:

(1)

$$recovery = \alpha \begin{bmatrix} IR \\ money \\ NER \\ cap\_adeq \\ gov\_cons \end{bmatrix} + \beta \begin{bmatrix} pub\_debt \\ ext\_debt \end{bmatrix} + \gamma \begin{bmatrix} IMF \\ default \end{bmatrix} + \delta \begin{bmatrix} FDI \\ \exp orts \\ portfolio \end{bmatrix} + \epsilon \begin{bmatrix} D2008 \\ cur\_crisis * IR \\ hi\_ext\_debt * NER \end{bmatrix} + c$$

where $IR$ stands for the central bank's interest rate, $NER$ for the nominal exchange rate depreciation, $cap\_adeq$ for capital adequacy of the banking system, $gov\_cons$ for government consumption, $pub\_debt$ and $ext\_debt$ for public and external debt, respectively, $FDI$, $exports$ and $portfolio$ for foreign direct investment, exports and potfolio flows, $IMF$ is a dummy for IMF arrangements, $default$ is a dummy if the country defaulted during the crisis, $D2008$ - a dummy for the 2008 crisis, $cur\_crisis$ - a dummy for currency crises and $hi\_ext\_debt$ - a dummy for high external indebtedness, $\alpha, \beta, \gamma, \delta$ and $\epsilon$ are vectors of coefficients and $c$ is the constant.

The selection of variables is very similar to other papers from the empirical crises literature (see the references in Section I and II). They can be grouped into five groups: 1) variables measuring policy reaction: interest rate, money supply and exchange rate for the *monetary policy*; capital adequacy for *banking regulation and supervision*; government consumption for the *fiscal policy*; 2) variables measuring the constraints for policy action (public debt and external debt); 3) variables measuring other factors that can affect the recovery mainly through structural reforms (IMF arrangements and default); 4) variables measuring short-term trade or financial flows that can affect short-run post-crisis recovery (FDI, exports and portfolio investment flows); 5) variables that allow effects of certain factors to differ in some situations (the dummy for the 2008 crisis and the two cross-product variables). The 2008 dummy allows for the possibility that the average growth after the 2008 crisis is lower than after

the other crises, due to factors omitted from the regression, like the global nature of this crisis. In addition, this dummy will allow us to investigate whether the effect of the policies on the recovery differs for the 2008 crisis. Next, the cross product between the currency-crisis dummy and the interest rate allows for differential effect of the interest rate during currency crises. Currency crises, which are defined as situations when the exchange rate depreciates substantially (see Table 10 in the appedix for exact definition), usually happen in countries with fixed exchage rates. It is well known that optimal monetary policy response in such situations demands increase in the interest rate, in order to prevent devaluation, not a decrease, as in normal crises. Finally, the cross-product of the exchange rate depreciation and the high external debt allows for the possibility that depreciation has adverse effects on the economy in situations when the external debt is high, differently from normal situations, when it is expected to have positive effects on the domestic economy, through improved competitiveness.

The main econometric problem with the above regression is the possibility for a two-way causality between the policy variables and the recovery (output growth) - for instance, higher future output growth allows more supportive fiscal policy today, as much as fiscal expansion today leads to a higher growth tomorrow. To avoid this problem, or at least alleviate it, the policy variables will be defined to measure behaviour during crises, when policy makers do not anticipate future output growth. Whether this is a reasonable assumption or not can be assessed by looking at policy makers' official announcements. If we take the European Central Bank (ECB), as one of the most reputable policy maker in the world and in our sample, it can be seen that in the second quarter of 2009, the quarter when the crisis in the Euro Area ended according to our metrics, ECB expected GDP in the Euro Area to start increasing (on a quarterly level) in mid-2010, one year after the quarter when it really started increasing (see ECB, 2009, p. 2).

The second problem with regressions as this one is that there are many factors that can cause cross-country differences in GDP growth (see, for instance, Sala-i-Martin, 1997), whose omission could bias the results. To avoid this problem, the dependent variable will be defined as post-crisis growth, minus average growth in the country since 1980 (or whenever the first GDP data are available). In this way, all fixed effects causing different countries to have different long-run growth rates will be eliminated.

If one accepts the above arguments for avoiding the endogeneity problem, the model can be safely estimated by Ordinary Least Squares (OLS). The modelling strategy will be alike the general-to-specific modeling (see Hendry, 2000, for more on general-to-specific modeling) - all the variables from eq. 1 will be included in the initial specification, and then the insignificant variables will be excluded

one by one, until a parsimonious model is achieved.

The OLS analysis will be accompanied by a Bayesian Model Averaging exercise. Bayesian Model Averaging (BMA) gained prominence in recent years in analyses in which numerous explanatory variables are available and when there is a significant uncertainty about the correct theoretical model. Instead of choosing one model, BMA draws inference using weighted average of many models. Of all the available models, given by all the possible combinations of the explanatory variables, BMA selects only some (using Markov Chain Monte Carlo methods), estimates these models using Bayesian techniques, and then weights them using a measure of their goodness-of-fit - their posterior model probability. Inference is then usually based on the grounds of the weighted averages of the posterior means and standard errors of the candidate variables, and on the Posterior Inclusion Probability (PIP), which, loosely speaking, is the probability that the candidate explanatory variable is a robust determinant of the dependent variable, i.e. is a measure of the significance of the variable. From the crises literature, Abiad et al. (2009) and Crespo Cuaresma and Feldkircher (2012) conduct a BMA analysis.

### *IV.B. Variables*

The variables that will be used in the analysis are those that enter equation 1. Detailed description of the variables' definitions and the data sources is presented in Table 10 in the Appendix.

The dependent variable, the speed of recovery, is constructed as the average annualized GDP growth in the 3 years after the crisis, *minus the average GDP growth since 1980* (or since there are GDP data), to remove the effects of the variables that cause different countries to have different long-run growth rates. The three-year horizon is chosen due to the conventional understanding that effects of monetary and fiscal policy usually last for 2-3 years. The recovery for some countries after the 2008 crisis is measured over a time period which is shorter than 12 quarters.

The monetary and fiscal policy variables are measured *during the crisis* (i.e. before the recovery), to avoid the reverse causality problem. Regulatory policy (i.e. capital adequacy), on the other hand, is measured *before the crisis*, since the situation in the banking sector can worsen during crises, which implies that the situation of the banking sector before the crisis is a better indicator for the quality of the regulation and supervision. Similarly, public debt and external debt are taken *before the crisis,* since they can also worsen during crises. Exports, FDI and portoflio investment are measured *during the recovery*, since they are included to capture other short-run determinants of GDP in the recovery

phase.

Variables which are measured before the crisis (capital adequacy, public debt, external debt) are included with their averages for the year before the crisis. Monetary and fiscal policy variables are included as differences from the pre-crisis level. Similarly, FDI, exports and portfolio flows are included as differences from the equilibrium levels (the equilibrium level is approximated by the average for the whole period). In some cases when the FDI, exports or the portfolio flows seemed to have structural breaks (for instance, in many of the ex-socialist countries FDI levels were rather low in the early years, and then increased), the equilibrium level was calculated as the average for the corresponding stable period, not as average for the whole period.

Several dummy variables will be used in the analysis. The dummy for the 2008 crisis will enable us to investigate whether recovery after the Great Recession differs from previous crises. The dummy for a currency crisis will capture the potentially different optimal behaviour of the interest rates in currency crises, when it should be increased to defend the currency, differently from other crises, when it should be decreased, to stimulate the economy. The currency crisis dummy is constructed as in Frankel and Rose (1996), as a situation when the currency depreciates more than 30%, which is at least 10 percentage points more than in the previous year. The IMF dummy takes unitary value if the country had an arrangement with the IMF during the recovery period. It is included to capture the positive effect IMF arrangements have on the recovery, primarily due to the structural reforms which are usually undertaken then, but also because of the financial aid and the restored confidence. The default dummy takes a value of one if the country defaulted during the crisis. It is included to capture the likely positive effect that the default can have on the recovery, due to the structural reforms which are usually associated with defaults, but also because of the decreased debt-servicing burden. The dummy for the high external indebtedness takes a unitary value if external debt exceeded 40% of GDP before the crisis. It is included in order to capture the potential adverse effects exchange rate depreciation can have on the economy when the external debt is high. The 40% threshold was chosen somewhat arbitrarily, since the average value of external indebtedness in the sample was 42%, but the results are not sensitive to the choice of the threshold. Finally, the high public debt dummy takes a value of one if the public debt service was above 3% of GNI before the crisis. The 3% threshold roughly corresponds to the Maastricht criteria threshold for high indebtedness of 60% of GDP.

Descriptive statistics for the variables are shown in Table 3. A preliminary assessment of the variables points out that the recovery period is marked by a higher-than-average GDP growth. It is

also interesting to note that monetary policy during the analysed crises has behaved contractionary - the average interest rate increase is around 30 percentage points (p.p.). However, this is completely due to the currency crises, during which the interest rate has increased on average by 100 p.p; during the other crises, the average interest rate has declined by 4.5 p.p. Nevertheless, crises are marked by a decline in the money supply, regardless of their type. Similarly, most of the crises are characterised by a contractionary fiscal policy. Another prominent characteristic of the analysed crises is the depreciation of the currency - in all but six crises, national currencies during the crises have depreciated by more than 5%. The capital adequacy on average has been relatively high, above the Basel's 8%; however, there is a pronounced variation here - adequacy goes below 4% and above 15% in several cases.

The correlation matrix is shown in Table 11 in the Appendix. It does not indicate potential multicollinearity problems - only the interest rate and the nominal exchange rate have a correlation exceeding 80%, but this is completely due to one extreme observation (Peru 1988), when the interest rate was increased by 1.300 percentage points, and the exchange rate was devalued by 11.000 times. It is worth noting that the results remain virtually identical when this crisis is excluded.

Table 3: Descriptive statistics of the variables

| | Recovery | IR | Money | NER | Cap_adeq | Gov_cons |
|---|---|---|---|---|---|---|
| **Mean** | 1.6 | 31.3 | -6.4 | 25441.8 | 8.5 | -1.9 |
| **Maximum** | 5.6 | 1297.8 | 38.0 | 1191644.0 | 18.6 | 20.6 |
| **Minimum** | -1.8 | -145.0 | -78.0 | -12.4 | 3.8 | -30.3 |
| **Std. Dev.** | 2.0 | 191.2 | 19.3 | 173806.3 | 3.3 | 9.8 |
| **25th perc.** | -0.1 | -0.7 | -16.9 | 11.8 | 6.7 | -6.1 |
| **75th perc.** | 3.5 | 4.6 | 4.9 | 56.8 | 9.7 | 3.9 |
| **Observations** | 47 | 47 | 47 | 47 | 41 | 47 |

| | Pub_debt | Ext_debt | FDI | exports | portfolio |
|---|---|---|---|---|---|
| **Mean** | 2.9 | 50.2 | 0.1 | 3.3 | 0.4 |
| **Maximum** | 8.4 | 157.7 | 9.2 | 16.9 | 5.8 |
| **Minimum** | 0.6 | 8.7 | -5.5 | -12.4 | -3.7 |
| **Std. Dev.** | 1.8 | 31.5 | 2.1 | 6.0 | 1.8 |
| **25th perc.** | 1.5 | 32.6 | -0.4 | 0.3 | -0.4 |
| **75th perc.** | 3.7 | 63.5 | 0.8 | 7.8 | 0.9 |
| **Observations** | 42 | 41 | 46 | 46 | 44 |

### *IV.C. OLS analysis*

The OLS analysis is done akin the general-to-specific approach, i.e. starting from a model that includes all the potential explanatory variables (eq. 1), we will exclude the insignificant variables one

by one, until we reach a model in which all the variables are singificant. These results are shown in Table 4. Each column shows results of one regression.

In the first regression most of the variables are insignificant, but this is most probably due to the extremely low number of degrees of freedom in that regression (there are only 32 observations and 16 coefficients to estimate). From this regression we drop the external debt, because it has the highest p-value (0.8). We then exclude the default, the exports, the portfolio flows and the public debt one by one, since they all have a p value above 0.6. In the sixth regression all the variables appear significant, except the IMF, which has a p value of 0.12. In the final specification, shown in column 7, all the variables are significant at 5%.[1]

1. The residuals in all the specifications are well behaved - the usual diagnostic tests indicate that the null hypotheses of homoscedasticity and normality in the residuals cannot be rejected at conventional levels of significance, and the Ramsey RESET test does not indicate mis-specification, either.

Table 4 - Results of the OLS analysis

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| IR | -0.399 | -0.326 | -0.317 | -0.311 | -0.331 | -0.456* | -0.531** |
| | (0.355) | (0.344) | (0.334) | (0.323) | (0.286) | (0.228) | (0.211) |
| M | 0.067 | 0.053 | 0.050* | 0.050* | 0.049* | 0.046** | 0.047** |
| | (0.043) | (0.041) | (0.029) | (0.027) | (0.025) | (0.021) | (0.019) |
| NER | 0.005 | 0.009 | 0.010 | 0.009 | 0.009* | 0.011*** | 0.010*** |
| | (0.013) | (0.011) | (0.009) | (0.005) | (0.005) | (0.003) | (0.003) |
| cap_adeq | 0.382* | 0.342 | 0.323* | 0.322* | 0.322* | 0.339** | 0.426*** |
| | (0.199) | (0.206) | (0.175) | (0.170) | (0.167) | (0.144) | (0.119) |
| gov_cons | 0.076 | 0.077 | 0.083 | 0.085 | 0.088 | 0.138** | 0.146*** |
| | (0.078) | (0.082) | (0.071) | (0.068) | (0.067) | (0.050) | (0.048) |
| pub_debt | 0.209 | 0.287 | 0.271 | 0.252 | 0.247 | | |
| | (0.393) | (0.373) | (0.348) | (0.295) | (0.293) | | |
| ext_debt | -0.005 | | | | | | |
| | (0.021) | | | | | | |
| FDI | 0.122 | 0.344 | 0.343 | 0.342 | 0.325 | 0.285** | 0.275** |
| | (0.286) | (0.248) | (0.241) | (0.242) | (0.222) | (0.111) | (0.112) |
| exports | 0.028 | 0.018 | 0.016 | 0.017 | | | |
| | (0.077) | (0.070) | (0.068) | (0.064) | | | |
| portfolio | -0.078 | -0.050 | -0.049 | | | | |
| | (0.234) | (0.266) | (0.259) | | | | |
| IMF | 0.471 | 0.606 | 0.642 | 0.653 | 0.698 | 0.942 | |
| | (0.824) | (0.825) | (0.836) | (0.772) | (0.715) | (0.596) | |
| default | -0.733 | -0.278 | | | | | |
| | (1.964) | (1.778) | | | | | |
| D2008 | -0.815 | -0.664 | -0.598 | -0.723 | -0.761 | -1.511* | -2.195*** |
| | (1.070) | (1.008) | (0.890) | (0.975) | (0.887) | (0.782) | (0.784) |
| cur_cri*IR | 0.454 | 0.370 | 0.361 | 0.356 | 0.376 | 0.516** | 0.597*** |
| | (0.351) | (0.341) | (0.331) | (0.322) | (0.285) | (0.229) | (0.212) |
| NER*hi_ext_debt | -0.005 | -0.009 | -0.010 | -0.009 | -0.009* | -0.011*** | -0.010*** |
| | (0.013) | (0.011) | (0.009) | (0.005) | (0.005) | (0.003) | (0.003) |
| Constant | -1.712 | -2.107 | -1.988 | -1.908 | -1.821 | -1.196 | -1.261 |
| | (1.963) | (1.928) | (1.785) | (1.556) | (1.593) | (0.929) | (0.904) |
| Observations | 32 | 34 | 34 | 35 | 35 | 40 | 40 |
| $R^2$ | 0.492 | 0.490 | 0.489 | 0.505 | 0.503 | 0.557 | 0.536 |

Dependent variable in all regressions is recovery. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Looking at this final specification, it is interesting to note that public debt does not seem to

affect post-crisis recovery. This might seem strange, especially given the discussion in Cottarelli and Jaramillo (2012), who point out two main channels through which public debt can affect post-crisis growth - through the interest-rate spreads and through the potential GDP growth. The first channel works itself out primarily through limiting the scope for fiscal support, i.e. through the smaller space for government spending when the interest-rate spreads are high. In our regression, however, the effect of the public debt is *conditional* on the government consumption, i.e. the coefficient on the public debt shows how the indebtedness affects the GDP growth, *given* a certain level of government consumption. Hence, the spreads channel that Cottarelli and Jaramillo (2012) discuss is already captured in our regression by the government consumption. The second channel they discuss is the effect higher public debt can have on potential output through crowding out, i.e. through lower productivity growth. However, this channel is more likely to affect the GDP in the *long run*, not in the short run, so it may not be unexpected that it does not appear in our analysis, since our analysis refers to the short-run post-crisis GDP growth.

It is also worth noting that from the trade and financial flows variables, only FDI seem to affect post-crisis GDP growth, while the exports and portfolio flows not.

The policy variables appear highly significant in the final specification, both statistically and economically. The interest rate coefficient suggests that if interest rate decreased by 5 percentage points (p.p.) during the crisis (move from the 25th percentile to the 75th percentile of the variable), this would stimulate the post-crisis GDP growth by roughly 2.5 p.p., on average, ceteris paribus. The interest rate effect differs for currency crises, as suggested by the significant coefficient on the cross product of the interest rate and the currency crises dummy. In currency crises, instead, lowering the interest rate by 5 p.p. would lead to post-crisis growth of -0.4 p.p., since the optimal monetary policy response in such cases requires raising the interest rate, in order to defend the exchange rate parity. Turning to the second monetary policy variable, expanding the money supply by 22 percent (move from the 25th percentile to the 75th percentile) leads to higher GDP growth by roughly 1 p.p. The exchange rate effect is similar - depreciation of the currency by 70 percent during the crisis (move from 25th to 75th percentile) leads to a 0.7 p.p. higher growth after the crisis. Exchange rate depreciation however, leads to a higher growth only when the external debt is low, since the cross product of the exchange rate and the dummy for high external debt is significant. When the external debt is high (above 40% of GDP), depreciation has no effect on the GDP, due to the fact that the positive effects of the depreciation, through the improved competitiveness, are offset by the negative effects, through the

worsened balance sheets. Equally strong are the fiscal policy and banking regulation effects. When government consumption growth is higher by 10 p.p. (move from the 25th percentile to the 75th), this leads to 1.5 p.p. higher post-crisis growth. Similarly, when the capital/assets ratio of the banking sector is higher by 3 percentage points (move from 25th to 75th percentile), post-crisis recovery is stronger by roughly 1.3 percentage points. Bearing in mind that the average value of the dependent variable is 1.6 p.p., these figures indicate that policy actions have rather strong effect on the post-crisis recovery.

The dummy for the 2008 crisis is significant and negative. This may indicate a potential structural break in how policy actions affect the recovery for the 2008 crisis. To test whether the effects of the determinants of the post-crisis recovery are different for the 2008 crisis, we include cross products of the 2008 dummy with all the explanatory variables as additional variables in the regression. These results are shown in Table 11 in the Appendix. The hypothesis that the cross-products of the variables with the 2008 dummy are jointly insignificant cannot be rejected at 10% (the p value is 0.4), and we have evidence to claim that the effects of the determinants of post-crisis recovery do not differ for the 2008 crisis, vis-a-vis the previous crises.

Therefore, we can interpret the 2008-dummy as a level shift in the recovery for the 2008 crisis. It points out that the annual GDP growth after the 2008 crisis, holding the policy response constant, is 2 p.p. lower than the growth after the previous crises. This comes as a no surprise - Benes et al. (2010) provide evidence that potential GDP growth slowed down after the 2008 crisis. Apart from that, the slower recovery after the 2008 crisis may be due to the global nature of the crisis, i.e. due to the fact that this crisis affected almost all countries in the world, while the previous crises were mainly local, or at most regional.

Comparing the unconditional average of our measure of the recovery after the 2008 crisis and after the previous crises, it can be observed that the former is 1.3 percentage points, while the latter is 1.9 percentage points. This difference of 0.6 p.p. is much lower than the mean conditional on the policy response of 2 percentage points. That actually implies that policy support during the 2008 crisis has been more aggressive than during the previous crises, and that the current recovery would have been even slower, if policy did not respond that aggressively.

Through which channels did this support actually come? Table 5 compares the policy response during the 2008 crisis and during the previous crises. During the 2008 crisis the support through the interest rates was weaker, due to the zero lower bound, but the support through the money supply

was stronger, due to the "unconventional" monetary policy measures. Apart from that, the 2008 crisis saw substantially smaller support through exchange rate depreciations, but the support through the government consumption was stronger during the 2008 crisis.

Table 5: Policy response during the 2008 crisis vs. the previous crises

| | **previous crises** | **2008 crisis** |
|---|---|---|
| IR | -11.5* | -0.35 |
| M | -12.06 | 1.34 |
| NER | 144.5** | 18.14 |
| gov_cons | -6.00 | 3.70 |

*excluding the currency crises, during which the interest rate was increased, not decreased

**excluding the Peru 1988 crisis, when the exchange rate depreciated 11.000 times

### *IV.D. OLS analysis - further investigation*

As already mentioned in the introduction, our identification strategy is not immune to another potential form of endogeneity emerging from the expectations - output growth depends on expectations, as well as policy decisions, so expectations for a slow recovery can indeed lead to a slow recovery, and would at the same time lead to a more expansionary policy. Hence, omission of the expectations from the above regression can lead to a correlation between the explanatory variables and the error term, which would bias the coefficients. Although this bias is expected to drive the policy coefficients towards zero (because expectations are positively correlated with the GDP, but negatively with the policy response), it would be worthwhile to investigate what happens to the results when a variable measuring expectations is added to the regression. Additional potential source of endogeneity is the GDP during the crises - the policy variables are measured over the crisis period, so they clearly depend on the GDP during the crisis; on the other hand, GDP is well known to be persistent, so it may also happen that the recovery is correlated with the GDP during the crisis. Although our variable for the recovery is defined in such a way that should actually remove this persistence in the GDP, it may be again worthwhile to see what happens to the results when the GDP growth during the crisis is added to the regression. Therefore, to control for these two potential sources of endogeneity, we next augment the model with the GDP fall during the crisis and a proxy for policy-makers' expectations -

projected GDP growth for the next year, at the time of the crisis, from the IMF's World Economic Outlook (WEO). These results are shown in Table 6, column 2 (column 1 presents the results of the final specification from before, for comparison). As can be seen, the number of observations drops substantially once the expectations variable is included, since GDP projections from WEO for most of the countries are available only since 2001. Consequently, all the coefficients in this regression are insignificant, due to the low number of degrees of freedom. However, the magnitude of all the coefficients remains roughly same as before, indicating that the policy effects that were estimated before are not driven by the omitted expectations or the GDP fall during the crisis.

Next, in the context of the recent debate in the literature about the growth effects of fiscal consolidation (see Alesina and Ardagna, 2009, Alesina, 2010, Perotti, 2011, Summers and De Long, 2012, Romer, 2012), it may be interesting to investigate what are the fiscal policy effects on the recovery when the public debt is high. Namely, there are arguments that expansionary fiscal policy when the debt is high can result in lower growth, or at least lower multiplier, due to worsened market confidence. We next investigate this possibility, by adding a cross product variable between the government consumption and a dummy for high public debt. This dummy takes a value of one if the public debt service was above 3% of GNI before the crisis, as explained above. These results are shown in Table 6, in column 3. The cross-product between government consumption and high public debt is positive, though insignificant. Hence, we find no evidence that the fiscal multiplier is smaller when the public debt is high.

Table 6 - Further investigation

| | (1) | (2) | (3) |
|---|---|---|---|
| IR | -0.531** | -0.311 | -0.504** |
| | (0.211) | (0.563) | (0.214) |
| M | 0.047** | 0.021 | 0.049** |
| | (0.019) | (0.051) | (0.019) |
| NER | 0.010*** | 0.015 | 0.010** |
| | (0.003) | (0.024) | (0.003) |
| cap_adeq | 0.426*** | 0.190 | 0.417*** |
| | (0.119) | (0.288) | (0.119) |
| gov_cons | 0.146*** | 0.119 | 0.137*** |
| | (0.048) | (0.089) | (0.048) |
| FDI | 0.275** | 0.381 | 0.270** |
| | (0.112) | (0.314) | (0.112) |
| D2008 | -2.195*** | -0.235 | -2.134** |
| | (0.784) | (2.091) | (0.831) |
| cur_cri*IR | 0.597*** | 0.508 | 0.579** |
| | (0.212) | (0.638) | (0.213) |
| NER*hi_ext_debt | -0.010*** | | -0.010*** |
| | (0.003) | | (0.003) |
| fall | | -0.049 | |
| | | (0.117) | |
| gdp_expected | | 0.261 | |
| | | (0.372) | |
| gov_cons*hi_pub_debt | | | 0.054 |
| | | | (0.076) |
| Constant | -1.261 | -1.529 | -1.215 |
| | (0.904) | (1.927) | (0.905) |
| Observations | 40 | 23 | 40 |
| $R^2$ | 0.536 | 0.437 | 0.543 |

Dependent variable in all regressions is recovery. *** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses.

Finally, we assess the robustness of the results. Although from the results shown in Table 6 one gets the impression that the results are pretty robust, we still do two additional types of robustness checks. In the first, we remove one by one all the variables from the model, and see what happens to the coefficients of the remaining variables. This may not be the best way to investigate robustness, because variables may be correlated between themselves, which will lead to change in coefficients, but also because removing an important variable will worsen the fit of the model and would increase

the standard errors of the coefficients. But, still, if the results do not change a lot when such radical changes are made, that would mean that they are really robust. In the second sub-group of robustness checks, we randomly discard 7 crises from our sample (around 15% of the total 47 crises), and see what happens to the results in such cases[2]. Again, reducing the sample size when working with small samples may not be the best option, since loss in the degrees of freedom may lead to insignificant coefficients. Because of that, we will focus on the magnitudes of the coefficients, not so much on their significance. The results of these checks are shown in Table 13 in the Appendix. Column number 1 shows the basic specification, columns 2 - 8 show the results when regressors are excluded one by one (in column 2, the interest rate is removed, in column 3 - the money supply etc.), columns 9-13 show the results when the sample size is decreased. Certain changes in some of the coefficients are evident, which is inevitable, but the overall impression is that the coefficients are pretty stable. Even the coefficient that seems least robust to us, the one on the government consumption, falls out of the 95% confidence interval from the basic specification (0.05 to 0.25) in only 2 out of the 11 regressions. Therefore, the robustness checks suggest that the results do not refer only to a specific set of variables and sample of crises, but are indeed likely to hold in general.

### *IV.E. BMA analysis - introduction*

Bayesian Model Averaging is particularly useful in empirical analyses in which there is uncertainty about the right theoretical model and when there are many explanatory variables available. For instance, if there are 20 candidate explanatory variables, there are $2^{20}$ =1,048,576 possible models (i.e. there are 1,048,576 different combinations of the 20 available variables), which can often produce conflicting results. Instead of selecting one model of all the available, BMA draws inference by estimating many of the potential models (sometimes even all the possible models) and by weighting their results. The models are estimated using Bayesian techniques, where researcher's prior information/expectations about the model parameters are combined with information from the data, to get the posterior parameter estimates. Then each of the estimated models is weighted by its posterior probability (a measure of the goodness of fit), and then these averages are used in inference (for a more detailed explanation of BMA, see Hoeting et al., 1999).

Application of BMA usually requires setting priors for the model parameters, setting priors for the models and determining how to choose from all the available models. In our case, since the number

2. The seed that was used for generating the random samples in Stata is **2601**.

of explanatory variables is rather low, 17, and the number of potential models is therefore only $2^{17} = 131\,072$, instead of choosing only a subset of models by Markov Chain Monte Carlo methods, we will estimate all the potential models. Regarding the model prior, we will use a uniform prior, i.e. we will assume that all models have equal prior probability for being correct, i.e. we will not favour smaller or bigger models. The most problematic part is to specify the priors for the model parameters. Usually, these priors are specified as uninformative priors with zero mean:

$$\beta|\sigma^2, M, g \sim N(0, \sigma^2 g(X'X)^{-1}) \tag{2}$$

where $\beta$ stands for the model parameters, $M$ for the model, $\sigma$ is the standard deviation of the residuals, $X$ are the regressors and $g$ is a hyperparameter, which controls the variance of the conditional distribution of the model parameters. Since the model priors are set as uniform, it is clear that $g$ also controls the posterior model probabilities (i.e. the overall results). The choice of $g$ can affect the results to a great extent, with high values of $g$ giving more weight to few best models, and low values of $g$ spreading the weights among more models. Several proposal have been suggested in the literature for $g$.Kass and Wasserman (1995), for instance, suggest the Unit Information Prior (UIP), which sets $g = N$ (where N is the number of observations), while Fernandez et al. (2001) show that setting $g = max(N, K\hat{}2)$ outperforms other choices of $g$ in selecting the correct model. Instead of being a fixed number, $g$ can also be "flexible", i.e. data- and model- dependent. For instance, Hansen and Yu (2001) propose Local Empirical Bayes $g$, i.e. they propose setting different $g$ for each separate model on the grounds of the marginal likelihood of the model (i.e. so that it achieves best fit). Similarly, Liang et al. (2008) propose setting $g$ as a hyperprior, i.e. as a probability distribution, not as a fixed number. They propose such a distribution on $g$ that the shrinkage factor $g/(1-g)$ follows a Beta distribution:

$$\frac{g}{1-g} \sim Beta(1, \frac{a}{2} - 1) \tag{3}$$

where the parameter $a$ controls the distribution of $g$, and hence - the overall results.

The crucial difference between fixed and flexible $g$ is that with fixed $g$, BMA works in a model selection way - it tries to find which model is more likely to have generated the data, i.e. it concentrates

the posterior mass on few best models, while with flexible priors the posterior mass is spread more evenly across different models. As Feldkircher and Zeugner (2009) demonstrate, flexible $g$ priors outperform fixed $g$ priors when the data are noisy. Our data and variables appear to be noisy at least for two reasons: 1) there is no clear argument why the variables would be defined in the way they have been defined; for instance, the interest rate variable is measured relative to the 4 quarters preeceding the crisis, but it can be also measured relative to the previous 6, or 8 quarters; 2) there may be differences in measurement and definitions of the variables in different countries, like in all cross-country studies. Thus, we would a priori prefer the more flexible priors, like the hyperprior g and the Local Empirical Bayes. Still, we will implement all the above-mentioned priors, in order to see how sensitive are the results.

To conserve space, we will present only the Posterior Inclusion Probabilities (PIP) and the posterior means and standard errors. The PIP, loosely speaking, is a probability that an explanatory variable is a robust determinant of the dependent variable, and is often treated as a measure of the significance of the variables, while the posterior means and standard errors refer to the averages of the posterior distributions of the variables in the estimated models.

### *IV.F. BMA analysis - results*

The results of the BMA analysis are shown in Table 7. All the four above-mentioned priors were used for the hyperparameter $g$. The first two colums, named "hyper g", show the results of the estimations which employs the prior of Liang et al. (2008), the next two columns, entitled "EBL g" use the Empirical Bayes Local prior of Hansen and Yu (2001), the columns entiled "UIP g" implement the Unit Information Prior of Kass and Wasserman (1995), while the results shown in the last two colums, named "BRIC g", are obtained using the prior of Fernandez et al. (2001). For each of these estimations, the first column presents the PIPs of the candidate variables and the second column shows the averages of the posterior means and standard errors for the model parameters. The results shown refer to the 2000 models with best fit. As usual in the literature, we will treat parameters with PIP above 0.5 as "significant". All the available explanatory variables are included in the estimations (including those that were used in the further investigation part of the OLS analysis), except the expected GDP, which is available for only 23 crises, and its inclusion alongside the other variables will render the estimation infeasible.

The **"hyper g"** and the **"EBL g"** results seem rather unanimous - the same seven variables are

"significant" in them both - money, capital adequacy, interest rate, exchange rate depreciation, the cross product of the interest rate with the currency crises dummy, the cross product of the depreciation with the high external debt dummy, and the cross product of the government consumption with the high public debt dummy. The **"UIP g"** results are somewhat different - only the money supply is a robust determinant of post-crisis recovery according to them, while the results obtained with the **BRIC** prior suggest that none of the included variables is a robust determinant of recovery. The higher number of significant variables in the first two estimations confirm that the hyper-g and EBL-g priors spread the mass more evenly. Furthermore, the notion that the mass is spread evenly in the hyper-g results suggests that our variables are indeed rather noisy (see Feldkircher and Zeugner, 2009). This then justifies our decision to attach more weight to the flexible priors.

The "hyper g" and "EBL g" results are also very similar to the OLS results - almost the same variables appear as determinants of post crisis recoveries in them both. The only qualitative differences are that the FDI flows and the dummy for the 2008 crisis are insignificant in the BMA exercise, and that the government consumption appears to help recovery only in highly indebted countries in the BMA analysis. The latter finding seems particurarly interesting, since it points out that the fiscal multiplier is higher in situations when the debt is high, contrary to the conventional understanding that the multiplier should be lower in such cases. It can be, however, justified by the improvement in market confidence that expansionary fiscal policy can bring when the debt is high: as De Long and Summers (2012) point out, fiscal expansion can be often self-financing and can lead to a decrease in indebtedness; if markets believe this, i.e. if they doubt that fiscal austerity can be expansionary, then the fiscal multiplier can indeed be higher when the debt is high. Anecdotal evidence presented in Romer (2012, p. 7), that bond markets worry about the growth prospects, suggests that this may well be the case.

Apart from this, the overall story obtained by the BMA is very similar to the one explained previously - post-crisis growth depends positively on expansionary monetary policy, measured both by the decline in the interest rate and the increase in the base money, on the prudent banking regulation and supervision, measured by the capital adequacy of the banking sector, on depreciation of the currency and on the expansionary fiscal policy. Again, the interest rate effect is opposite during currency crises, as well as the depreciation effect during episodes of high external debt. There are certain differences in the magnitudes of the coefficients, though. More precisely, the capital adequacy and government consumption effects are 3 times smaller in BMA than in OLS, while the interest rate

and the exchange rate effects are more than 10 times smaller. This could also be because the BMA analysis is done on a reduced sample (the number of observations in all the BMA estimations is 32, compared to the 40 in the final OLS regressions).

Table 7 - Results of the BMA analysis

| | **g=hyper** | | **g=EBL** | | **g=UIP** | | **g=BRIC** | |
|---|---|---|---|---|---|---|---|---|
| | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) |
| M | **0.991** | 0.043 (0.022) | **1** | 0.043 (0.022) | **0.548** | 0.032 (0.037) | 0.099 | 0.003 (0.014) |
| cap_adeq | **0.903** | 0.13 (0.099) | **0.947** | 0.137 (0.1) | 0.398 | 0.078 (0.12) | 0.088 | 0.01 (0.047) |
| hi_pub_debt *gov_cons | **0.675** | 0.056 (0.067) | **0.733** | 0.06 (0.069) | 0.274 | 0.03 (0.069) | 0.069 | 0.001 (0.024) |
| cur_cri*IR | **0.648** | 0.043 (0.093) | **0.672** | 0.047 (0.101) | 0.384 | 0.021 (0.057) | 0.123 | 0.003 (0.02) |
| hi_ext_debt *NER | **0.57** | -0.001 (0.004) | **0.574** | -0.001 (0.004) | 0.389 | -0.001 (0.005) | 0.124 | 0 (0.003) |
| NER | **0.569** | 0.001 (0.004) | **0.572** | 0.001 (0.004) | 0.387 | 0.001 (0.005) | 0.124 | 0 (0.003) |
| IR | **0.518** | -0.003 (0.093) | **0.528** | -0.007 (0.102) | 0.356 | 0.012 (0.055) | 0.121 | 0.002 (0.02) |
| IMF | 0.325 | 0.147 (0.406) | 0.334 | 0.142 (0.409) | 0.268 | 0.283 (0.608) | 0.182 | 0.215 (0.552) |
| pub_debt | 0.282 | 0.055 (0.172) | 0.324 | 0.065 (0.186) | 0.111 | 0.023 (0.127) | 0.069 | 0.015 (0.094) |
| portfolio | 0.228 | -0.016 (0.071) | 0.241 | -0.016 (0.074) | 0.102 | -0.011 (0.062) | 0.057 | -0.005 (0.048) |
| gov_cons | 0.216 | 0.004 (0.024) | 0.237 | 0.005 (0.025) | 0.118 | 0.002 (0.022) | 0.077 | -0.002 (0.015) |
| FDI | 0.214 | 0.021 (0.105) | 0.23 | 0.021 (0.109) | 0.166 | 0.048 (0.157) | 0.121 | 0.045 (0.157) |
| D2008 | 0.208 | -0.05 (0.32) | 0.221 | -0.055 (0.338) | 0.091 | -0.011 (0.25) | 0.057 | -0.013 (0.203) |
| default | 0.203 | -0.066 (0.459) | 0.212 | -0.077 (0.481) | 0.099 | 0.044 (0.428) | 0.068 | 0.063 (0.395) |
| exports | 0.191 | 0.003 (0.018) | 0.205 | 0.003 (0.019) | 0.082 | 0.002 (0.016) | 0.051 | 0.001 (0.013) |
| ext_debt | 0.182 | 0 (0.004) | 0.19 | 0 (0.004) | 0.107 | -0.001 (0.004) | 0.058 | 0 (0.003) |
| fall | 0.176 | 0 (0.023) | 0.182 | 0 (0.024) | 0.131 | -0.005 (0.027) | 0.113 | -0.007 (0.026) |

Standard errors in parentheses. "Significant" coefficients in bold (i.e. coefficients with PIP>0.5).

We next investigate the sensitivity of the BMA results to different assumptions about the number of models on which the results are calculated and about the hyperprior g. These results are presented in Table 8. In the "number of models" exercise we first save only the 500 best models, instead of

Table 8 - Sensitivity of the BMA results

| | 2000 models (base) | | 500 models | | All models | | a=3 | | a=4. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) | PIP | Post. Mean (Post. SD) |
| M | **0.991** | **0.043** | **0.99** | **0.046** | **0.627** | **0.017** | **0.999** | **0.039** | **0.999** | **0.035** |
| | | (0.022) | | (0.022) | | (0.022) | | (0.021) | | (0.02) |
| cap_adeq | **0.903** | **0.13** | **0.95** | **0.143** | **0.55** | **0.05** | **0.92** | **0.121** | **0.928** | **0.11** |
| | | (0.099) | | (0.095) | | (0.089) | | (0.095) | | (0.09) |
| hi_pub_debt*gov_cons | **0.675** | **0.056** | **0.745** | **0.066** | **0.5** | **0.021** | **0.694** | **0.052** | **0.705** | **0.047** |
| | | (0.067) | | (0.069) | | (0.051) | | (0.064) | | (0.06) |
| cur_cri*IR | **0.648** | **0.043** | **0.641** | **0.039** | **0.553** | **0.03** | **0.656** | **0.041** | **0.663** | **0.038** |
| | | (0.093) | | (0.077) | | (0.097) | | (0.09) | | (0.088) |
| hi_ext_debt*NER | **0.57** | **-0.001** | **0.547** | **-0.001** | **0.55** | **-0.001** | **0.578** | **-0.001** | **0.578** | **-0.001** |
| | | (0.004) | | (0.003) | | (0.005) | | (0.004) | | (0.004) |
| NER | **0.569** | **0.001** | **0.542** | **0** | **0.55** | **0.001** | **0.574** | **0.001** | **0.574** | **0.001** |
| | | (0.004) | | (0.003) | | (0.005) | | (0.004) | | (0.004) |
| IR | **0.518** | **-0.003** | 0.467 | 0.005 | **0.537** | **-0.012** | **0.524** | **-0.004** | **0.528** | **-0.005** |
| | | (0.093) | | (0.077) | | (0.097) | | (0.091) | | (0.088) |
| IMF | 0.325 | 0.147 | 0.241 | 0.11 | 0.494 | 0.2 | 0.327 | 0.131 | 0.328 | 0.117 |
| | | (0.406) | | (0.355) | | (0.445) | | (0.383) | | (0.361) |
| pub_debt | 0.282 | 0.055 | 0.261 | 0.059 | 0.449 | 0.037 | 0.296 | 0.053 | 0.305 | 0.05 |
| | | (0.172) | | (0.172) | | (0.166) | | (0.167) | | (0.16) |
| portfolio | 0.228 | -0.016 | 0.176 | -0.013 | 0.435 | -0.013 | 0.235 | -0.015 | 0.239 | -0.013 |
| | | (0.071) | | (0.063) | | (0.086) | | (0.068) | | (0.065) |
| gov_cons | 0.216 | 0.004 | 0.138 | 0.002 | 0.461 | 0.007 | 0.23 | 0.004 | 0.235 | 0.004 |
| | | (0.024) | | (0.018) | | (0.032) | | (0.023) | | (0.022) |
| FDI | 0.214 | 0.021 | 0.151 | 0.016 | 0.457 | 0.042 | 0.22 | 0.019 | 0.226 | 0.018 |
| | | (0.105) | | (0.09) | | (0.135) | | (0.101) | | (0.097) |
| D2008 | 0.208 | -0.05 | 0.136 | -0.038 | 0.44 | 0.022 | 0.218 | -0.049 | 0.224 | -0.045 |
| | | (0.32) | | (0.251) | | (0.442) | | (0.314) | | (0.303) |
| default | 0.203 | -0.066 | 0.131 | -0.045 | 0.44 | 0.032 | 0.208 | -0.064 | 0.214 | -0.061 |
| | | (0.459) | | (0.366) | | (0.618) | | (0.446) | | (0.433) |
| exports | 0.191 | 0.003 | 0.132 | 0.002 | 0.43 | 0.003 | 0.198 | 0.002 | 0.202 | 0.002 |
| | | (0.018) | | (0.015) | | (0.023) | | (0.018) | | (0.017) |
| ext_debt | 0.182 | 0 | 0.108 | 0 | 0.433 | -0.001 | 0.188 | 0 | 0.192 | 0 |
| | | (0.004) | | (0.003) | | (0.005) | | (0.004) | | (0.004) |
| fall | 0.176 | 0 | 0.108 | 0 | 0.442 | -0.005 | 0.178 | 0 | 0.18 | 0 |
| | | (0.023) | | (0.018) | | (0.033) | | (0.022) | | (0.021) |

Standard errors in parentheses. "Significant" coefficients in bold. The g prior in all the cases is the hyper-g.

2000, and then we save all the models. In the hyperparameter exercise, we increase the parameter $a$, that governs the distribution of the hyperprior $g$ (see eq. 3) to 3 and 4 (instead of 2.1 as it was before), following Liang et al. 2008. As can be seen, the results remain virtually unchanged during these exercises.

Hence, to summarise this section, the BMA analysis generally confirms the findings from the OLS analysis - that higher post-crisis growth requires supportive monetary and fiscal policy and healthy banking sector, that the 2008 crises is not different from the previous crises in terms of how the policy actions affect the recovery, and that the high public debt does not appear to slow-down growth during recovery through channels different from the governemnt consumption.

# V. Conclusion

This paper investigates how policy measures affect short-run GDP growth after economic crises. The measures that are in focus refer to the monetary policy, the fiscal policy and the banking regulation and supervision policy. The analysis is done on a sample of 47 episodes of economic crises in 22 countries from the last three decades. Careful definitions of the variables help us avoid the two biggest problems in an exercise like this - the problems of omitted variables and reverse causality. The results indicate that the effect of the three policies on short-term post-crisis growth is significant, both statistically and economically. The 2008 crisis does not seem to differ from the previous crises in terms of how the policy actions affect the recovery. The slower recovery after the 2008 crisis is explained by the global nature of this crisis, and our results indicate that the recovery would have been even slower if policy makers did not react timely and aggressively during the crisis, through unconventional monetary policy measures and through expansionary fiscal policy. Regarding the current debate in the literature on the appropriate fiscal policy during crises, we fail to find evidence that the fiscal multiplier is smaller during episodes of high public debt. Furthermore, we fail to find evidence that high public debt slows down post-crisis recovery, once the fiscal support is controlled for. These two facts can be interpreted as arguments in favour of pursuing expansionary fiscal policy during crises, in order to ensure solid recovery.

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# VI. Appendix

Table 9: Beginning and ending dates of the crises

| Crisis | Begin date | End date | Crisis | Begin date | End date |
|---|---|---|---|---|---|
| Argentina, 1994 | 1994Q2 | 1995Q3 | Malaysia, 1998 | 1998Q1 | 1998Q3 |
| Argentina, 2001 | 1998Q3 | 2002Q1 | Malaysia, 2008 | 2008Q3 | 2009Q1 |
| Argentina, 2008 | 2008Q4 | 2009Q2 | Mexico, 1982 | 1982Q1 | 1983Q2 |
| Belarus, 1995 | 1995Q1 | 1995Q4 | Mexico, 1995 | 1995Q1 | 1995Q2 |
| Belarus, 2008 | 2008Q4 | 2009Q2 | Mexico, 2008 | 2008Q3 | 2009Q2 |
| Bulgaria, 1996 | 1996Q1 | 1997Q1 | Norway, 1991 | 1991Q3 | 1991Q4 |
| Bulgaria, 2008 | 2008Q4 | 2009Q4 | Norway, 2008 | 2008Q3 | 2009Q2 |
| Chile, 1981 | 1981Q4 | 1982Q4 | Peru, 1982 | 1982Q2 | 1983Q3 |
| Chile, 2008 | 2008Q3 | 2009Q2 | Peru, 1988 | 1988Q1 | 1990Q3 |
| Colombia, 1998 | 1998Q2 | 1999Q2 | Peru, 2008 | 2008Q4 | 2009Q2 |
| Croatia, 1998 | 1998Q1 | 1999Q2 | Philippines, 1983 | 1983Q3 | 1985Q3 |
| Croatia, 2008 | 2008Q2 | 2010Q2 | Philippines, 1998 | 1998Q1 | 1998Q2 |
| Czech Republic, 1997 | 1997Q1 | 1998Q2 | Philippines, 2008 | 2008Q4 | 2009Q1 |
| Czech Republic, 2008 | 2008Q4 | 2009Q2 | Russia, 1998 | 1998Q1 | 1998Q3 |
| Finland, 1990 | 1990Q2 | 1993Q2 | Russia, 2008 | 2008Q3 | 2009Q2 |
| Finland, 2008 | 2008Q2 | 2009Q2 | Slovakia, 1998 | 1998Q2 | 1999Q4 |
| Indonesia, 1998 | 1998Q1 | 1998Q4 | Slovakia, 2008 | 2008Q4 | 2009Q1 |
| Jamaica, 1996 | 1996Q2 | 1996Q4 | Sweden, 1991 | 1991Q1 | 1993Q1 |
| Jamaica, 2008 | 2008Q2 | 2009Q3 | Sweden, 2008 | 2008Q3 | 2009Q3 |
| Japan, 1997 | 1997Q2 | 1998Q2 | Thailand, 1997 | 1997Q3 | 1998Q3 |
| Japan, 2008 | 2008Q2 | 2009Q1 | Thailand, 2008 | 2008Q2 | 2009Q1 |
| Korea, 1998 | 1998Q1 | 1998Q2 | Turkey, 1994 | 1994Q1 | 1994Q2 |
| Korea, 2008 | 2008Q2 | 2008Q4 | Turkey, 2001 | 2001Q1 | 2001Q4 |
| | | | Turkey, 2008 | 2008Q2 | 2009Q1 |

Table 10: Definitions of variables and data sources

| Variable | The way it is constructed | Source |
|---|---|---|
| Recovery | Average annualized GDP growth in the 3 years after the crisis has ended, minus average annualized GDP for the period since 1980 (or whenever the first GDP data are available). In percentage points. | IFS |
| IR | Average interest rate of the central bank during the crisis, minus average interest rate 4 quarters before the crisis. In percentage points. | IFS |
| Money | Increase in the real narrow money at the end of the crisis, vs. the last quarter before the crisis. In percents. | IFS and WDI |
| NER | Nominal exchange rate depreciation during the crisis, against the dollar, i.e. nominal exchange rate in the last quarter of the crisis vs. the exchange rate in the last quarter before the crisis. In percents. Positive values stand for depreciation. | IFS |
| Cap_adeq | Capital of the banking sector, as % of total assets in the banking sector, the year before the crisis. | WDI and central banks' reports |
| Gov_cons | Average year-on-year growth of real government consumption during the crisis, in percents. Real government consumption is obtained by dividing the nominal consumption by the CPI index. | IFS and WDI |
| Pub_debt | Public debt service, the year before the crisis, as percentage of GNI. | WDI and author's calculations* |
| Ext_debt | External debt the year before the crisis, as a percentage of GNI. | WDI and Reinhart and Rogoff (2010)** |
| Exports | Exports during the recovery, as percentage of GDP, relative to average exports for the whole period. | IFS and WDI |
| FDI | Foreign Direct Investment (net foreign direct investment in the country, excluding exceptional financing) during the recovery, as percentage of GDP, relative to average for the whole period. | IFS and WDI |
| Portfolio | Portfolio investment flows during the recovery, as a percentage of GDP, relative to the average for the whole period (name of the series in IFS: Portfolio Investment Liabilities, excluding Financial Derivatives and Exceptional Financing). | IFS |
| Cur_crisis | Dummy for currency crises. Constructed as in Frankel and Rose (1996), as a situation when the currency depreciates more than 30%, which is at least 10 percentage points more than in the previous year. Currency crises are: Argentina 2001, Indonesia 1998, Mexico 1982. Philippines 1983, Peru 1988, Thailand 1997, Turkey 2001, Bulgaria 1996 and Finland 1990. | Author's calculations |
| IMF | Dummy for IMF arrangement during the recovery. Takes a value of 1 for the following crises: Argentina 1994 and 2001, Belarus 2008, Colombia 1998, Indonesia 1998, Jamaica 2008, Korea 1998, Mexico 1995 and 2008, Philippines 1998, Russia 1998, Thailand 1997, Turkey 1994 and 2001, Bulgaria 1996, Croatia 1998. | IMF |
| Default | Dummy if the country defaulted during the crisis. Countries that defaulted are Argentina in 2001, Chile in 1981, Indonesia in 1998, Mexico in 1982, Peru in 1982, Philippines in 1983 and Russia in 1998. | Reinhart and Rogoff (2008, 2009) |
| Hi_ext_debt | Dummy for high external debt. Takes unitary value if external debt was above 40% of GNI. Countries with high external debt are Argentina in 2001 and 2008, Chile in 1981, Indonesia in 1998, Jamaica in 1996 and 2008, Malaysia in 1998, Peru in 1988, Philippines in 1983, 1998 and 2008, Thailand in 1997, Turkey in 2001, Japan in 2008, Bulgaria in 1996 and 2008, Finland in 1990 and 2008, Norway in 1991 and 2008, Slovakia in 1998 and 2008 and Sweden in 1991 and 2008. | Author's calculations |
| Hi_pub_debt | Dummy for high public debt. Takes unitary value if public debt service was above 3% of GNI. Highly indebted countries in our sample are Argentina in 2001, Bulgaria in 1996, Chile in 1981, Colombia in 1998, Indonesia in 1998, Jamaica in 1996 and 2008, Mexico in 1982, Peru in 1982 and 2008, Philippines in 1983, 1998 and 2008 and Turkey in 1994 and 2001, Norway in 1991 and Sweden in 1991. | Author's calculations |

*When there were no data on WDI on public debt service, this variable was constructed as a product between the level of public debt (from Abbas et al., 2010) and the 10-years government bond yield at that time, obtained from Trading Economics.

**When data on external debt were not available on WDI, the data from Reinhart and Rogoff (2011) was used. The two sources are very similar - their correlation is 90% (for the crises on which data are available through them both).

Table 11: Correlation matrix of the variables

| | Recovery | IR | M | NER | Cap_adeq | Gov_cons | Pub_debt | Ext_debt | FDI | exports | portfolio |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Recovery | 1 | 0.18 | -0.02 | 0.15 | 0.16 | -0.21 | 0.16 | -0.11 | 0.26 | 0.01 | -0.12 |
| IR | 0.18 | 1 | -0.68 | 0.99 | -0.03 | -0.45 | -0.07 | -0.05 | 0.07 | -0.21 | -0.10 |
| M | -0.02 | -0.68 | 1 | -0.64 | -0.29 | 0.59 | 0.01 | 0.21 | -0.17 | 0.18 | 0.23 |
| NER | 0.15 | 0.99 | -0.64 | 1 | -0.04 | -0.38 | -0.13 | -0.05 | 0.04 | -0.20 | -0.09 |
| Cap_adeq | 0.16 | -0.03 | -0.29 | -0.04 | 1 | -0.03 | -0.38 | -0.43 | 0.07 | -0.17 | -0.01 |
| Gov_cons | -0.21 | -0.45 | 0.59 | -0.38 | -0.03 | 1 | -0.41 | 0.03 | -0.15 | 0.08 | 0.15 |
| Pub_debt | 0.16 | -0.07 | 0.01 | -0.13 | -0.38 | -0.41 | 1 | 0.06 | 0.22 | 0.04 | -0.18 |
| Ext_debt | -0.11 | -0.05 | 0.21 | -0.05 | -0.43 | 0.03 | 0.06 | 1 | -0.27 | 0.14 | 0.50 |
| FDI | 0.26 | 0.07 | -0.17 | 0.04 | 0.07 | -0.15 | 0.22 | -0.27 | 1 | -0.17 | -0.22 |
| exports | 0.01 | -0.21 | 0.18 | -0.20 | -0.17 | 0.08 | 0.04 | 0.14 | -0.17 | 1 | -0.05 |
| portfolio | -0.12 | -0.10 | 0.23 | -0.09 | -0.01 | 0.15 | -0.18 | 0.50 | -0.22 | -0.05 | 1 |

Table 12: Results of the structural break test

| | |
|---|---|
| IR | -0.616*** |
| | (0.147) |
| M | 0.052** |
| | (0.023) |
| NER | 0.010*** |
| | (0.003) |
| cap_adeq | 0.543*** |
| | (0.159) |
| gov_cons | 0.141* |
| | (0.069) |
| FDI | 0.261 |
| | (0.163) |
| D2008 | 0.739 |
| | (4.106) |
| cur_crisis*IR | 0.680*** |
| | (0.148) |
| NER*hi_ext_debt | -0.010*** |
| | (0.003) |
| D2008*IR | 0.303 |
| | (0.603) |
| D2008*M | -0.002 |
| | (0.083) |
| D2008*NER | -0.052 |
| | (0.052) |
| D2008*cap_adeq | -0.216 |
| | (0.482) |
| D2008*gov_cons | -0.005 |
| | (0.151) |
| D2008*FDI | 0.276 |
| | (0.386) |
| D2008*NER*hi_ext_debt | 0.013 |
| | (0.128) |
| Constant | -2.088 |
| | (1.329) |
| Observations | 40 |
| $R^2$ | 0.612 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Robustness checks

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IR | -0.53** | | -0.61** | -0.64** | -0.00 | -0.44* | -0.44* | -0.26 | -0.75*** | -0.68*** | -0.50** | -0.43* | -0.55* |
| | (0.21) | | (0.23) | (0.24) | (0.01) | (0.23) | (0.23) | (0.20) | (0.19) | (0.20) | (0.22) | (0.23) | (0.29) |
| M | 0.05** | 0.04* | | 0.04* | 0.04* | 0.06*** | 0.04 | 0.04** | 0.05** | 0.06* | 0.06** | 0.04 | 0.05** |
| | (0.02) | (0.02) | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) | (0.03) | (0.02) |
| NER | 0.01*** | 0.01*** | 0.01** | | 0.00 | 0.01*** | 0.01** | 0.01*** | 0.01** | 0.01** | 0.01*** | 0.01*** | 0.01*** |
| | (0.00) | (0.00) | (0.00) | | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| cap_adeq | 0.43*** | 0.19* | 0.38*** | 0.47*** | | 0.38*** | 0.35*** | 0.27** | 0.51*** | 0.46*** | 0.43*** | 0.40** | 0.39*** |
| | (0.12) | (0.10) | (0.13) | (0.13) | | (0.11) | (0.11) | (0.12) | (0.12) | (0.12) | (0.13) | (0.15) | (0.12) |
| gov_cons | 0.15*** | -0.01 | 0.16*** | 0.03 | 0.06 | | 0.13** | 0.08 | 0.17*** | 0.17*** | 0.12** | 0.16*** | 0.08 |
| | (0.05) | (0.06) | (0.05) | (0.06) | (0.07) | | (0.06) | (0.06) | (0.05) | (0.05) | (0.06) | (0.05) | (0.07) |
| FDI | 0.28** | 0.23 | 0.19 | 0.27 | 0.18 | 0.31** | | 0.36** | 0.30** | 0.32** | 0.23** | 0.34* | 0.28** |
| | (0.11) | (0.18) | (0.13) | (0.16) | (0.15) | (0.14) | | (0.14) | (0.11) | (0.12) | (0.10) | (0.17) | (0.13) |
| D2008 | -2.20*** | -0.90 | -2.09** | -2.18** | -0.68 | -1.28 | -2.18** | | -2.62*** | -2.48** | -2.51** | -1.38 | -1.69** |
| | (0.78) | (0.83) | (0.82) | (0.88) | (0.75) | (0.83) | (0.83) | | (0.90) | (1.01) | (0.94) | (1.01) | (0.73) |
| cur_cri*IR | 0.60*** | | 0.67*** | 0.65** | 0.06** | 0.47** | 0.50** | 0.32 | 0.82*** | 0.75*** | 0.56** | 0.51** | 0.61** |
| | (0.21) | | (0.23) | (0.24) | (0.03) | (0.23) | (0.23) | (0.20) | (0.19) | (0.20) | (0.22) | (0.23) | (0.29) |
| NER*hi_ext_debt | -0.01*** | -0.01*** | -0.01** | | -0.00 | -0.01*** | -0.01** | -0.01*** | -0.01** | -0.01** | -0.01*** | -0.00 | -0.01*** |
| | (0.00) | (0.00) | (0.00) | | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.01) | (0.00) |
| Constant | -1.26 | 0.31 | -1.09 | -1.09 | 1.65*** | -1.15 | -0.57 | -1.14 | -1.68 | -1.24 | -1.29 | -1.65* | -1.29 |
| | (0.90) | (0.89) | (1.00) | (0.95) | (0.47) | (0.90) | (0.78) | (0.99) | (1.02) | (1.01) | (0.96) | (0.96) | (1.03) |
| Observations | 40 | 40 | 40 | 40 | 46 | 40 | 41 | 40 | 35 | 34 | 34 | 33 | 34 |
| $R^2$ | 0.54 | 0.24 | 0.48 | 0.33 | 0.22 | 0.42 | 0.42 | 0.42 | 0.60 | 0.57 | 0.59 | 0.54 | 0.53 |

Dependent variable in all specification is the recovery. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1