Cost of banking crises: Does the policy framework matter?*

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Abstract

This paper empirically investigates the impact of fiscal and monetary policy frameworks, and the impact of the exchange rate regime on the unconditional cost of banking crises. Due to their discipline and credibility-enhancing effects, stringent policy frameworks are expected to decrease the probability of banking crises. However, having the hands tied by such frameworks prevents policymakers from properly responding to crises if such an event occurs. Our analysis, based on a sample of 67 countries over the 1970-2012 period, reveals that extremely restrictive policy features such as corner exchange rate regimes, budget balance rules without "friendly" clauses and a high degree of both monetary policy conservatism and independence are conducive to a higher real cost of crises. In contrast, by combining discipline and flexibility, fiscal rules with easing clauses, intermediate exchange rate regimes and an inflation targeting framework can significantly contain the costs of banking crises. As such, we provide evidence of the benefits of "constrained discretion" regarding the real impact of banking crises.

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1 Introduction

Many efforts have been made thus far to identify the main determinants of the occurrence and cost of banking crises, especially in the wave of the recent global financial crisis. This issue is important because banking and financial crises are at the origin of balance sheet recessions, which are more harmful than real business cycle recessions (Reinhart and Reinhart, 2010; Taylor, 2015). Recent surveys indicate the role played by excess credit and debt, GDP per capita, exchange rate developments and current account deficits[1]. However, the effects of monetary and fiscal policy frameworks, as well as the impact of exchange rate regimes (ERRs), to a lesser extend, are largely ignored.

Generally speaking, the macroeconomic policy framework refers to all the characteristics that define and restrict the conduct of macroeconomic policies. Such a framework makes reference to formal arrangements such as fiscal rules, pegging or floating ERRs, inflation targeting (IT), and the degree of central bank independence (CBI). Some features may be less formal, such as the degree of central bank conservatism (CBC). Past and recent financial crises tend to suggest that they may constitute a determinant of both *ex ante* financial vulnerabilities (i.e. before the occurrence of a banking crisis) and the amplitude of banking crises *ex post* (i.e. in the aftermath of a banking crisis), which both explain the output losses due to banking crises.

Thus, the objective of this paper is to empirically assess the influence of monetary policy, fiscal policy and exchange rate frameworks on the cost of systemic banking crises, in terms of output losses. This is a serious issue, as policy frameworks may have opposite impacts.

On the one hand, a restrictive policy framework is supposed to yield important benefits. First, stringent policy arrangements such as fiscal rules or inflation targeting should enforce greater accountability and may discipline policymakers[2]. This should lead to stronger economic and banking sector stability. For instance, fiscal rules may push the sovereign premium down (Lara and Wolff, 2014) and reduce the risk of twin sovereign debt and banking crises. Moreover, a stringent fiscal framework gives financial room ("policy space"), that a policymaker can expect to bail out in the event of a banking crisis (Romer and Romer, 2017). Conversely, a high-inflation context, for example, is more subject to financial and banking crises (Bordo et al., 2002). Second, by strengthening time consistency of policies, restrictive policy frameworks are supposed to improve policymaker credibility. An extensive body of literature - since Kydland and Prescott (1977) - indicates the great importance of credibility for policy efficiency and success. While independent and discretionary decisions are socially suboptimal due to time inconsistency and political distortions, a restrictive policy framework seeks to strengthen policy stability and thus economic stability (Sargent, 1982). As such, financial disequilibrium and vulnerabilities that lead to financial and banking crises should be less likely in the presence of stringent policy frameworks.

On the other hand, as highlighted by the traditional rule *vs* discretion literature, restrictive

[1] See for instance the survey of Frankel and Saravelos (2012).

[2] The literature dedicated to the discipline-enhancing effect of fiscal policy rules is vast. See the recent meta-analysis provided by Heinemann et al. (2018).

frameworks may have some drawbacks. In particular, they lack flexibility to respond to unforeseeable and unquantifiable shocks (Athey et al., 2005). More generally, rules cannot foresee every contingency and they are inadequate if the economy has an unstable structure (Mishkin, 2017). Thus, as instability is a key feature of banking crises episodes, having the hands tied may render banking crises more costly. Next, as indicated by recent experience, restrictive policy frameworks are not sufficient to prevent financial and banking crises. They may in fact be counterproductive. Berger and Kißmer (2013) demonstrate that the more independent central bankers are, the more likely they are to refrain from implementing preemptive monetary tightening to maintain financial stability. Levieuge et al. (2018) find that the higher the degree of CBC, the higher the banking sector vulnerabilities. Similarly, while a fixed ERR *a priori* imposes market discipline, it can also create moral hazard, and by impeding the lender-of-last-resort mission of the central bank, excessive focus on parity can ultimately prevent stabilization of the economy following a banking crisis[3]. Finally, some stringent arrangements such as fiscal rules can induce procyclicality[4], which can worsen the negative impact of a banking crisis.

Against this background, we empirically investigate whether the discipline-enhancing effects of restrictive policy frameworks - and their underlying room for maneuvering - exceed (or not) the drawbacks related to the lack of flexibility. Given that the issue of the restrictiveness *vs* flexibility of policy arrangements has been neglected thus far in explaining the cost of a banking crisis, such a focus is the first original aspect of our contribution.

The second originality of this paper is to focus on the *unconditional* cost of banking crises. Actually, the existing literature focuses on the cost of banking crises conditional on having a banking crisis. However, this is conducive to a selection bias. This leads to neglect the factors that explain why a crisis does or does not occur, i.e. to neglect the factors of vulnerability that are conducive to a banking crisis. As aforementioned, the policy frameworks can have an impact on these financial vulnerabilities. In this perspective, the absence of a banking crisis constitutes an important information: a given policy framework can be responsible for a situation of crisis or, on the contrary, for a non-crisis situation. Similarly to a cost-benefit analysis perspective, we propose to gauge the global effect (positive, negative, neutral) of any policy framework on the unconditional cost of banking crises[5]. This is why we consider the unconditional cost of banking crises in a panel database reporting annual output losses related to banking crises for a sample of 67 countries over the period 1970-2012. The value of the dependent variable reported at any time for any country, may be zero or positive. Zeros mean no crisis or no cost in case of crisis.

Our dependent variable is characterized by a right-skewed distribution with a mass-point

[3]See Eichengreen and Hausmann (1999); Domac and Martinez Peria (2003).

[4]See Budina et al. (2012b, Tab. 1) and Bova et al. (2014).

[5]Another strand of the literature aims at explaining the probability of banking crises. Considering the sole occurrence of banking crises would also give insufficient information for normative prescriptions. First, such an approach does not address the severity of a crisis. The Figure A1 in Appendix shows that the cumulated output losses related to banking crises, as computed by Laeven and Valencia (2013), are widely dispersed. Interestingly, approximately 28% of reported banking crises imply no loss at all. One-third of the identified banking crises have a cumulative loss that is lower than 5% of the real GDP trend. Second, a given policy arrangement could have opposite effects on the probability of a crisis and on the conditional losses.

at zero which is incompatible with a Gaussian distribution. As a consequence, we use an estimator based on the Poisson distribution. This constitutes a third original aspect of our empirical approach.

As a whole, our results reveal that extremely restrictive policy features such as corner exchange rate regimes, budget balance rules without "friendly" clauses and a high degree of both monetary policy conservatism and independence are conducive to a higher real cost of crises. In contrast, by combining discipline and flexibility, fiscal rules with easing clauses, intermediate exchange rate regimes and an inflation targeting framework can significantly contain the costs of banking crises. These results are robust and still hold when banking regulation is taken into account. Overall, our findings show that middle-ground policy frameworks dominate extremely stringent policy arrangements. As such, we provide evidence of the benefits of policy frameworks based on "constrained discretion" to contain the real costs of banking crises.

The remainder of this paper is organized as follows. Section 2 reviews the literature on the main causes and consequences of costs related to banking crises. Section 3 presents the data, methodology and baseline estimates obtained with a set of traditional control variables. Then, the effects of fiscal policy rules, ERRs, and monetary policy arrangements are addressed in Sections 4, 5 and 6, respectively. Section 7 is devoted to robustness checks. Section 8 concludes.

2 Related Literature

Given the serious economic and social damage that banking crises can cause, the academic literature on the causes and consequences of banking crises is relatively abundant (see, e.g. Laeven, 2011). In this section, we focus on studies having assessed the economic costs of banking crises and their determinants.

Among the potential factors driving the real cost of banking crises, several papers note the role of excessive leverage and credit growth, particularly when the latter feeds asset and real estate price bubbles (Berkmen et al., 2012; Frankel and Saravelos, 2012; Feldkircher, 2014). Moreover, as Sachs et al. (1996) argue, a rapid pre-crisis credit growth is likely to be associated with a decline in lending standards, amplifying the vulnerability of the banking sector and the risk of credit crunch when the crisis occurs.

Empirical evidence also suggests that the severity of banking crises largely depends on the initial level of financial development and the size of the banking sector, especially within developing and emerging countries (Kroszner et al., 2007; Furceri and Mourougane, 2012). This result can be simply explained by the fact that the level of financial development partly explains the size of the shock, and then economies with deeper financial systems are more severely affected during times of crisis.

Furthermore, some papers examine the role of banking regulation and supervision (see, e.g. Giannone et al., 2011). In particular, Angkinand (2009) finds that bank capital regulation and deposit insurance coverage are negatively related to the real cost of banking crises.

More generally, output losses after a banking crisis are related to the structural features of the economy, such as trade openness, export diversification, current account balance, or the quality of domestic institutions. For instance, one would expect that economies with greater trade openness should suffer less output decline than closed economies, in the aftermath of a banking crisis, as they have the ability to export goods and services to compensate for lower domestic demand (Gupta et al., 2007).

Finally, recent work also investigates concerns about the role of domestic macroeconomic policies in mitigating output losses associated to banking crises. These studies must face endogeneity issue, as the size of the supportive policy measures largely depends on the crisis intensity. Furceri and Mourougane (2012) address this issue by estimating an exogenous measure of discretionary fiscal policy. They find that stimulating aggregate demand through a countercyclical fiscal policy helps to reduce the real cost of banking crises in both the short and medium term. Similarly, their results indicate that an expansionary monetary policy significantly reduces output losses.

However, despite the extensive literature on banking crises, relatively little is known about how the policy framework influences the real cost of banking crises. Empirical investigation on the resilience of the IT framework to large shocks, such as the recent financial crisis, does not provide clear-cut conclusion (see, e.g. de Carvalho Filho, 2011; Petreski, 2014). The influence of the ERR is also discussed: according to the so-called bipolar view, corner regimes (pegging and pure floating) should provide better performance. However, this point of view is challenged. Tsangarides (2012) finds that growth performance for pegs was not statistically different from that of floats during the global financial crisis. On the contrary, according to Berkmen et al. (2012) and Furceri and Mourougane (2012), countries with a flexible ERR are characterized by a more rapid recovery in the aftermath of a crisis. Last, Berkmen et al. (2012) find little evidence for the importance of other policy variables.

Hence, additional research is needed to empirically investigate to what extent policy frameworks influence the resilience of economies to a banking crisis.

3 Measures, Methodology and Data

This section is dedicated to the data and methodology that we use in this paper. We also present some preliminary results obtained with a set of usual control variables.

3.1 Measuring the Cost of Banking Crises

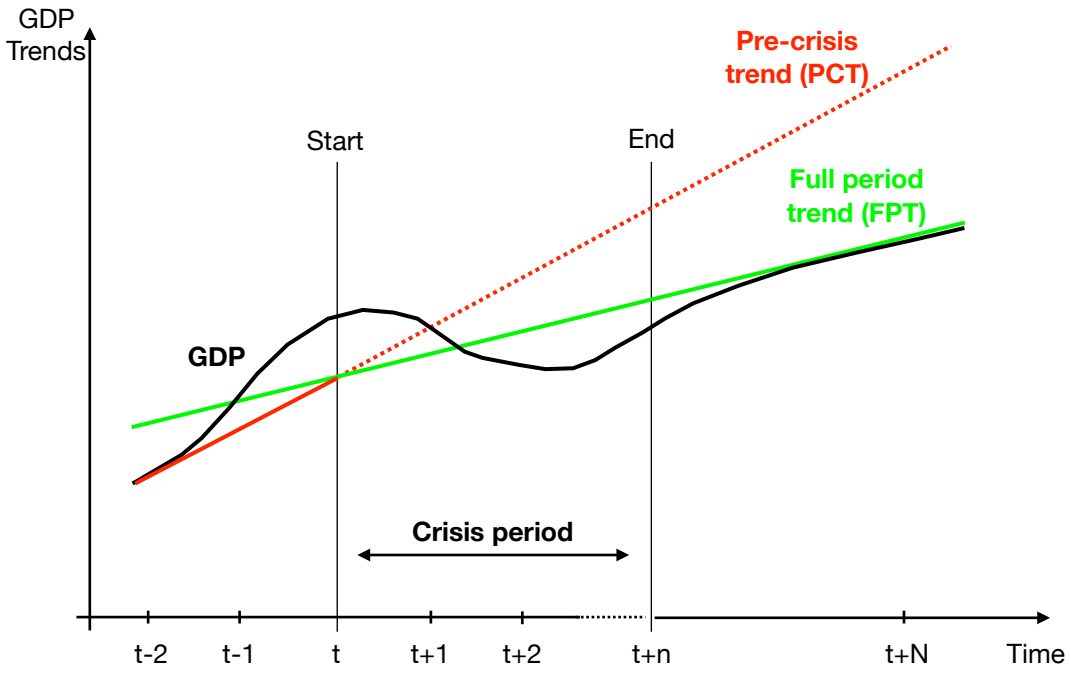
As aforementioned, our dependent variable measures the unconditional cost of banking crises, which is defined such as:

$$y_{i,t}^{k} = \begin{cases} \tilde{y}_{i,t}^{k} & \text{when a banking crisis occurs} \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

It is equal to zero in the absence of banking crisis at time t in country i, or equal to $\tilde{y}_{i,t}^{k}$ in case of banking crisis. In other words, $\tilde{y}_{i,t}^{k} \in \mathbb{R}^{+}$ represents the costs conditional on a banking crisis. As usual in the literature, these conditional costs are measured in terms of losses in output. $k = \{5year, all, trend, cycle\}$ corresponds to the four alternative measures which we consider. Three of them are based on the loss in GDP with respect to its trend[6]. Additionally, we provide an alternative original measure which is the loss in the trend itself.

The Figure 1 illustrates the different ways of computing $\tilde{y}_{i,t}^{k}$. The two thin vertical lines indicate the starting and ending dates of the banking crisis. In practice, we use the information about the timing of the systemic banking crises provided by Laeven and Valencia (2013). The black curve represents the actual real GDP. The red dotted line stands for the pre-crisis GDP trend - noted as $PCT_{i,t}$ - extrapolated regardless of a possible change in GDP trend due to the banking crisis. Finally, the green line is the GDP trend - noted as $FPT_{i,t}$ - computed over the full period (including the crisis period).

Figure 1: Illustration of output and trend losses



As in Wilms et al. (2018), our first measure, noted as $\tilde{y}_{i,t}^{5year}$ ("$loss\_5years$" in the tables of results), is computed as the gap between the actual GDP and the extrapolated Hodrick-Prescott (HP) pre-crisis trend. Extrapolation is based on the average growth rate of the HP trend over the five years preceding the beginning of the banking crisis. The measure of loss is expressed as a percentage of the pre-crisis GDP trend, such as:

$$\tilde{y}_{i,t}^{5year} = \frac{PCT_{i,t} - GDP_{i,t}}{PCT_{i,t}} \tag{2}$$

In Figure 1, this measures refers to the difference between the dotted red line (the extrap-

[6]See, e.g. Abiad et al. (2009); Angkinand (2009); Feldkircher (2014).

olated pre-crisis trend) and the black curve (the actual GDP) over the crisis period[7]. Such an extrapolated trend may be overstated if a boom in the activity occurred just before the crisis. Thus, following Laeven and Valencia (2013), an alternative extrapolation is based on the average growth rate of the GDP trend over a longer pre-crisis period, precisely from the first observation to the year before the start of the crisis. This second measure of output loss is noted as $\tilde{y}_{i,t}^{all}$ ("$loss\_all$" in the tables of results).

Moreover, banking crises can have hysteresis effects that decrease potential output (Furceri and Mourougane, 2012; Cerra and Saxena, 2017). Unfortunately, data required for computing potential output (especially data on capital stock) are not available for all the countries in our sample. Hence, we compute losses in GDP trend as a proxy for losses in potential GDP. In Figure 1, the corresponding measure refers to the gap between the dotted red line and the green line over the crisis period. It is labeled $\tilde{y}_{i,t}^{trend}$ ("$trend\_loss$") and defined as follows:

$$\tilde{y}_{i,t}^{trend} = \frac{PCT_{i,t} - FPT_{i,t}}{PCT_{i,t}} \tag{3}$$

where $FPT_{i,t}$ corresponds to the HP filter trend computed over the full sample.

Finally, if a significant loss is found for a given country i in time t, it is of interest to determine whether this loss is due to a change in the GDP trend as measured by $\tilde{y}_{i,t}^{trend}$ and/or due to a cyclical, temporary deviation of GDP from this - possible lower and decreasing - trend. In Figure 1, this "cycle loss" corresponds to the difference between the green line (current trend) and the black curve (actual GDP). More formally, this fourth measure of output loss is noted $\tilde{y}_{i,t}^{cycle}$ ("$cycle\_loss$"), and computed as follows:

$$\tilde{y}_{i,t}^{cycle} = \frac{FPT_{i,t} - GDP_{i,t}}{FPT_{i,t}} \tag{4}$$

The next section provides details on the econometric model that is used to estimate the influence of policy frameworks on these measures of banking crises losses.

3.2 The Appropriate Econometric Model

In line with the definition of our dependent variable, we consider a panel structure in our database by reporting an annual loss for each country (67) and each year, from 1970 to 2012. A large proportion of losses are equal to zero. Zeros occur because (1) some countries did not experience a banking crisis in a given year or (2) some crises did not trigger significant real losses. Even if this zero lower bound can be treated as a censored variable, using a Tobit regression model is not suitable in this case. First, the cost of banking crises is not truly left-censored as the zeros are not necessarily set for substituting unobserved negative values. The loss in GDP is by definition a non-negative variable. Second, according to Hurd (1979) and Santos Silva and Tenreyro (2006), Tobit models produce inconsistent and biased parameter estimates when

[7]Note that when GDP exceeds the extrapolated trend, which is possible particularly at the beginning of the crisis, the negative loss is censored to zero.

the assumption of homoscedasticity is violated, as is the case in our sample. In addition, the Tobit model assumes that the dependent variable follows a truncated Gaussian distribution. However, this is a strong assumption in our case, as our real loss measures are characterized by a right-skewed distribution with a mass point at zero. Under these circumstances, applying a Tobit model would raise significant shortcomings. In particular, the misspecification of the likelihood function would result in biased and inefficient estimates (Arabmazar and Schmidt, 1982).

To overcome this issue, we use a random-effects Poisson regression model. Even if the original motivation of the standard Poisson is to model count data, this methodology can also be used for continuous variables. Moreover, the Poisson methodology performs well when the proportion of zeros is very large (Santos Silva and Tenreyro, 2011). This is why the Poisson estimator is commonly used in empirical studies on bilateral trade, for example, which is a positive-continuous variable and which refers to a large number of zeros (as many countries do not trade among themselves)[8]. Furthermore, it is justified to use this method in our case because, by admitting a point mass at zero, the Poisson distribution properly fits with the (numerous) cases of no crisis. Last, a Poisson model theoretically assumes that the variance of the dependent variable is equal to its mean value. However, the overdispersion issue is not so important (Wooldridge, 2015) and can be easily addressed in our case by the inclusion of random effects. The random-effects Poisson model explicitly models data with heteroskedasticity and captures unobserved time-invariant heterogeneity at the country level[9].

In sum, using a random-effects Poisson pseudo-maximum likelihood estimator is well suited to the large proportion of zeros and the non-normal distribution of our data, to address the overdispersion of the standard Poisson estimator and to control for heterogeneity across countries. We precisely estimate the parameters of the following equation:

$$y_{i,t}^{k} = \xi_i \exp\left(\beta_0 + \sum_{s=1}^{9} \beta_s X_{s,i,t-1} + \beta_{PF} PF_{i,t-1} + \delta_t + \epsilon_{i,t}\right) \tag{5}$$

where $y_{i,t}^{k}$ is one of the four measures of real losses related to banking crises, as defined by (1). $X_{s,i,t-1}$ refers to the control variables, which are lagged once (unless specified otherwise) to capture the impact of pre-crisis conditions and to address the issue of potential simultaneity bias. For the same reasons, the variables capturing the policy framework, noted $PF_{i,t-1}$, which are included one by one, are considered with a one-year lag. The term ξ_i represents the individual random effects, which are supposed to follow a Gamma distribution[10]. Finally, δ_t represents the time fixed effects capturing the impact of global shocks that may affect all countries in a given year, and $\epsilon_{i,t}$ is the error term.

[8] See, e.g., Waugh (2010).

[9] In our case, fixed-effects estimator would lead to a selection bias. Indeed, such an approach would omit all the countries that did not experience a banking crisis (see Table C1 in Appendix).

[10] For parsimony purpose, the shape parameter of the Gamma distribution is not reported in the tables of results but available upon request. Note that this parameter is always found significantly different from zero, which means that data suffer from an overdispersion issue. Thus the inclusion of the random effects improves the model relative to the standard Poisson model.

3.3 Preliminary Results with the Control Variables

According to the literature, several factors seem to significantly explain the severity of banking crises. They are considered as control variables in our analysis. We retain nine control variables, which can be divided into four groups. Further details are provided in Table B1 in Appendix.

Macroeconomic and financial characteristics. We consider three variables concerning macroeconomic and financial characteristics. First, *GDP per capita* captures the level of economic development. Moreover, as usual, it is expected to deal with the heterogeneity of the countries in the sample. Second, we consider the *inflation rate*, which is expected to positively affect the banking crises losses. Indeed, a high pre-crisis inflation rate reflects poor macroeconomic policy (Angkinand, 2009) and gives rise to imbalances that are conducive to a banking crisis (Demirgüç-Kunt and Detragiache, 1998; Klomp, 2010). Third, we control for the effects of banking sector size, through the *credit-to-GDP* ratio, as in Abiad et al. (2011). These three variables come from the World Development Index (WDI) database.

Real and financial vulnerabilities. We consider the credit-to-GDP gap as a key measure of financial vulnerability[11]. It is widely recognized that excess credit is conducive to distress for the banking sector[12]. The higher the excessive credit, the higher the nonperforming loans are in the case of crisis and, thus, the higher the inherent real cost is. Note that, given its regulatory importance, banking capital could have been viewed as an alternative candidate. However, bank capital is mainly a buffer against losses (Beltratti and Stulz, 2012; Berger and Bouwman, 2013) and not a factor triggering a banking crisis (Jorda et al., 2017). Moreover, a median or mean value of national bank capital is not representative of the vulnerability of a given country, as it depends on the size of the credit institutions that are potentially undercapitalized. Furthermore, bank capital does not constitute a discriminant measure of vulnerability because many countries have aligned themselves with the recommendation of the Basel Committee on Banking Supervision since the late 1980s (Levieuge et al., 2018).

We also address macroeconomic vulnerability by considering the level of public debt (as a percentage of GDP), taken from the database of Abbas et al. (2010). Basically, countries with higher pre-crisis debt are supposed to have less fiscal space during a crisis (Romer and Romer, 2017). In addition, some empirical studies indicate that the higher the public debt, the steeper the downturns are in the case of crisis (Blanchard et al., 2010).

Global financial stress. An important number of simultaneous crises around the world may imply spillover effects and restrain flows (exports, foreign direct investments) that should normally contain the crisis severity (Detragiache and Ho, 2010). Similarly, "twin crises" are associated with larger output losses[13]. Thus, we control for these aggravating factors through

[11] The results obtained with the credit-to-deposit ratio, as an alternative measure of financial vulnerability, are quite similar to those obtained with the credit-to-GDP gap. They are available upon request.

[12] See, e.g. Schularick and Taylor (2012) and Aikman et al. (2015).

[13] See e.g. Kaminsky and Reinhart (1999); Hoggarth et al. (2002); Abiad et al. (2009); Angkinand (2009); Gourinchas and Obstfeld (2012).

the inclusion of two variables. The first one is a count variable standing for the number of simultaneous banking crises at time t. More precisely, crises are considered as simultaneous when they happen in the same year or in adjacent years. The second variable is the dummy variable proposed by Reinhart and Rogoff (2009) which takes the value of 1 when a domestic currency crisis occurred in time t and 0 otherwise.

Policy responses. The last set of control variables concerns the fiscal and monetary responses that intend to sustain economic recovery in the aftermath of a crisis. Because of automatic stabilizers, public spending is endogenous to losses. Thus, they do not rigorously stand for the deliberate response of fiscal authorities. Discretionary government spendings should be considered instead (Furceri and Zdzienicka, 2012; Gupta et al., 2009). To this end, we use the indicator on discretionary fiscal policy suggested by Ambrosius (2017). This indicator is obtained by regressing the change in fiscal expenditure relative to GDP on both contemporaneous and one-year lagged GDP growth[14]. The estimated residuals derived from this regression represent the measure of discretionary fiscal policy, as they only contain the fiscal expenditure component that is not driven by GDP growth. Next, we control for the cleaning up afterward performed by monetary policy. In light of the recent crisis, considering the level of the interest rate level would be insufficient. Instead, we retain the level of central bank assets. Note that these policy variables are lagged one period to address the transmission delay of policy measures and potential simultaneity bias.

Table 1 presents the results that we obtain while regressing our four alternative measures of banking crises losses on the set of nine control variables. Except the variables measuring international financial stress, all the control variables are lagged one period. The estimation covers 2193 observations, including 212 in time of crises. The results confirm that the inflation and credit-to-GDP ratio positively affect the cost of banking crises. The effects are less clear for GDP per capita, which has a positive impact on *loss_all* and *trend_loss* but no significant impact on the two other measures of losses. Regarding real and financial vulnerabilities, we find that the credit-to-GDP gap and public debt ratio significantly increase the losses associated to banking crises. Concerning global financial stress, the results confirm that a concomitant currency crisis significantly increases the banking crises losses. Nevertheless, the number of simultaneous banking crises worldwide at time t has no significant impact. Finally, we find that the fiscal response significantly contain the cost of banking crises. In contrast, the monetary policy response is only significant for the *cycle_loss* variable. This result is in line with Borio and Zabai (2016) who find that unconventional monetary policy "*have succeeded in influencing financial conditions even though their ultimate impact on output and inflation is harder to pin down*". Overall, this set of essential control variables yields satisfactory results. As they are conceptually important, the "simultaneous crisis" and monetary policy variables are kept in the set. Now, we can investigate the impact of different fiscal, exchange rate and monetary policy features on the unconditional costs of banking crises.

[14]Similarly to Ambrosius (2017), we also include the annual inflation rate and oil prices as control variables.

Table 1: Preliminary results with control variables

	loss_5years	loss_all	trend_loss	cycle_loss
GDP per capita	0.001	0.002**	0.003**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.005***	0.004***	0.002**	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Bank credit / GDP	0.028***	0.027***	0.029***	0.021***
	(0.002)	(0.001)	(0.002)	(0.003)
Credit-to-GDP gap	0.719***	0.692***	0.574***	1.070***
	(0.190)	(0.162)	(0.212)	(0.286)
Public debt / GDP	0.025***	0.027***	0.027***	0.024***
	(0.002)	(0.001)	(0.002)	(0.003)
Simultaneous crisis	0.002	0.002	0.002	0.019
	(0.006)	(0.005)	(0.006)	(0.013)
Currency crisis	0.824***	0.571***	0.835***	0.958***
	(0.081)	(0.070)	(0.087)	(0.125)
Discret. gov. consumption	-3.412***	-2.044***	-1.731***	-3.988***
	(0.473)	(0.379)	(0.510)	(0.660)
CB assets	0.002	-0.006	0.008	-0.016**
	(0.005)	(0.004)	(0.006)	(0.008)
Constant	-3.043***	-2.934***	-3.680***	-3.490***
	(0.354)	(0.321)	(0.379)	(0.432)
Observations	2,193	2,193	2,193	2,193
Number of countries	67	67	67	67
Crisis obs.	212	212	212	212
Year FE	YES	YES	YES	YES

Notes: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

4 The Impact of Fiscal Rules

We first focus on fiscal policy rules as a restrictive policy framework. According to a vast literature, fiscal policy rules represent restrictions that are discipline-enhancing[15]. This may reduce the risk of a sovereign debt crisis and the risk of twin sovereign-banking crises. Moreover, rules are a way to forge the credibility of policymakers, which is important for the efficiency and the success of economic policies. However, in case of crisis, even if rules can offer policy space to respond to shocks (Klomp, 2010; Romer and Romer, 2017), all these advantages may be offset by a lack of flexibility and by the possible procyclicality. Thus, tied hands may make the crisis more costly. The global impact of fiscal rules on the cost of banking crises has to be gauged. To this end, we rely on database on policy rules provided by Schaechter et al. (2012)[16]. We consider three types of rules:

- *Expenditure rules*, which are defined as limits on government spending;
- *Budget balance rules*, which correspond to constraints on public deficit;
- *Debt rules*, which refer to limits or targets for the debt-to-GDP ratio.

Each rule is coded through a binary variable that takes a value of 1 if the rule was adopted by a country i at time t and 0 otherwise. As another way of measuring the constraints surrounding fiscal policy, we also consider a count variable defined as the number of rules simultaneously prevailing at time t in country i.

The results of the estimates with the successive inclusion of the four variables related to fiscal rules are reported in Tables 2 and 3. As the control variables were already discussed[17], we focus on the variables of interest (in bold characters). We find that fiscal rules have a negative and significant effect on the cost of banking crises. This result suggests that the discipline and credibility-enhancing effects would overcome the potential adverse effects of rules. However, this finding may rely on the potential existence of "flexibility clauses", which allow for easing the fiscal constraints in times of need. More precisely, two types of clauses generally exist. First, "investment-friendly" clauses allow to exclude some specific spending, such as social transfers or interest payments, from expenditure rules. Second, "cycle-friendly" clauses modulate the limit of the budget balance rule according to the position of the economy in the business cycle. To test the impact of such clauses, we define two dummy variables. the first dummy variable takes a value of 1 when the fiscal rule is accompanied by a clause and 0 otherwise. The second dummy variable is set equal to 1 when the rule is set without clause and is equal to 0 otherwise[18]. These dummies are included together in the regressions. They have to be interpreted with respect to a situation without rules at all.

[15] See, e.g. Agnello et al. (2013); Bergman et al. (2016); Burret and Feld (2018) for the most recent contributions. Interestingly, Eyraud et al. (2018) show that fiscal rules can reduce the deficit bias even when they are not complied with.

[16] Details and updates are provided by Budina et al. (2012a); Bova et al. (2015); Lledó et al. (2017). Revenue rules are ignored because they are not actually related to fiscal discipline and are quite rare.

[17] Incidentally, we note that while the sample size is twice as small in this case (decreasing from more than 2.000 observations to 977), the control variables remain widely significant, which indicates robustness.

[18] Information still comes from the dataset provided by Schaechter et al. (2012).

Table 2: The impact of public expenditure and budget balance rules on the real costs of banking crises

	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Fiscal Rule	**-1.605*** **	**-1.835*** **	**-2.000*** **	**-1.046*** **	**-0.165**	**-0.455*** **	**-0.440** **	**-0.117**
	(0.201)	**(0.181)**	**(0.225)**	**(0.332)**	**(0.187)**	**(0.162)**	**(0.213)**	**(0.298)**
GDP per capita	-0.000	0.001	0.003	-0.001	-0.003**	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Inflation	-0.001	-0.001	-0.000	0.000	0.001	0.002***	0.002	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank credit / GDP	0.051***	0.054***	0.044***	0.033***	0.049***	0.049***	0.041***	0.033***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)
Credit-to-GDP gap	2.079***	2.024***	1.204***	3.615***	2.170***	1.949***	1.249***	3.574***
	(0.365)	(0.296)	(0.397)	(0.558)	(0.364)	(0.294)	(0.391)	(0.565)
Public debt / GDP	0.051***	0.049***	0.041***	0.058***	0.049***	0.045***	0.039***	0.055***
	(0.003)	(0.003)	(0.003)	(0.007)	(0.003)	(0.003)	(0.003)	(0.007)
Simultaneous crisis	0.034***	0.030***	0.020***	0.064***	0.029***	0.024***	0.016**	0.054***
	(0.006)	(0.006)	(0.007)	(0.015)	(0.006)	(0.006)	(0.007)	(0.014)
Currency crisis	1.305***	0.552***	0.998***	1.804***	1.128***	0.458***	0.816***	1.706***
	(0.141)	(0.109)	(0.140)	(0.210)	(0.134)	(0.106)	(0.133)	(0.205)
Discret. gov. consumption	-2.688***	-0.163	-2.052**	-0.292	-1.644**	0.406	-0.939	0.004
	(0.826)	(0.564)	(0.870)	(1.046)	(0.803)	(0.545)	(0.830)	(1.022)
CB assets	0.087***	0.054***	0.041***	0.042**	0.083***	0.042***	0.033***	0.042**
	(0.011)	(0.009)	(0.011)	(0.016)	(0.011)	(0.009)	(0.011)	(0.017)
Constant	-4.918***	-4.651***	-4.595***	-6.092***	-4.711***	-4.335***	-4.103***	-6.099***
	(0.585)	(0.518)	(0.571)	(0.801)	(0.586)	(0.498)	(0.539)	(0.823)
Observations	977	977	977	977	977	977	977	977
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	130	130	130	130	130	130	130	130
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table 3: The impact of debt fiscal rules and number of rules on the real costs of banking crises

	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Fiscal Rule	**-1.818*** **	**-2.174*** **	**-2.122*** **	**-1.679*** **	**-0.591*** **	**-0.690*** **	**-0.769*** **	**-0.426*** **
	(0.231)	**(0.196)**	**(0.241)**	**(0.393)**	**(0.079)**	**(0.067)**	**(0.087)**	**(0.131)**
GDP per capita	0.001	0.002	0.002	-0.000	0.000	0.002	0.003	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Inflation	0.002	0.002**	0.003*	0.002	0.001	0.001	0.002	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Bank credit / GDP	0.050***	0.053***	0.040***	0.035***	0.050***	0.053***	0.042***	0.034***
	(0.004)	(0.003)	(0.003)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)
Credit-to-GDP gap	2.003***	1.847***	0.987**	3.347***	2.013***	1.831***	0.983**	3.440***
	(0.377)	(0.304)	(0.408)	(0.564)	(0.369)	(0.297)	(0.401)	(0.555)
Public debt / GDP	0.050***	0.047***	0.037***	0.058***	0.052***	0.049***	0.041***	0.058***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.003)	(0.007)
Simultaneous crisis	0.025***	0.021***	0.012*	0.052***	0.030***	0.026***	0.016**	0.059***
	(0.006)	(0.006)	(0.007)	(0.015)	(0.006)	(0.006)	(0.007)	(0.015)
Currency crisis	1.135***	0.450***	0.832***	1.734***	1.225***	0.497***	0.911***	1.778***
	(0.135)	(0.106)	(0.135)	(0.210)	(0.138)	(0.107)	(0.138)	(0.209)
Discret. gov. consumption	-1.366*	0.430	-0.763	0.075	-1.931**	0.261	-1.302	-0.130
	(0.802)	(0.535)	(0.832)	(1.010)	(0.810)	(0.540)	(0.849)	(1.023)
CB assets	0.058***	0.025***	0.006	0.024	0.069***	0.035***	0.015	0.033**
	(0.012)	(0.009)	(0.012)	(0.017)	(0.011)	(0.009)	(0.011)	(0.017)
Constant	-4.693***	-4.185***	-3.503***	-5.931***	-4.711***	-4.316***	-3.795***	-5.893***
	(0.587)	(0.526)	(0.568)	(0.829)	(0.580)	(0.518)	(0.561)	(0.807)
Observations	977	977	977	977	977	977	977	977
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	130	130	130	130	130	130	130	130
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table 4: The impact of fiscal rules with clauses on the real costs of banking crises (1)

	Expenditure rule (1)				Budget balance rule (2)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Rule with clause	**-1.106*** **	**-1.599*** **	**-1.511*** **	**-0.884** **	**-3.680*** **	**-3.709*** **	**-4.100*** **	**-2.559*** **
	(0.228)	**(0.197)**	**(0.252)**	**(0.352)**	**(0.437)**	**(0.366)**	**(0.487)**	**(0.731)**
Rule without clause	**-2.579*** **	**-2.481*** **	**-2.907*** **	**-2.373*** **	**0.861*** **	**0.257**	**0.426**	**0.568***
	(0.307)	**(0.268)**	**(0.328)**	**(0.671)**	**(0.233)**	**(0.183)**	**(0.271)**	**(0.331)**
GDP per capita	-0.001	0.001	0.002	-0.001	0.010***	0.010***	0.014***	0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
Inflation	-0.001	-0.000	0.000	0.001	0.003**	0.002***	0.003*	0.003**
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Bank credit / GDP	0.056***	0.056***	0.050***	0.035***	0.056***	0.057***	0.051***	0.034***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.004)	(0.006)
Credit-to-GDP gap	1.741***	1.743***	0.696*	3.439***	2.055***	1.806***	0.855**	3.330***
	(0.376)	(0.300)	(0.411)	(0.564)	(0.388)	(0.302)	(0.418)	(0.558)
Public debt / GDP	0.053***	0.048***	0.041***	0.058***	0.047***	0.046***	0.037***	0.054***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.004)	(0.007)
Simultaneous crisis	0.036***	0.029***	0.021***	0.066***	0.013**	0.014**	0.001	0.046***
	(0.006)	(0.006)	(0.007)	(0.015)	(0.007)	(0.006)	(0.007)	(0.015)
Currency crisis	1.312***	0.544***	1.039***	1.761***	1.167***	0.452***	0.944***	1.704***
	(0.142)	(0.109)	(0.144)	(0.209)	(0.141)	(0.108)	(0.139)	(0.211)
Discret. gov. consumption	-2.711***	-0.225	-2.139**	-0.295	-2.360***	0.088	-1.901**	-0.232
	(0.833)	(0.562)	(0.878)	(1.042)	(0.831)	(0.562)	(0.871)	(1.047)
CB assets	0.082***	0.050***	0.035***	0.039**	0.119***	0.058***	0.066***	0.050***
	(0.012)	(0.010)	(0.011)	(0.017)	(0.013)	(0.010)	(0.012)	(0.017)
Constant	-5.245***	-4.593***	-4.702***	-6.172***	-6.420***	-5.691***	-5.757***	-6.447***
	(0.607)	(0.530)	(0.586)	(0.841)	(0.648)	(0.571)	(0.646)	(0.845)
Observations	977	977	977	977	977	977	977	977
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	130	130	130	130	130	130	130	130
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here, we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider potential cycle-friendly clauses in budget balance rules.

Table 5: The impact of fiscal rules with clauses on the real costs of banking crises (2)

	Expenditure rule (1)				Budget balance rule (2)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Rule flex.	**-1.846****	**-3.914*****	**-3.138*****	**-1.165**	**-15.582*****	**-15.094*****	**-16.826*****	**-10.806*****
	(0.895)	**(0.774)**	**(0.982)**	**(1.488)**	**(1.685)**	**(1.418)**	**(1.838)**	**(2.900)**
Rule flex. (squared)	**-0.733**	**1.434***	**0.231**	**-1.208**	**16.442*****	**15.351*****	**17.252*****	**11.375*****
	(0.979)	**(0.850)**	**(1.063)**	**(1.831)**	**(1.654)**	**(1.395)**	**(1.764)**	**(2.914)**
GDP per capita	-0.001	0.001	0.002	-0.001	0.010***	0.010***	0.014***	0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
Inflation	-0.001	-0.000	0.000	0.001	0.003**	0.002***	0.003*	0.003**
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Bank credit / GDP	0.056***	0.056***	0.050***	0.035***	0.056***	0.057***	0.051***	0.034***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.004)	(0.006)
Credit-to-GDP gap	1.741***	1.743***	0.696*	3.439***	2.055***	1.806***	0.855**	3.330***
	(0.376)	(0.300)	(0.411)	(0.564)	(0.388)	(0.302)	(0.418)	(0.558)
Public debt / GDP	0.053***	0.048***	0.041***	0.058***	0.047***	0.046***	0.037***	0.054***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.004)	(0.007)
Simultaneous crisis	0.036***	0.029***	0.021***	0.066***	0.013**	0.014**	0.001	0.046***
	(0.006)	(0.006)	(0.007)	(0.015)	(0.007)	(0.006)	(0.007)	(0.015)
Currency crisis	1.312***	0.544***	1.039***	1.761***	1.167***	0.452***	0.944***	1.704***
	(0.142)	(0.109)	(0.144)	(0.209)	(0.141)	(0.108)	(0.139)	(0.211)
Discret. gov. consumption	-2.711***	-0.225	-2.139**	-0.295	-2.360***	0.088	-1.901**	-0.232
	(0.833)	(0.562)	(0.878)	(1.042)	(0.831)	(0.562)	(0.871)	(1.047)
CB assets	0.082***	0.050***	0.035***	0.039**	0.119***	0.058***	0.066***	0.050***
	(0.012)	(0.010)	(0.011)	(0.017)	(0.013)	(0.010)	(0.012)	(0.017)
Constant	-5.245***	-4.593***	-4.702***	-6.172***	-6.420***	-5.691***	-5.757***	-6.447***
	(0.607)	(0.530)	(0.586)	(0.841)	(0.648)	(0.571)	(0.646)	(0.845)
Observations	977	977	977	977	977	977	977	977
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	130	130	130	130	130	130	130	130
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.
(1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider potential cycle-friendly clauses in budget balance rules.

The corresponding results are reported in Table 4. First, expenditures rules without clauses appear to have as much negative impact on the real banking crises losses as expenditure rules with clauses. A different pattern emerges for budget balance rules: budget balance rules with flexibility clauses have a highly negative impact on the banking crises costs, even higher than the effect of expenditure rules (irrespective of the existence of flexibility clauses)[19]. However, budget balance rules without clauses tend to increase the real losses associated to banking crises. Thus, the favorable effect of budget balance rules that we have previously found is significantly explained by the existence of clauses that render such rules more flexible.

Hence, the results indicate that while rules have positive effects, the fiscal policy framework better contain the costs of banking crises when the constraints are accompanied by some flexibility. To address this perspective, we conduct additional tests by considering that expenditure and budget balance rules take three values in increasing order of restrictiveness: 0 when no rule is implemented, 0.5 when the rule includes a clause, and 1 when a rule does not include a clause. To test for a potential nonlinear relationship between rule flexibility and the real losses related to banking crises, the squared values of this measure are also added in the regressions. The results are reported in Table 5. They confirm that expenditure rules have a negative impact on the cost of banking crises, but without indication of nonlinearity. Nonetheless, the second part of the table reports a significant nonlinear U-shaped relationship between budget balance rules and loss in output. The situations of "no rule" and "rule without clauses" are found to be less desirable than an intermediate solution that consists of a rule with a flexibility clause.

5 The Impact of Exchange Rate Regimes

According to the so-called *bipolar view*, fixed and pure flexible ERRs constitute opportune restrictive frameworks that increase the responsibility of policymakers. Indeed, by tying the hands of policymakers, pegged regimes imply more discipline and, as a rule, more credibility (Canzoneri et al., 2001; Ghosh et al., 2011). Next, in emerging countries, fixed exchange rates protect local markets from imported inflation and financial instability (see, e.g. Calvo and Reinhart, 2002). Similarly, a pure floating ERR is discipline-enhancing because any bad political behavior leads to immediate punishment through (potentially large) movements in the exchange rate (Tornell and Velasco, 2000). In the end, intermediate ERRs are believed to be more prone to banking and financial crises (Eichengreen et al., 1994; Bubula and Ötker-Robe, 2003). However, this point of view has recently been challenged. For example, Ambrosius (2017) reject any robust impact of the ERR on the recovery speed in the aftermath of a banking crisis. Combes et al. (2016) find that intermediate ERRs are not more vulnerable to banking crises than corner (fixed or floating) regimes.

Against this backdrop, we test the influence of the ERR on the losses related to banking

[19]The comparison logically suggests that excluding certain types of spending from the scope of the expenditure rule is not decisive regarding the cost of banking crises, while adjusting the budget balance rule to the cyclical position leads to improve discipline during the expansion period, to increase fiscal space during a recession, and thus is more effective in reducing banking crises losses.

crises. To this end, we use the granular ERR classification proposed by Ghosh et al. (2011), which includes entries lying between 1 (fixed ERR) and 14 (pure floating). Following the recommendations of Ghosh et al. (2011), entries 1 to 5 can be aggregated and considered as a fixed ERR, entries 6 to 13 all refer to an intermediate ERR, and the last modality (14) refers to pure floating. We simplify this aggregated classification even further by defining two dummy variables. One dummy, labeled *E.R. fixed*, is equal to one if a country operates under a fixed ERR and 0 otherwise. Another dummy, named *E.R. floating*, is equal to one if a country is under the floating regime, and 0 otherwise. We include these two dummies in the regressions, with intermediate ERRs as the reference. The results are reported in Table 6. Both dummies appear significant, with a positive sign. Thus, contrary to the bipolar view, we find that an intermediate ERR provides better outcome in terms of cost of banking crises.

The robustness of such a nonlinear relationship is assessed now by considering the granular classification of Ghosh et al. (2011) and testing the significance of a quadratic influence of ERRs. The results are reported in the second part of Table 6. They confirm the existence of a U-shaped relationship between the EER and the cost of banking crises, with a threshold located around the modality "8", which exactly refers to an intermediate ERR. This result is in line with Eichengreen and Hausmann (1999, p. 3), according to whom "*both fixed and flexible exchange rates are problematic*". Indeed, on the one hand, fixed ERRs do not necessarily encourage discipline, as bad behaviour today leads to insidious build-up of vulnerabilities that will make the peg collapse, but not before long (Schuknecht, 1998; Tornell and Velasco, 2000). Even worse, pegged regimes may increase financial and banking vulnerabilities by providing implicit guarantee against currency risk, and thus creating moral hazard (see, e.g. Eichengreen and Hausmann, 1999). Burnside et al. (2001, 2004) show that fixed ERRs are more vulnerable to speculative attacks and more sensitive to banking and currency crises. In this line, according to Haile and Pozo (2006), announced pegged ERRs increase the risk of currency crisis even if, in reality, the exchange rate system in place is not pegged. Last, while defending its parity under a pegged regime, a central bank may not be able to fulfill its lender-of-last-resort mission and thus may not prevent the economy from bank runs (Chang and Velasco, 2000). As a result, Domac and Martinez Peria (2003) find that a fixed ERR implies a higher real cost once a crisis occurs. In this vein, Lane and Milesi-Ferretti (2011) find that countries with pegged exchange regimes experienced weaker output growth during the GFC. On the other hand, in case of pure floating ERR, agents indebted in foreign currency are threatened by an increase in their real debt burden if the domestic currency collapses (Eichengreen and Hausmann, 1999).

In contrast, intermediate ERRs present many advantages regarding the real losses associated to banking crises. Indeed, they are not less discipline-enhancing than fixed ERRs, because, as a flexible regime, punishment would be quite immediate in the case of bad behavior. Moreover, countries under intermediate ERR can use the exchange rate policy as a stabilizing tool. Finally, an intermediate ERR should imply less volatility than a pure floating regime. Thus, as for fiscal rules, an intermediate solution, as opposed to an overly restrictive or too lax framework better contain the real costs of banking crises.

Table 6: The impact of exchange rate regime on the real costs of banking crises

	Dummies exchange rate regime				Exchange rate regime squared			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Dummy E.R. fixed	**0.728*** **	**0.899*** **	**0.694*** **	**0.559*** **				
	(0.110)	**(0.097)**	**(0.124)**	**(0.165)**				
Dummy E.R. floating	**0.928*** **	**0.909*** **	**0.670*** **	**1.307*** **				
	(0.102)	**(0.092)**	**(0.120)**	**(0.158)**				
E.R. Regime					**-0.410*** **	**-0.558*** **	**-0.379*** **	**-0.480*** **
					(0.057)	**(0.050)**	**(0.065)**	**(0.088)**
E.R. Regime (squared)					**0.025*** **	**0.033*** **	**0.023*** **	**0.030*** **
					(0.003)	**(0.003)**	**(0.004)**	**(0.005)**
GDP per capita	0.002	0.002*	0.003**	-0.001	0.002*	0.002**	0.004***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.004***	0.003***	0.002	0.001	0.003***	0.002***	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank credit / GDP	0.031***	0.030***	0.033***	0.019***	0.029***	0.028***	0.031***	0.018***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Credit-to-GDP gap	0.529***	0.499***	0.183	1.287***	0.506***	0.535***	0.248	1.131***
	(0.191)	(0.164)	(0.215)	(0.285)	(0.194)	(0.165)	(0.218)	(0.285)
Public debt / GDP	0.025***	0.028***	0.028***	0.022***	0.023***	0.027***	0.027***	0.020***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Simultaneous crisis	0.003	0.004	0.003	0.019	0.000	0.003	0.002	0.018
	(0.006)	(0.005)	(0.006)	(0.013)	(0.006)	(0.005)	(0.006)	(0.013)
Currency crisis	0.899***	0.601***	0.827***	1.082***	0.927***	0.683***	0.877***	1.082***
	(0.085)	(0.073)	(0.092)	(0.129)	(0.086)	(0.073)	(0.092)	(0.129)
Discret. gov. consumption	-3.017***	-1.762***	-1.662***	-3.781***	-3.221***	-1.752***	-1.595***	-3.943***
	(0.478)	(0.387)	(0.519)	(0.677)	(0.482)	(0.386)	(0.517)	(0.675)
CB assets	-0.002	-0.007	0.001	-0.016**	-0.002	-0.008*	0.001	-0.014*
	(0.006)	(0.005)	(0.007)	(0.008)	(0.006)	(0.005)	(0.007)	(0.008)
Constant	-3.568***	-3.614***	-4.164***	-3.765***	-1.945***	-1.453***	-2.700***	-1.911***
	(0.370)	(0.340)	(0.399)	(0.451)	(0.415)	(0.370)	(0.455)	(0.510)
Observations	1,713	1,713	1,713	1,713	1,713	1,713	1,713	1,713
Number of countries	67	67	67	67	67	67	67	67
Crisis obs.	204	204	204	204	204	204	204	204
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

6 The Impact of Monetary Policy Features

Regarding monetary policy arrangements, we first address two features that are likely to influence the flexibility of monetary policy, namely independence and conservatism. Second, we focus on the inflation targeting framework, which is interesting in that it is supposed to combine precommitment and flexibility.

6.1 Central Bank Independence and Conservatism

The degree of central bank independence (CBI) is a monetary policy feature which may impact the cost of banking crises. On the one hand, CBI protects central bankers from lobbying pressures. Moreover, CBI can be viewed as discipline-enhancing, by strengthening the responsibility and challenging the reputation of central bankers. By extension, it may imply fiscal discipline and is conducive to a sound macroeconomic environment (see, e.g. Bodea and Higashijima, 2017). On the other hand, according to the "paradox of credibility view", CBI may encourage risk-taking by improving the effectiveness of monetary policy (Borio and Zhu, 2012). Even further, an independent central bank is less prone to "clean up afterwards", i.e. to support the recovery policies of the government in the case of crisis (Rosas, 2006), unless inflation is highly affected. Independent central bankers may even refrain to lean against the wind because this might lead to an undesirable undershooting of the inflation target (Berger and Kißmer, 2013).

To assess the global impact of CBI on the output costs of banking crises[20], we use the well-known CWN index initially developed by Cukierman et al. (1992) and recently updated by Garriga (2016). This *de jure* measure is based on the analysis of central banks statutes. The CWN index offers the advantage of dealing with the multidimensionality of independence. It is constructed as a weighted average of four subcomponents: executive independence, monetary policy formulation, monetary policy objective(s), and limitations on lending to the government. This last subcomponent, whose weighting represents a significant proportion of the index (50%), is particularly interesting in our case, as it can partly capture the fact that a central bank can legally or not financially support recovery policies of the government.

The results are reported in Table 7. We find a significant positive relationship between CBI and the cost of a banking crisis. The higher the CBI, the higher the unconditional losses are, both in terms of trend and cycle losses.

While more factual than institutional, the degree of central bank conservatism (CBC) is another important monetary policy feature, which is related to its degree of flexibility. Basically, the degree of CBC refers to the preference given by the monetary authorities to the objective of price stability relative to the objective of output stabilization. Certainly, a high degree of CBC implies more monetary discipline and may imply a rigorous conduct of monetary policy and macroeconomic stability. Nevertheless, some recent papers show that financial stability is

[20]Note that empirical findings on the CBI-financial stability nexus are very rare and not conclusive. Klomp and de Haan (2009) empirically find a positive relation between CBI and financial stability, whereas Klomp (2010) finds no significant effects of CBI on the probability of a banking crisis.

likely to be neglected when monetary policy primarily focused on price stabilization[21]. The induced worsening of financial imbalances may increase vulnerabilities and the loss in output in the case of crisis. Moreover, a conservative central banker may be reluctant to deviate from its top priority objective of inflation[22], which may affect the pace of economic recovery in the aftermath of a banking crisis. On the contrary, a dovish central banker is believed to respond more quickly to a crisis. Thus, a high degree of CBC can render a banking crisis more costly because of a lack of "leaning" before the crisis and a lack of "cleaning up" afterwards.

To assess the global impact of CBC on the unconditional cost of banking crises, we use two alternative measures of central banks' preferences. We first consider a *de jure* proxy for CBC, which is a subcomponent of the full CWN index of CBI previously mentioned. This subcomponent, called CWN_OBJ, captures the importance given to the pursuit of price stability relative to the other objectives in central bank statutes. CWN_OBJ lies between 0 and 1, with 1 corresponding to the case in which price stability is the sole/main objective of monetary policy. We also gauge the level of CBC by the CONS index suggested by Levieuge and Lucotte (2014). This *de facto* index relies on the Taylor curve, i.e. based on the volatility of the output gap relative to the volatility of inflation over a five-year rolling window. We precisely use the shock-adjusted version of the CBC index, called CONS_W, which lies between 0 (no conservatism) and 1 (highest level of conservatism).

The results are reported in the last part of Table 7. They confirm that the higher the CBC, the higher the cost of banking crises is, regardless of the way CBC and losses are computed, except for the effect of CWN_OBJ on the loss in GDP trend. Thus, hawkish stance tends to exacerbate the real losses related to banking crises. Note that this result is supported by the negative and highly significant correlation (-0.25) that we observe in our sample between the CONS_W index and the control variable of monetary policy response.

Importantly, these results do not mean that a very low level of CBI or CBC is desirable. In fact, we suspect a non-linear impact of CBI and CBC, with low and high levels being detrimental to financial stability. However, our empirical estimations fail to find significant evidence of such a non-linearity. One reason may be that our sample comprises mostly countries with middle-high and high levels of CBC and CBI and only few (low-income) countries with low levels of CBC and CBI. This leads to find a strictly positive impact of CBI.

Finally, note that CWN and CONS_W are not substitutable. While significantly different from zero at the 1% level, their correlation is weak (approximately 0.06). The first part of Table D1 in Appendix indicates that they remain significant when they are simultaneously inserted in the same regression. Thus, CWN and CONS_W clearly account for distinct features of monetary policy design. The second part of Table D1 even indicates that CBI and CBC are complementary. Indeed, the coefficient related to the interaction term CWN $\times$ CONS_W is positive. Hence, as expected regarding the previous results, a high degree of CBI is even more detrimental in terms of banking crisis cost when the degree of CBC is high.

[21] See Bernanke (2013); Mishkin (2017); Levieuge et al. (2018).

[22] Such a view is supported, for example, by Whelan (2013). See Tillmann (2008) for a more general assessment of the welfare cost related to an overly conservative central banker.

Table 7: The impact of central bank preferences and independence on the real costs of banking crises

	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)				Central bank preferences (CONS_W)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Index of CBC/CBI	**1.784*** **	**1.644*** **	**0.624***	**2.152*** **	**1.507*** **	**1.081*** **	**0.222**	**2.377*** **	**0.346** **	**-0.070**	**0.429*** **	**0.442** **
	(0.296)	**(0.259)**	**(0.329)**	**(0.464)**	**(0.214)**	**(0.187)**	**(0.240)**	**(0.336)**	**(0.136)**	**(0.121)**	**(0.151)**	**(0.212)**
GDP per capita	0.001	0.001	0.003**	-0.001	0.003***	0.003***	0.003**	0.001	-0.001	-0.001	0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.004***	0.002***	0.003***	0.002	0.006***	0.004***	0.003***	0.005***	0.006***	0.004***	0.003***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank credit / GDP	0.037***	0.036***	0.038***	0.026***	0.033***	0.031***	0.032***	0.027***	0.028***	0.026***	0.029***	0.018***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)	(0.003)
Credit-to-GDP gap	0.847***	0.995***	0.185	1.501***	0.860***	0.989***	0.554**	1.122***	0.623***	0.588***	0.475**	1.318***
	(0.216)	(0.186)	(0.252)	(0.300)	(0.204)	(0.178)	(0.236)	(0.301)	(0.194)	(0.169)	(0.218)	(0.297)
Public debt / GDP	0.029***	0.032***	0.033***	0.022***	0.029***	0.030***	0.031***	0.023***	0.025***	0.026***	0.026***	0.023***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Simultaneous crisis	0.004	0.005	0.005	0.019	0.001	0.003	0.005	0.016	0.001	0.004	0.002	0.016
	(0.006)	(0.005)	(0.006)	(0.013)	(0.006)	(0.005)	(0.006)	(0.013)	(0.006)	(0.005)	(0.006)	(0.013)
Currency crisis	0.775***	0.531***	0.661***	1.095***	0.751***	0.508***	0.682***	1.156***	0.803***	0.708***	0.801***	0.723***
	(0.091)	(0.079)	(0.100)	(0.131)	(0.089)	(0.077)	(0.095)	(0.133)	(0.082)	(0.073)	(0.088)	(0.136)
Discret. gov. consumption	-4.351***	-2.735***	-2.094***	-4.881***	-3.889***	-2.412***	-1.558***	-4.783***	-3.314***	-2.693***	-1.506***	-4.497***
	(0.527)	(0.423)	(0.584)	(0.692)	(0.505)	(0.412)	(0.555)	(0.686)	(0.474)	(0.399)	(0.518)	(0.687)
CB assets	-0.008	-0.012***	-0.006	-0.011	-0.004	-0.009**	0.001	-0.010	-0.001	-0.006	0.010	-0.018**
	(0.006)	(0.005)	(0.007)	(0.008)	(0.006)	(0.004)	(0.007)	(0.008)	(0.006)	(0.005)	(0.007)	(0.008)
Constant	-4.694***	-4.574***	-4.733***	-5.052***	-4.689***	-4.152***	-4.229***	-5.616***	-2.708***	-2.332***	-3.406***	-3.320***
	(0.426)	(0.386)	(0.459)	(0.587)	(0.421)	(0.372)	(0.442)	(0.561)	(0.351)	(0.322)	(0.372)	(0.435)
Observations	1,635	1,635	1,635	1,635	2,038	2,038	2,038	2,038	1,699	1,699	1,699	1,699
Number of countries	66	66	66	66	66	66	66	66	62	62	62	62
Crisis obs.	192	192	192	192	200	200	200	200	203	203	203	203
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *; **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

6.2 Inflation Targeting

By implying a precommitment to a certain level of inflation at a given horizon, inflation targeting (IT) constitutes a restrictive monetary policy framework for central bankers. Bernanke and Mishkin (1997) assert that IT improves the transparency of monetary policy, the accountability of the central bank and, by extension, its credibility. Woodford (2012) theoretically demonstrates that an IT regime can achieve long-term price stability while ensuring activity and financial stabilization in the short term. However, the influence of IT on financial stability is discussed. Some studies indicate that IT may have adverse effects on asset prices (Frappa and Mésonnier, 2010; Lin, 2010), while according others studies IT allows for leaning against financial vulnerabilities. Fazio et al. (2015) for example show that IT countries have relatively sounder and more capitalized banking systems.

In terms of conditional costs, some studies indicate that IT countries are less affected than their peers in the case of financial crisis (Walsh, 2009; Andersen et al., 2015). One reason is that they have more room for maneuvering in terms of interest rate cuts (de Carvalho Filho, 2011). Moreover, thanks to a better anchoring of inflation expectations, IT reduces the risk of falling into deflation and into a liquidity trap. Nonetheless, in the aftermath of the global financial crisis, a number of economists have called for a reconsideration of the desirability of IT [23].

In this section, we propose to assess the global performance of IT in terms of real costs of banking crises. To this end, we use a binary variable that takes the value of 1 once a country has achieved full-fledged adoption of IT as a monetary policy regime and 0 otherwise[24]. Our empirical results, reported in Table 8, shows that IT tends to lower the real losses (both in terms of business cycles and trend) related to banking crises.

These results are very interesting in light of the trade-off between restrictiveness and flexibility that is at the heart of this paper. First, it is worth noting that IT not only refers to the adoption of an explicit inflation target but also implies important institutional reforms, concerning both the management of monetary policy (production of statistics, forecasting tools, communication) and reforms to improve fiscal policy efficiency[25]. Second, like a rule, IT should imply more discipline and responsibility. In the same time, IT is a flexible framework, in that the precommitment to the inflation target prevails for a medium-term horizon. Meanwhile, the central bank can respond to shocks (Svensson, 1997), including to credit conditions (Choi and Cook, 2018), and stabilize the real economy.

In a seminal paper, Bernanke and Mishkin (1997) argued: "*Some useful policy strategies are 'rule-like', in that by their forward-looking nature they constrain central banks from systematically engaging in policies with undesirable long-run consequences; but which also allow some discretion for dealing with unforeseen or unusual circumstances. These hybrid or intermediate approaches may be said to subject the central bank to 'constrained discretion'.*" They precisely

[23] See e.g. the references given by Woodford (2012) in its introduction.

[24] Full-fledged adoption corresponds to the fulfillment of all the preconditions of an IT framework. See Mishkin and Schmidt-Hebbel (2007).

[25] See Lucotte (2012), Minea and Tapsoba (2014), Combes et al. (2017) and Ardakani et al. (2018).

assert that IT must be viewed as a constrained discretion framework[26] that constitutes a desirable compromise for macroeconomic stability. Similarly to fiscal rules with friendly clauses and intermediate ERRs, IT implies discipline but allows some discretion for dealing with unusual circumstances. In this paper we provide evidence that "constrained discretion" also appears suitable to contain the real costs of banking crises.

Table 8: The impact of inflation targeting on the real costs of banking crises

	Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss
Inflation targeting	**-1.371*** **	**-1.616*** **	**-1.268*** **	**-1.579*** **
	(0.187)	**(0.180)**	**(0.205)**	**(0.325)**
GDP per capita	0.002	0.003**	0.003**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.004***	0.002***	0.002*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Bank credit / GDP	0.033***	0.032***	0.034***	0.024***
	(0.002)	(0.002)	(0.002)	(0.003)
Credit-to-GDP gap	0.402**	0.415**	0.126	1.049***
	(0.195)	(0.167)	(0.219)	(0.291)
Public debt / GDP	0.026***	0.029***	0.029***	0.023***
	(0.002)	(0.002)	(0.002)	(0.003)
Simultaneous crisis	0.002	0.003	0.003	0.021
	(0.006)	(0.005)	(0.006)	(0.013)
Currency crisis	0.834***	0.552***	0.824***	0.932***
	(0.082)	(0.071)	(0.090)	(0.124)
Discret. gov. consumption	-3.809***	-2.308***	-2.142***	-4.216***
	(0.486)	(0.384)	(0.520)	(0.665)
CB assets	-0.009	-0.014***	-0.005	-0.019**
	(0.006)	(0.005)	(0.007)	(0.008)
Constant	-2.812***	-2.754***	-3.490***	-3.111***
	(0.370)	(0.339)	(0.400)	(0.439)
Observations	1,723	1,723	1,723	1,723
Number of countries	67	67	67	67
Crisis obs.	204	204	204	204
Year FE	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

7 Robustness checks

We check the robustness of our previous findings in three ways. First, we control for cross-country differences in terms of banking regulation. Banking regulation refers to both measures aiming to control banking sector vulnerabilities and measures defining the scope for policy-makers' actions to solve crises. Papers that empirically investigate this issue usually find that banking regulation and supervision is negatively linked to the real cost of banking crises (see, e.g Hoggarth et al., 2005; Fernández et al., 2013; Angkinand, 2009).

Banking regulation has been neglected thus far for sample size reasons. Indeed, information on national banking regulation is less extensive than usual macroeconomic data. We collected information from the Database of Regulation and Supervision of Banks around the World, detailed in Barth et al. (2013). This survey was first published in 1999[27]. So, it excludes the

[26] See Kim (2011) for a theoretical demonstration.

[27] The database contains four surveys (1999, 2003, 2007, and 2011). To conserve the panel structure of our

banking crises that occurred from 1970 to the early 1990s. Nonetheless, considering a smaller sample can also serve as an additional robustness check. More precisely, we consider three alternative measures of banking regulation and supervision:

- "Prompt corrective action": This captures the level of automatic intervention set in the authorities' statutes to resolve banking sector vulnerabilities;

- "Activity regulation": This measures the restrictions on bank activities regarding securities offerings, insurance and real estate services;

- "Supervision power": This refers to the supervision power that authorities have to impose regulatory constraints on banks to correct financial imbalances.

Each measure is a polynomial variable. The higher the value, the higher the level of regulation and supervision. We expect banking regulation to be associated with a smaller loss in output in the aftermath of a banking crisis.

All the previous regressions are replicated with the inclusion of these three indicators of banking regulation, successively. The results are reported in Tables D2, D3 and D4 in Appendix. For parsimony purposes, we only report the estimated coefficients for the policy framework and banking regulation variables. Our previous findings hold while including measures of banking regulation, and despite substantial changes in sample size, with very few exceptions[28]. Furthermore, when significantly different from zero, the impact of banking regulation on the real losses associated to banking crises is negative, as expected.

Then, we consider the existence of a deposit insurance scheme as an additional control variable. Theoretically, a deposit insurance scheme can have ambiguous effects on the severity of banking crises. Certainly, it is intended to prevent bank runs and to reduce the likelihood that a bank's distress causes a full-fledged banking crisis. However, such a scheme can also be a source of moral hazard that may increase banks' incentives to take excessive risks, which may increase the likelihood and the conditional cost of banking crises. Overall, empirical findings generally suggest that the first effect dominates; as a safety net preventing bank runs, deposit insurance coverage is negatively related to the real costs of banking crises (see, e.g. Hoggarth et al., 2005; Angkinand, 2009; Fernández et al., 2013).

To check the robustness of our results once the existence of a deposit insurance is considered, we define a dummy variable equal to one if such a scheme is implemented in country i at time t and 0 otherwise. Information stems from the WDI database. The results are reported in Table D5 in Appendix. In line with the existing literature, we find that the existence of a deposit insurance scheme reduces the cost of a banking crisis. More importantly, our previous

data, we consider the results of the 1st survey for the years 1999-2002, of the 2nd survey for the years 2003-2006, of the 3rd survey for the years 2007-2010, and of the 4th survey for years 2011 and 2012.

[28]To be exhaustive, these exceptions concern monetary independence in trend_loss and some loss_5years equations, CONS_W in loss_all equations, ER regimes (dummies) in cycle_loss equations, budget balance rule in some cycle_loss equations, and budget balance rule (dummies) in some trend_loss and cycle_loss equations. However, it is not possible to determine whether these exceptions are due to the additional control variables or to the changes in sample size.

results, concerning policy frameworks, are very robust to the inclusion of this additional control variable.

Next, it might be possible that each policy feature considered so far only refers to one global characteristic that would be institutional quality. To check this point, we control for the quality of the domestic institutional context. As argued by Demirgüç-Kunt and Detragiache (1998), the quality of domestic institutions is highly related to the ability of the government to implement effective prudential regulation. Furthermore, a weak institutional environment is expected to exacerbate financial fragility, as it provides limited judicial protection to creditors and shareholders (Shimpalee and Breuer, 2006). Claessens et al. (2005) find that better domestic institutions, less corruption and greater judicial efficiency contribute to lower output losses and fiscal costs in the aftermath of a banking crisis. They explain this result by the fact that a well-functioning legal system can help to restructure corporations in crisis, but also by the ability of supervisory authorities to enforce regulation and to intervene in incipient crisis situations.

Consequently, one would expect that banking crises may be less costly if there are good domestic institutions. In the case of our study, we proxy the quality of domestic institutions by considering three variables commonly used in the literature: government stability, democratic accountability, and bureaucracy quality. These variables are taken from the International Country Risk Guide (ICRG) database and are available from 1984. In line with Claessens et al. (2005), we alternatively consider these three variables in each of our specifications. Results are reported in Tables D6 to D8. As we can see, our results are robust to the inclusion of these variables. We still find that the policy framework is a key driver of the unconditional cost of banking crises, despite the inclusion of government stability, democratic accountability, and bureaucracy quality, which significantly decrease the real losses associated to banking crises. This confirms that the impact of policy framework is distinct from the influence of institutional quality.

Finally, it may be possible that each variable related to a given policy framework accounts for similar - and possibly unobserved - characteristic(s). To check this point, we simultaneously include the variables capturing the monetary policy, the fiscal policy and the exchange rate frameworks in the same regression. More precisely, four alternative sets of variables are considered. All of them include the number of fiscal rules and the two dummy variables capturing the corner ERRs. Then we consider different variables referring to the monetary policy framework, namely CWN, CWN_OBJ, CONS_W index, and the inflation targeting dummy. The results are reported in Tables D9 and D10. We observe that our variables of interest remain significant. Hence, they do not account for any common unobserved characteristic, but they contain original individual information. This reinforces our results.

8 Conclusion

In the wave of economic recessions led by banking crises, and in particular the recent Global Financial Crisis, many efforts have been made to empirically assess the determinants of either the probability or the cost of banking crises. This paper contributes to this literature, with three original aspects.

A first innovation consists in focusing on the role of the policy framework in explaining the real cost of banking crises. We thus focus on the role of fiscal policy, monetary policy and exchange rate regimes. We argue that stringent policy frameworks are expected to decrease the probability of banking crises, due to their discipline and credibility-enhancing effects. However, having the hands tied prevents policymakers from properly responding to crises if such an event were to occur. Hence, do the discipline-enhancing effects of restrictive policy frameworks - and their underlying room for maneuvering - exceed (or not) the drawbacks related to their lack of flexibility?

The second innovation of our study is to consider the impact of policy frameworks on the *unconditional* losses of banking crises. We argue that, from a cost-benefit perspective, it seems more instructive to gauge the global effect (positive, negative, neutral) of any policy framework on the losses due to banking crises. Instead, existing research has addressed the probability of crisis or the costs related to banking crises (i.e. the conditional costs) separately, therefore delivering only partial information for policymakers and regulators. When focusing on the cost of crisis, one neglects the drivers of banking crises, as well as the factors allowing preventing them. Adversely, focusing only on the probability of crises neglects the severity of crises. Finally, a given policy framework can have opposite effects on the probability and on the conditional costs of crisis, which would be ignored if the two are analysed separately.

Third, we use an original empirical approach by applying an estimator based on the Poisson distribution. This method appears well-suited for right-skewed distributions with a mass point at zero, as it the case for unconditional output losses.

A graphical representation of our results, based on a sample of 67 countries over the 1970-2012 period, is presented in Figure F1. We find that the absence of restriction (e.g. no fiscal rule) is associated with higher unconditional losses. Moreover, extremely restrictive policy features such as corner exchange rate regimes, budget balance rules without "friendly" clauses and a high degree of monetary policy conservatism and independence are conducive to a higher real cost of crises. In contrast, by combining discipline and flexibility, fiscal rules with easing clauses, intermediate exchange rate regimes and an inflation targeting framework can significantly contain the costs of banking crises.

In this way, we provide evidence of the benefits of policy frameworks based on "constrained discretion". Two decades ago, a seminal paper by Bernanke and Mishkin (1997) argued that "constrained discretion" is a desirable compromise for macroeconomic stability (in particular through inflation targeting). In this paper we provide evidence that "constrained discretion" also appears suitable to minimize the real costs of banking crises[29].

[29]In margin of our econometrical analysis, and in line with the existing literature, we also examined the

Results are consistent to several robustness checks, like the inclusion of additional control variables, such as banking regulation and institutional quality. Moreover, by simultaneously considering several features of fiscal, monetary and exchange rate frameworks, we show that they do not account for a common unobserved characteristic, but they contain original individual information.

Several extensions are considered for future research. First, we could examine the interactions between different structural policy features. For instance, can an IT framework compensate for the negative impact of a pure floating exchange rate? Can an intermediate ERR counteract the adverse effect of high degrees of CBI or CBC? Is an IT framework even more suitable in the absence of fiscal rules? Etc. That would ultimately allow us to determine what would be the optimal "policy-framework-mix". Second, we would be interested in assessing the impact of policy transparency and credibility. We would expect lower unconditional costs of crises whenever transparency and credibility are high, as policymakers could more easily deviate from their usual mandate, without losing control over agents' uncertainty (Bianchi and Melosi, 2018).

influence of the policy frameworks on the probability of crises (see Table E1) and on the cumulative distribution functions of conditional losses (see Figure E1), separately. Broadly speaking, in some cases (e.g. for exchange rate regimes and inflation targeting), probabilities of crisis and cumulative distribution functions of conditional losses tend to deliver quite clear-cut intuitions on the impact of the corresponding policy frameworks, that are incidentally confirmed by our econometric results. However, in other cases, e.g. with CBI and CBC, the tests and density functions are less clear-cut. Similarly, separate results (probability / cost) regarding the fiscal policy features are inconclusive, with no clear evidence of stochastic dominance. Overall, our broader approach allows for having clearer and more instructive results.

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Appendix A - Distribution of the cumulative cost of banking crisis according to Laeven and Valencia (2013)

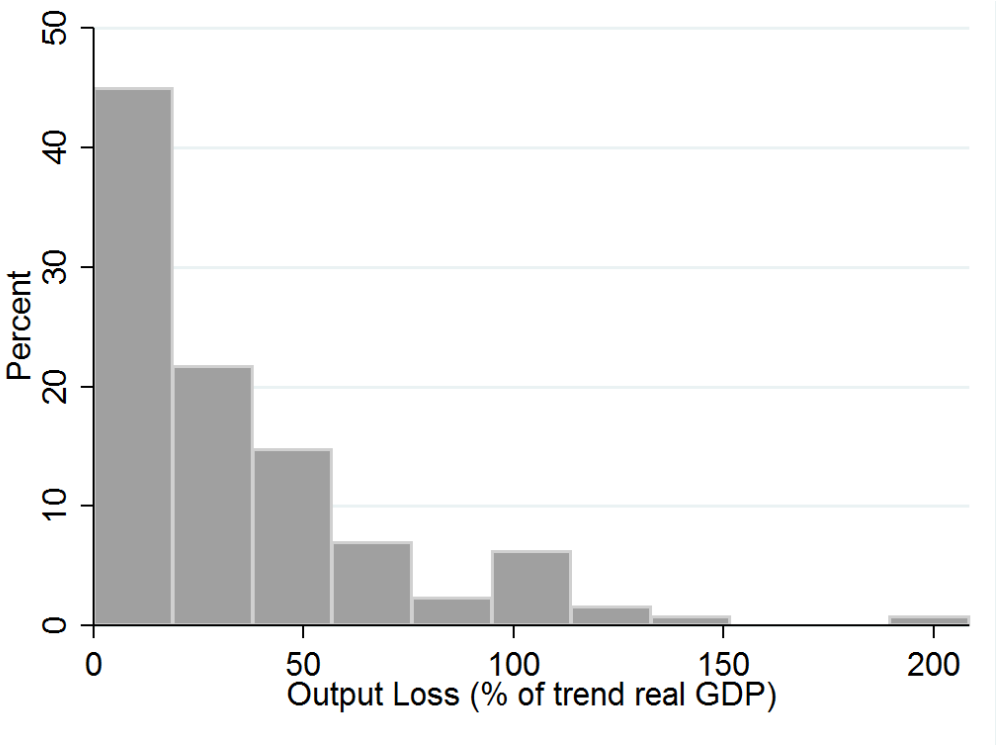

Figure A1: Distribution of cumulative output losses due to banking crises

Source: Laeven and Valencia (2013, Table A1)

Note: Output losses are computed as the cumulative sum of the differences between actual and trend real GDP over the period $[t, t+3]$, expressed as a percentage of trend real GDP, with t as the starting year of the crisis.

Appendix B - Definition and source of variables

Table B1: Definition and source

Variable	Definition	Source
Real GDP per capita	The GDP in constant 2005 U.S. dollars divided by midyear population.	WDI
Inflation	The annual percentage change in the consumer price index.	WDI
Banks credit to GDP	The financial resources provided to the private sector by domestic money banks as a share of GDP.	WDI
Credit-to-GDP gap	The difference in percentage between domestic credit to the private sector as a share of GDP and its long-term trend, obtained using an HP filter. Domestic credit to private sector refers to financial resources provided to the private sector. For some countries, it includes financial resources to public enterprises.	WDI and authors' calculation
Public debt to GDP	The gross general government debt as a share of GDP.	Abbas et al. (2011)
Simultaneous crisis	The number of countries hit simultaneously by a banking crisis across the world. Crises are considered simultaneous when they occur within a period of less than one year according to the starting dates reported in Laeven and Valencia (2013).	Laeven and Valencia (2013) and authors' calculation
Currency crisis	Dummy variable. = 1 if the domestic currency is subject to annual depreciation versus the US dollar or the relevant anchor currency of 15 percent or more; and 0 otherwise.	Reinhart and Rogoff (2009)
Discretionary government spending	The share of government expenditures in the percent of GDP that is not driven by automatic stabilizers, following Ambrosius (2017).	WDI and authors' calculation
Central bank assets	The ratio of central bank assets to GDP. Central bank assets are claims on the domestic real nonfinancial sector.	GFDD
Expenditure rule	Dummy variable based on country-specific information on fiscal rules collected by the IMF, = 1 if fiscal policy operates under an expenditure rule.	Bova et al. (2015) and Lledó et al. (2017)
Budget balance rule	Dummy variable based on country-specific information on fiscal rules collected by the IMF, = 1 if fiscal policy operates under a budget balance rule.	Bova et al. (2015) and Lledó et al. (2017)
Debt rule	Dummy variable based on country-specific information on fiscal rules collected by the IMF, = 1 if fiscal policy operates under a debt rule.	Bova et al. (2015) and Lledó et al. (2017)
Number of rules	A count variable that measures the number of fiscal rules (among expenditure, budget balance and debt rule) that are simultaneously applied in a given country	Bova et al. (2015) and Lledó et al. (2017)
Dummy fixed exchange rate	Dummy variable based on the IMF *de facto* classification of an exchange rate regime. = 1 if a country operates under a fixed exchange rate regime and 0 otherwise	IMF and Ghosh et al. (2011)
Dummy floating exchange rate	Dummy variable based on the IMF *de facto* classification of an exchange rate regime. = 1 if a country operates under a floating exchange rate regime and 0 otherwise	IMF and Ghosh et al. (2011)
Exchange rate regime	A *de facto* classification of an exchange rate regime based on IMF country team analysis and consultations with the central bank. *De facto* exchange rate regimes are grouped into fourteen categories. The higher the value, the more flexible the exchange rate regime.	IMF and Ghosh et al. (2011)
Inflation targeting	Dummy variable. = 1 if a country has adopted a full-fledged inflation targeting framework and 0 otherwise.	Authors' calculation
CONS_W	A *de facto* measure of central bank conservatism based on the Taylor curve. It is computed as a shock-adjusted ratio of the variance in the output gap relative to the variance of inflation.	Levieuge and Lucotte (2014) and authors' calculation
CWN_OBJ	A *de jure* measure of central bank conservatism based on the importance given by the central bank legal statute to price stability, relative to other objectives	Cukierman et al. (1992) and Garriga (2016)
CWN index	A *de jure* index measuring the level of central bank independence. It is computed as a weighted average of four subcomponents corresponding to organic independence, monetary policy objectives, monetary policy formulation and limitations of lending to the government. The index lies between 0 and 1, with 0 as the smallest level of independence and 1 as the highest.	Cukierman et al. (1992) and Garriga (2016)
Prompt corrective action	A polynomial variable measuring whether a law establishes predetermined levels of bank solvency deterioration that force automatic actions, such as intervention. It ranges from 0 to 6, with a higher value indicating more promptness in responding to problems.	Barth et al. (2004)
Activities regulation	A polynomial variable between 0 and 12 capturing the level of restrictions on banks regarding securities, insurance and real estate activities. A higher value indicates more restrictions on banking activities.	Barth et al. (2004)
Supervision power	A polynomial variable between 0 and 16 of the extent to which official supervisory institutions have the authority to take specific actions to prevent and resolve banks' problems. A higher value indicates greater supervisory power.	Barth et al. (2004)
Deposit insurance	Dummy variable, coded as one if a country implements a deposit insurance scheme and zero otherwise.	WDI
Government stability	An index of the government's ability to carry out its declared program(s), and its ability to stay in office. The index lies between 0 and 12, with a higher score equating to higher stability.	ICRG
Democratic accountability	A, index of how responsive government is to its people, on the basis that the less responsive it is, the more likely it is that the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one. The index lies between 0 and 6, with a higher score indicating lower risk.	ICRG
Bureaucracy quality	An index of the institutional strength and quality of the bureaucracy to govern without drastic changes in policy or interruptions in government services. The index lies between 0 and 4, with a higher score representing stronger bureaucracy.	ICRG

Appendix C - Sample description on banking crises

Table C1: Sample description: Countries and banking crises

Country	Numb. of banking crises (start date)	Country	Numb. of banking crises (start date)
Algeria	1 (1990)	Kenya	2 (1985, 1992)
Angola	0	Malaysia	1 (1997)
Argentina	4 (1980, 1989, 1995, 2001)	Mauritius	0
Australia	0	Mexico	2 (1981, 1994)
Austria	1 (2008)	Morocco	1 (1980)
Belgium	1 (2008)	Netherlands	1 (2008)
Bolivia	1 (1994)	New Zealand	0
Brazil	2 (1990, 1994)	Nicaragua	2 (1990, 2000)
Canada	0	Nigeria	2 (1991, 2009)
Central African Republic	1 (1995)	Norway	1 (1991)
Chile	2 (1976, 1981)	Panama	1 (1988)
China	1 (1998)	Paraguay	1 (1995)
Colombia	2 (1982, 1998)	Peru	1 (1983)
Costa Rica	2 (1987, 1994)	Philippines	2 (1983, 1997)
Cote d'Ivoire	1 (1988)	Poland	0
Denmark	1 (2008)	Portugal	1 (2008)
Dominican Republic	1 (2003)	Romania	0
Ecuador	2 (1982, 1998)	Russia	2 (1998, 2008)
Egypt	1 (1980)	Singapore	0
El Salvador	1 (1989)	South Africa	0
Finland	1 (1991)	South Korea	1 (1997)
France	1 (2008)	Spain	2 (1977, 2008)
Germany	1 (2008)	Sri Lanka	1 (1989)
Ghana	1 (1982)	Sweden	2 (1991, 2008)
Greece	1 (2008)	Switzerland	1 (2008)
Guatemala	0	Thailand	2 (1983, 1997)
Honduras	0	Tunisia	1 (1991)
Hungary	1 (2008)	Turkey	2 (1982, 2000)
Iceland	1 (2008)	United Kingdom	1 (2007)
India	1 (1993)	United States	2 (1988, 2007)
Indonesia	1 (1997)	Uruguay	2 (1981, 2002)
Ireland	1 (2008)	Venezuela	1 (1994)
Italy	1 (2008)	Zimbabwe	1 (1995)
Japan	1 (1997)	**Total**	**76 banking crises**

Note: According to Laeven and Valencia (2013), Poland and Romania experienced a banking crisis in 1992 and 1990, respectively. Due to data availability, these banking crisis episodes are not covered by our sample.

Appendix D - Additional results and robustness checks

Table D1: Additional results: Substitutability or complementarity between CBC and CBI

	Regressions with both CBC and CBI				Interaction between CBC and CBI			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Index of CBC (CONS_W)	**0.718*** **	**0.362*** **	**0.825*** **	**0.841*** **				
	(0.145)	**(0.129)**	**(0.162)**	**(0.222)**				
Index of CBI (CWN)	**2.138*** **	**1.822*** **	**0.963*** **	**2.369*** **	**1.544*** **	**1.454*** **	**0.216**	**1.542*** **
	(0.298)	**(0.264)**	**(0.336)**	**(0.484)**	**(0.324)**	**(0.289)**	**(0.371)**	**(0.509)**
CONS_W × CWN					**0.961*** **	**0.612** **	**1.246*** **	**1.384*** **
					(0.272)	**(0.243)**	**(0.314)**	**(0.397)**
GDP per capita	-0.002*	-0.001	-0.000	-0.002*	-0.002**	-0.001	-0.000	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.005***	0.003***	0.005***	0.004***	0.005***	0.003***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank credit / GDP	0.036***	0.035***	0.037***	0.024***	0.036***	0.035***	0.037***	0.023***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Credit-to-GDP gap	0.753***	0.758***	0.124	1.662***	0.840***	0.793***	0.193	1.757***
	(0.217)	(0.192)	(0.255)	(0.314)	(0.216)	(0.190)	(0.254)	(0.311)
Public debt / GDP	0.029***	0.029***	0.031***	0.020***	0.029***	0.029***	0.031***	0.020***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Simultaneous crisis	0.001	0.002	0.001	0.014	0.001	0.002	0.000	0.012
	(0.006)	(0.005)	(0.006)	(0.013)	(0.006)	(0.006)	(0.007)	(0.013)
Currency crisis	0.737***	0.578***	0.601***	0.836***	0.743***	0.578***	0.622***	0.810***
	(0.093)	(0.083)	(0.102)	(0.144)	(0.093)	(0.083)	(0.101)	(0.145)
Discret. gov. consumption	-4.217***	-3.141***	-1.894***	-5.294***	-4.207***	-3.135***	-1.826***	-5.336***
	(0.524)	(0.440)	(0.597)	(0.723)	(0.526)	(0.440)	(0.594)	(0.722)
CB assets	-0.011*	-0.014***	-0.003	-0.012	-0.011*	-0.014***	-0.004	-0.012
	(0.006)	(0.005)	(0.008)	(0.008)	(0.006)	(0.005)	(0.008)	(0.008)
Constant	-4.767***	-4.244***	-4.821***	-5.250***	-4.282***	-3.973***	-4.267***	-4.694***
	(0.428)	(0.388)	(0.453)	(0.608)	(0.423)	(0.384)	(0.450)	(0.591)
Observations	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350
Number of countries	62	62	62	62	62	62	62	62
Crisis obs.	183	183	183	183	183	183	183	183
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table D2: Sensitivity to prompt corrective action (PCA) as an additional control variable.

	Prompt corrective action							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.101	0.055	-0.148*	0.015	-0.167**	0.085	-0.203**	0.021
	(0.087)	(0.063)	(0.088)	(0.126)	(0.082)	(0.058)	(0.090)	(0.112)
Fiscal rule	-1.838***	-2.124***	-2.088***	-2.159***	-0.675***	-1.105***	-0.825***	-0.908**
	(0.218)	(0.195)	(0.237)	(0.446)	(0.217)	(0.198)	(0.234)	(0.402)
Observations	712	712	712	712	712	712	712	712
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	97	97	97	97	97	97	97	97
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.336***	-0.237***	-0.454***	-0.074	-0.153*	0.002	-0.200**	-0.003
	(0.092)	(0.070)	(0.106)	(0.117)	(0.083)	(0.061)	(0.091)	(0.118)
Fiscal rule	-3.372***	-4.091***	-3.664***	-3.711***	-0.941***	-1.145***	-1.093***	-1.130***
	(0.307)	(0.275)	(0.326)	(0.605)	(0.094)	(0.084)	(0.106)	(0.197)
Observations	712	712	712	712	712	712	712	712
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	97	97	97	97	97	97	97	97
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.123	0.054	-0.166*	0.002	0.155	0.321***	0.084	0.172
	(0.086)	(0.061)	(0.087)	(0.126)	(0.104)	(0.070)	(0.102)	(0.138)
Rule with clause	-1.292***	-1.811***	-1.600***	-1.989***	-4.576***	-5.684***	-4.177***	-4.415***
	(0.242)	(0.212)	(0.257)	(0.500)	(0.519)	(0.523)	(0.515)	(1.048)
Rule without clause	-3.045***	-2.996***	-2.942***	-3.457***	0.201	-0.458**	0.016	-0.010
	(0.338)	(0.301)	(0.343)	(0.732)	(0.260)	(0.227)	(0.282)	(0.450)
Observations	712	712	712	712	712	712	712	712
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	97	97	97	97	97	97	97	97
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.123	0.054	-0.166*	0.002	0.155	0.321***	0.084	0.172
	(0.086)	(0.061)	(0.087)	(0.126)	(0.104)	(0.070)	(0.102)	(0.138)
Rule flex.	-2.124**	-4.250***	-3.456***	-4.499**	-18.504***	-22.277***	-16.722***	-17.650***
	(0.947)	(0.831)	(1.019)	(1.935)	(1.988)	(1.997)	(1.949)	(4.104)
Rule flex. (squared)	-0.920	1.254	0.514	1.043	18.705***	21.819***	16.738***	17.640***
	(1.041)	(0.919)	(1.120)	(2.134)	(1.931)	(1.925)	(1.874)	(4.065)
Observations	712	712	712	712	712	712	712	712
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	97	97	97	97	97	97	97	97
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.148**	0.042	-0.186**	-0.027	-0.109	0.063	-0.149*	-0.035
	(0.073)	(0.054)	(0.079)	(0.092)	(0.072)	(0.052)	(0.078)	(0.091)
E.R. fixed/ E.R.R.	0.704***	0.850***	0.734***	0.280	-0.823***	-0.799***	-0.793***	-0.729***
	(0.214)	(0.188)	(0.225)	(0.335)	(0.093)	(0.078)	(0.101)	(0.146)
E.R. floating/ E.R.R. (squared)	1.306***	0.869***	1.054***	1.457***	0.052***	0.049***	0.049***	0.047***
	(0.181)	(0.148)	(0.193)	(0.283)	(0.006)	(0.005)	(0.006)	(0.009)
Observations	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029
Number of countries	67	67	67	67	67	67	67	67
Crisis obs.	120	120	120	120	120	120	120	120
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.239***	0.024	-0.249***	-0.046	-0.182**	0.057	-0.212**	-0.022
	(0.082)	(0.055)	(0.085)	(0.099)	(0.079)	(0.055)	(0.083)	(0.096)
Monetary policy fram.	1.442***	1.294***	0.941**	0.945	1.344***	1.169***	0.501	1.084*
	(0.406)	(0.351)	(0.417)	(0.673)	(0.364)	(0.312)	(0.383)	(0.557)
Observations	1,012	1,012	1,012	1,012	1,012	1,012	1,012	1,012
Number of countries	66	66	66	66	66	66	66	66
Crisis obs.	120	120	120	120	120	120	120	120
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
PCA	-0.219***	0.036	-0.249***	-0.050	-0.294***	-0.126**	-0.322***	-0.066
	(0.080)	(0.055)	(0.087)	(0.097)	(0.086)	(0.059)	(0.092)	(0.104)
Monetary policy fram.	0.971***	-0.115	0.963***	0.612	-1.446***	-2.448***	-1.486***	-2.215***
	(0.249)	(0.198)	(0.257)	(0.407)	(0.238)	(0.231)	(0.251)	(0.439)
Observations	925	925	925	925	1,031	1,031	1,031	1,031
Number of countries	62	62	62	62	67	67	67	67
Crisis obs.	119	119	119	119	120	120	120	120

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider potential cycle-friendly clauses in budget balance rules.

Table D3: Sensitivity to banking activities restriction as an additional control variable

	Activities restriction							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	-0.106	0.030	-0.081	0.077	-0.238***	-0.109	-0.232***	0.022
	(0.089)	(0.082)	(0.083)	(0.182)	(0.090)	(0.079)	(0.083)	(0.164)
Fiscal rule	-1.648***	-1.981***	-1.890***	-1.865***	-0.242	-0.811***	-0.481*	-0.421
	(0.219)	(0.194)	(0.234)	(0.451)	(0.242)	(0.213)	(0.251)	(0.445)
Observations	713	713	713	713	713	713	713	713
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	96	96	96	96	96	96	96	96
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	0.012	0.053	0.010	0.169	0.038	0.165**	0.085	0.180
	(0.090)	(0.081)	(0.083)	(0.169)	(0.090)	(0.080)	(0.086)	(0.176)
Fiscal rule	-2.839***	-3.563***	-3.021***	-3.302***	-0.804***	-1.041***	-0.963***	-0.937***
	(0.313)	(0.261)	(0.307)	(0.610)	(0.098)	(0.083)	(0.105)	(0.197)
Observations	713	713	713	713	713	713	713	713
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	96	96	96	96	96	96	96	96
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	-0.109	0.052	-0.080	0.151	-0.195**	-0.125	-0.194**	0.115
	(0.094)	(0.081)	(0.084)	(0.185)	(0.091)	(0.083)	(0.086)	(0.165)
Rule with clause	-1.028***	-1.652***	-1.418***	-1.499***	-4.801***	-5.574***	-4.223***	-3.826***
	(0.254)	(0.210)	(0.259)	(0.502)	(0.593)	(0.521)	(0.553)	(1.068)
Rule without clause	-3.134***	-3.096***	-3.135***	-3.459***	0.824***	-0.154	0.486	0.462
	(0.355)	(0.312)	(0.362)	(0.760)	(0.309)	(0.248)	(0.318)	(0.500)
Observations	713	713	713	713	713	713	713	713
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	96	96	96	96	96	96	96	96
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	-0.109	0.052	-0.080	0.151	-0.195**	-0.125	-0.194**	0.115
	(0.094)	(0.081)	(0.084)	(0.185)	(0.091)	(0.083)	(0.086)	(0.165)
Rule flex.	-0.976	-3.511***	-2.536**	-2.538	-20.029***	-22.142***	-17.376***	-15.767***
	(0.992)	(0.819)	(1.025)	(1.958)	(2.273)	(1.988)	(2.073)	(4.181)
Rule flex. (squared)	-2.157**	0.415	-0.599	-0.922	20.853***	21.988***	17.862***	16.228***
	(1.090)	(0.909)	(1.135)	(2.187)	(2.213)	(1.917)	(1.974)	(4.150)
Observations	713	713	713	713	713	713	713	713
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	96	96	96	96	96	96	96	96
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	-0.273***	-0.219***	-0.291***	-0.204*	-0.237***	-0.216***	-0.279***	-0.219*
	(0.068)	(0.061)	(0.067)	(0.113)	(0.071)	(0.064)	(0.071)	(0.113)
E.R. fixed/ E.R.R.	0.291	0.583***	0.544**	0.063	-0.852***	-0.817***	-0.832***	-0.686***
	(0.209)	(0.190)	(0.224)	(0.345)	(0.108)	(0.091)	(0.114)	(0.170)
E.R. floating/ E.R.R. (squared)	1.211***	0.796***	1.080***	1.591***	0.052***	0.048***	0.049***	0.044***
	(0.203)	(0.165)	(0.208)	(0.338)	(0.006)	(0.005)	(0.007)	(0.010)
Observations	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Number of countries	66	66	66	66	66	66	66	66
Crisis obs.	113	113	113	113	113	113	113	113
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	-0.459***	-0.364***	-0.435***	-0.304***	-0.398***	-0.299***	-0.385***	-0.256**
	(0.070)	(0.062)	(0.070)	(0.117)	(0.065)	(0.058)	(0.066)	(0.111)
Monetary policy fram.	2.363***	2.366***	1.900***	2.035***	1.704***	1.308***	0.922**	1.469**
	(0.417)	(0.369)	(0.429)	(0.735)	(0.381)	(0.327)	(0.389)	(0.608)
Observations	988	988	988	988	988	988	988	988
Number of countries	66	66	66	66	66	66	66	66
Crisis obs.	113	113	113	113	113	113	113	113
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Activities restriction	-0.356***	-0.285***	-0.348***	-0.215*	-0.346***	-0.276***	-0.318***	-0.269**
	(0.068)	(0.060)	(0.066)	(0.115)	(0.069)	(0.063)	(0.069)	(0.119)
Monetary policy fram.	0.994***	-0.107	1.048***	0.789*	-1.010***	-2.259***	-1.157***	-1.983***
	(0.255)	(0.200)	(0.269)	(0.440)	(0.241)	(0.227)	(0.256)	(0.459)
Observations	887	887	887	887	1,002	1,002	1,002	1,002
Number of countries	62	62	62	62	66	66	66	66
Crisis obs.	111	111	111	111	113	113	113	113

Note: Standard errors are reported in parentheses. *; **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider cycle-friendly clauses in budget balance rules.

Table D4: Sensitivity to supervisor power index as an additional control variable

	Supervision power							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.197**	-0.119	-0.117	-0.273*	-0.195**	-0.133*	-0.124*	-0.269**
	(0.085)	(0.076)	(0.075)	(0.142)	(0.079)	(0.070)	(0.071)	(0.134)
Fiscal rule	-1.544***	-1.945***	-1.768***	-1.707***	-0.637***	-0.982***	-0.854***	-0.317
	(0.224)	(0.204)	(0.239)	(0.458)	(0.238)	(0.209)	(0.251)	(0.436)
Observations	637	637	637	637	637	637	637	637
Number of countries	44	44	44	44	44	44	44	44
Crisis obs.	88	88	88	88	88	88	88	88
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.064	-0.048	0.051	-0.190	-0.118	-0.043	-0.030	-0.248*
	(0.090)	(0.082)	(0.083)	(0.142)	(0.087)	(0.078)	(0.077)	(0.146)
Fiscal rule	-3.074***	-3.838***	-3.806***	-3.016***	-0.828***	-1.083***	-1.061***	-0.832***
	(0.335)	(0.281)	(0.371)	(0.593)	(0.102)	(0.090)	(0.119)	(0.200)
Observations	637	637	637	637	637	637	637	637
Number of countries	44	44	44	44	44	44	44	44
Crisis obs.	88	88	88	88	88	88	88	88
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.155*	-0.058	-0.050	-0.278**	0.092	0.165**	0.127	-0.222
	(0.083)	(0.073)	(0.072)	(0.141)	(0.091)	(0.083)	(0.081)	(0.155)
Rule with clause	-1.300***	-1.983***	-1.746***	-1.748***	-4.186***	-5.057***	-4.077***	-2.839***
	(0.255)	(0.239)	(0.288)	(0.503)	(0.626)	(0.588)	(0.641)	(0.941)
Rule without clause	-2.258***	-2.256***	-2.072***	-2.706***	0.267	-0.474*	-0.102	0.590
	(0.331)	(0.286)	(0.331)	(0.744)	(0.301)	(0.250)	(0.317)	(0.522)
Observations	637	637	637	637	637	637	637	637
Number of countries	44	44	44	44	44	44	44	44
Crisis obs.	88	88	88	88	88	88	88	88
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.155*	-0.058	-0.050	-0.278**	0.092	0.165**	0.127	-0.222
	(0.083)	(0.073)	(0.072)	(0.141)	(0.091)	(0.083)	(0.081)	(0.155)
Rule flex.	-2.942***	-5.675***	-4.911***	-4.285**	-17.011***	-19.755***	-16.204***	-11.947***
	(0.991)	(0.923)	(1.129)	(1.973)	(2.424)	(2.259)	(2.439)	(3.707)
Rule flex. (squared)	0.683	3.418***	2.839**	1.580	17.278***	19.281***	16.102***	12.536***
	(1.070)	(0.978)	(1.200)	(2.200)	(2.379)	(2.192)	(2.353)	(3.723)
Observations	637	637	637	637	637	637	637	637
Number of countries	44	44	44	44	44	44	44	44
Crisis obs.	88	88	88	88	88	88	88	88
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.127	-0.164**	-0.002	-0.241**	-0.121	-0.126*	-0.017	-0.218*
	(0.080)	(0.070)	(0.072)	(0.115)	(0.078)	(0.069)	(0.069)	(0.113)
E.R. fixed/ E.R.R.	0.654***	0.990***	0.680**	0.147	-0.958***	-0.829***	-0.852***	-0.692***
	(0.252)	(0.227)	(0.275)	(0.393)	(0.109)	(0.093)	(0.118)	(0.178)
E.R. floating/ E.R.R. (squared)	1.443***	0.923***	1.341***	1.689***	0.060***	0.049***	0.053***	0.044***
	(0.206)	(0.163)	(0.215)	(0.337)	(0.006)	(0.005)	(0.007)	(0.010)
Observations	890	890	890	890	890	890	890	890
Number of countries	64	64	64	64	64	64	64	64
Crisis obs.	105	105	105	105	105	105	105	105
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.195***	-0.183***	-0.065	-0.292***	-0.148**	-0.145**	-0.056	-0.253**
	(0.076)	(0.065)	(0.070)	(0.113)	(0.074)	(0.065)	(0.069)	(0.108)
Monetary policy fram.	1.461***	1.582***	0.407	1.333*	1.417***	1.212***	0.802**	1.265**
	(0.449)	(0.389)	(0.466)	(0.780)	(0.375)	(0.318)	(0.392)	(0.590)
Observations	875	875	875	875	875	875	875	875
Number of countries	63	63	63	63	63	63	63	63
Crisis obs.	105	105	105	105	105	105	105	105
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Supervision power	-0.103	-0.156**	-0.011	-0.262**	-0.100	-0.078	0.007	-0.220*
	(0.078)	(0.067)	(0.072)	(0.118)	(0.077)	(0.068)	(0.071)	(0.113)
Monetary policy fram.	1.082***	-0.157	1.313***	0.856*	-1.149***	-2.227***	-1.294***	-1.657***
	(0.278)	(0.212)	(0.289)	(0.487)	(0.239)	(0.224)	(0.258)	(0.425)
Observations	790	790	790	790	892	892	892	892
Number of countries	59	59	59	59	64	64	64	64
Crisis obs.	104	104	104	104	105	105	105	105

Note: Standard errors are reported in parentheses. *; **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider cycle-friendly clauses in budget balance rules.

Table D5: Sensitivity to the existence of a deposit insurance scheme as an additional control variable

	Deposit insurance							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.746***	-0.269	-1.299***	0.399	-0.781***	-0.354*	-1.273***	0.117
	(0.224)	(0.187)	(0.230)	(0.379)	(0.217)	(0.183)	(0.222)	(0.361)
Fiscal rule	-1.786***	-2.002***	-2.065***	-1.738***	-0.522**	-0.844***	-0.656***	-0.702**
	(0.205)	(0.182)	(0.225)	(0.384)	(0.204)	(0.179)	(0.224)	(0.339)
Observations	855	855	855	855	855	855	855	855
Number of countries	40	40	40	40	40	40	40	40
Crisis obs.	116	116	116	116	116	116	116	116
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.941***	-0.479**	-1.251***	0.034	-0.940***	-0.467**	-1.358***	0.216
	(0.237)	(0.202)	(0.240)	(0.382)	(0.230)	(0.193)	(0.232)	(0.377)
Fiscal rule	-2.430***	-2.840***	-2.537***	-2.651***	-0.814***	-0.936***	-0.931***	-0.823***
	(0.256)	(0.214)	(0.267)	(0.476)	(0.086)	(0.074)	(0.096)	(0.156)
Observations	855	855	855	855	855	855	855	855
Number of countries	40	40	40	40	40	40	40	40
Crisis obs.	116	116	116	116	116	116	116	116
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.591**	-0.149	-1.199***	0.605	-0.787***	-0.191	-1.463***	0.153
	(0.234)	(0.195)	(0.238)	(0.403)	(0.237)	(0.196)	(0.249)	(0.369)
Rule with clause	-1.326***	-1.671***	-1.724***	-1.417***	-3.964***	-4.090***	-4.113***	-3.695***
	(0.235)	(0.201)	(0.263)	(0.404)	(0.444)	(0.405)	(0.476)	(0.913)
Rule without clause	-2.960***	-2.972***	-2.941***	-3.290***	0.544**	-0.060	0.519*	0.021
	(0.327)	(0.291)	(0.331)	(0.716)	(0.243)	(0.203)	(0.284)	(0.371)
Observations	855	855	855	855	855	855	855	855
Number of countries	40	40	40	40	40	40	40	40
Crisis obs.	116	116	116	116	116	116	116	116
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.591**	-0.149	-1.199***	0.605	-0.787***	-0.191	-1.463***	0.153
	(0.234)	(0.195)	(0.238)	(0.403)	(0.237)	(0.196)	(0.249)	(0.369)
Rule flex.	-2.343**	-3.714***	-3.953***	-2.376	-16.400***	-16.299***	-16.971***	-14.799***
	(0.923)	(0.792)	(1.031)	(1.640)	(1.701)	(1.548)	(1.801)	(3.590)
Rule flex. (squared)	-0.617	0.742	1.011	-0.914	16.944***	16.239***	17.490***	14.820***
	(1.016)	(0.883)	(1.112)	(1.949)	(1.659)	(1.500)	(1.742)	(3.563)
Observations	855	855	855	855	855	855	855	855
Number of countries	40	40	40	40	40	40	40	40
Crisis obs.	116	116	116	116	116	116	116	116
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.392***	-0.284**	-0.469***	-0.310	-0.421***	-0.323***	-0.504***	-0.308
	(0.132)	(0.119)	(0.148)	(0.201)	(0.133)	(0.120)	(0.149)	(0.202)
E.R. fixed/ E.R.R.	0.615***	0.813***	0.670***	0.344*	-0.338***	-0.466***	-0.365***	-0.414***
	(0.118)	(0.105)	(0.128)	(0.190)	(0.058)	(0.052)	(0.066)	(0.094)
E.R. floating/ E.R.R. (squared)	0.846***	0.741***	0.645***	1.227***	0.022***	0.028***	0.022***	0.027***
	(0.105)	(0.095)	(0.122)	(0.169)	(0.003)	(0.003)	(0.004)	(0.005)
Observations	1,366	1,366	1,366	1,366	1,366	1,366	1,366	1,366
Number of countries	54	54	54	54	54	54	54	54
Crisis obs.	183	183	183	183	183	183	183	183
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.005	0.084	-0.119	0.003	0.117	0.320***	0.158	-0.103
	(0.138)	(0.123)	(0.158)	(0.196)	(0.135)	(0.119)	(0.154)	(0.195)
Monetary policy fram.	1.006***	0.825***	0.302	1.289***	1.006***	0.512***	-0.008	1.918***
	(0.309)	(0.268)	(0.333)	(0.494)	(0.228)	(0.196)	(0.251)	(0.356)
Observations	1,330	1,330	1,330	1,330	1,680	1,680	1,680	1,680
Number of countries	54	54	54	54	54	54	54	54
Crisis obs.	171	171	171	171	178	178	178	178
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Deposit insurance	-0.239*	-0.051	-0.408***	-0.167	-0.111	0.043	-0.242	0.031
	(0.128)	(0.112)	(0.142)	(0.205)	(0.133)	(0.120)	(0.148)	(0.197)
Monetary policy fram.	0.415***	-0.067	0.509***	0.351	-1.254***	-1.598***	-1.224***	-1.677***
	(0.145)	(0.127)	(0.157)	(0.239)	(0.192)	(0.183)	(0.208)	(0.347)
Observations	1,388	1,388	1,388	1,388	1,376	1,376	1,376	1,376
Number of countries	51	51	51	51	54	54	54	54
Crisis obs.	186	186	186	186	183	183	183	183

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider potential cycle-friendly clauses in budget balance rules.

Table D6: Sensitivity to government stability as an additional control variable

	Government stability							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.180***	-0.207***	-0.083*	-0.237***	-0.209***	-0.251***	-0.134***	-0.255***
	(0.045)	(0.037)	(0.047)	(0.073)	(0.045)	(0.037)	(0.046)	(0.073)
Fiscal rule	-1.551***	-1.736***	-1.958***	-1.117***	-0.271	-0.523***	-0.475**	-0.272
	(0.200)	(0.180)	(0.225)	(0.345)	(0.188)	(0.161)	(0.211)	(0.312)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.269***	-0.274***	-0.182***	-0.281***	-0.222***	-0.240***	-0.127***	-0.263***
	(0.045)	(0.037)	(0.045)	(0.072)	(0.044)	(0.037)	(0.046)	(0.072)
Fiscal rule	-2.006***	-2.239***	-2.208***	-1.861***	-0.603***	-0.678***	-0.761***	-0.487***
	(0.231)	(0.193)	(0.239)	(0.409)	(0.077)	(0.066)	(0.086)	(0.137)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.191***	-0.211***	-0.100**	-0.242***	-0.214***	-0.241***	-0.124***	-0.228***
	(0.045)	(0.037)	(0.047)	(0.074)	(0.047)	(0.038)	(0.048)	(0.073)
Rule with clause	-1.063***	-1.503***	-1.462***	-0.960***	-3.743***	-3.744***	-4.071***	-2.588***
	(0.226)	(0.195)	(0.251)	(0.366)	(0.431)	(0.374)	(0.485)	(0.732)
Rule without clause	-2.560***	-2.431***	-2.899***	-2.351***	0.773***	0.209	0.416	0.427
	(0.309)	(0.271)	(0.331)	(0.673)	(0.229)	(0.182)	(0.268)	(0.352)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.191***	-0.211***	-0.100**	-0.242***	-0.214***	-0.241***	-0.124***	-0.228***
	(0.045)	(0.037)	(0.047)	(0.074)	(0.047)	(0.038)	(0.048)	(0.073)
Rule flex.	-1.692*	-3.579***	-2.951***	-1.488	-15.744***	-15.186***	-16.700***	-10.781***
	(0.893)	(0.773)	(0.983)	(1.525)	(1.670)	(1.453)	(1.836)	(2.901)
Rule flex. (squared)	-0.867	1.148	0.052	-0.863	16.517***	15.394***	17.116***	11.208***
	(0.983)	(0.856)	(1.069)	(1.847)	(1.646)	(1.433)	(1.767)	(2.918)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.334***	-0.334***	-0.236***	-0.366***	-0.353***	-0.336***	-0.257***	-0.370***
	(0.035)	(0.030)	(0.038)	(0.053)	(0.034)	(0.029)	(0.037)	(0.052)
E.R. fixed/ E.R.R.	0.969***	1.056***	1.049***	0.259	-0.387***	-0.538***	-0.439***	-0.411***
	(0.138)	(0.119)	(0.156)	(0.203)	(0.066)	(0.057)	(0.075)	(0.101)
E.R. floating/ E.R.R. (squared)	0.633***	0.618***	0.593***	0.820***	0.021***	0.029***	0.023***	0.025***
	(0.120)	(0.109)	(0.142)	(0.180)	(0.004)	(0.003)	(0.004)	(0.006)
Observations	1,463	1,463	1,463	1,463	1,463	1,463	1,463	1,463
Number of countries	65	65	65	65	65	65	65	65
Crisis obs.	173	173	173	173	173	173	173	173
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.305***	-0.281***	-0.198***	-0.348***	-0.259***	-0.241***	-0.165***	-0.333***
	(0.036)	(0.030)	(0.039)	(0.053)	(0.036)	(0.030)	(0.039)	(0.054)
Monetary policy fram.	2.170***	2.162***	1.316***	1.775***	2.719***	2.180***	1.778***	2.254***
	(0.325)	(0.279)	(0.356)	(0.517)	(0.275)	(0.232)	(0.298)	(0.420)
Observations	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422
Number of countries	64	64	64	64	64	64	64	64
Crisis obs.	164	164	164	164	164	164	164	164
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Government stability	-0.351***	-0.343***	-0.242***	-0.467***	-0.404***	-0.395***	-0.297***	-0.425***
	(0.035)	(0.031)	(0.038)	(0.056)	(0.034)	(0.029)	(0.037)	(0.052)
Monetary policy fram.	0.604***	0.073	0.808***	0.630**	-1.942***	-2.362***	-1.816***	-2.024***
	(0.172)	(0.149)	(0.193)	(0.270)	(0.210)	(0.209)	(0.225)	(0.362)
Observations	1,277	1,277	1,277	1,277	1,471	1,471	1,471	1,471
Number of countries	61	61	61	61	65	65	65	65
Crisis obs.	166	166	166	166	173	173	173	173

Note: Standard errors are reported in parentheses. *; **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider cycle-friendly clauses in budget balance rules.

Table D7: Sensitivity to democratic accountability as an additional control variable

	Democratic accountability							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.433***	-0.422***	-0.429***	-0.393***	-0.353***	-0.409***	-0.336***	-0.332***
	(0.070)	(0.062)	(0.083)	(0.110)	(0.070)	(0.063)	(0.079)	(0.109)
Fiscal rule	-1.776***	-1.925***	-2.106***	-1.440***	-0.349*	-0.660***	-0.546***	-0.408
	(0.204)	(0.182)	(0.224)	(0.364)	(0.191)	(0.165)	(0.211)	(0.330)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.392***	-0.455***	-0.273***	-0.423***	-0.425***	-0.478***	-0.364***	-0.437***
	(0.070)	(0.065)	(0.085)	(0.112)	(0.070)	(0.064)	(0.083)	(0.112)
Fiscal rule	-1.928***	-2.267***	-2.073***	-2.066***	-0.653***	-0.749***	-0.773***	-0.626***
	(0.233)	(0.194)	(0.241)	(0.433)	(0.079)	(0.067)	(0.086)	(0.148)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.456***	-0.496***	-0.441***	-0.426***	-0.451***	-0.467***	-0.449***	-0.364***
	(0.072)	(0.065)	(0.084)	(0.111)	(0.076)	(0.067)	(0.091)	(0.111)
Rule with clause	-1.277***	-1.731***	-1.614***	-1.235***	-3.991***	-4.122***	-4.138***	-3.053***
	(0.230)	(0.195)	(0.252)	(0.389)	(0.432)	(0.389)	(0.470)	(0.796)
Rule without clause	-2.849***	-2.736***	-3.075***	-2.796***	0.694***	0.014	0.388	0.307
	(0.320)	(0.279)	(0.336)	(0.688)	(0.230)	(0.182)	(0.257)	(0.364)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.456***	-0.496***	-0.441***	-0.426***	-0.451***	-0.467***	-0.449***	-0.364***
	(0.072)	(0.065)	(0.084)	(0.111)	(0.076)	(0.067)	(0.091)	(0.111)
Rule flex.	-2.259**	-4.190***	-3.381***	-2.144	-16.658***	-16.503***	-16.940***	-12.520***
	(0.895)	(0.766)	(0.980)	(1.585)	(1.673)	(1.509)	(1.788)	(3.139)
Rule flex. (squared)	-0.589	1.455*	0.305	-0.652	17.353***	16.517***	17.328***	12.827***
	(0.982)	(0.848)	(1.064)	(1.884)	(1.647)	(1.483)	(1.729)	(3.135)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.065	-0.104**	-0.044	-0.144*	-0.124**	-0.137***	-0.101*	-0.149*
	(0.052)	(0.045)	(0.060)	(0.079)	(0.051)	(0.045)	(0.059)	(0.078)
E.R. fixed/ E.R.R.	0.938***	0.981***	1.012***	0.230	-0.395***	-0.568***	-0.430***	-0.437***
	(0.141)	(0.121)	(0.159)	(0.208)	(0.066)	(0.057)	(0.075)	(0.101)
E.R. floating/ E.R.R. (squared)	0.795***	0.830***	0.732***	0.970***	0.022***	0.032***	0.023***	0.028***
	(0.119)	(0.107)	(0.143)	(0.176)	(0.004)	(0.003)	(0.004)	(0.006)
Observations	1,463	1,463	1,463	1,463	1,463	1,463	1,463	1,463
Number of countries	65	65	65	65	65	65	65	65
Crisis obs.	173	173	173	173	173	173	173	173
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.333***	-0.352***	-0.309***	-0.167**	-0.381***	-0.398***	-0.332***	-0.244***
	(0.056)	(0.051)	(0.066)	(0.081)	(0.058)	(0.053)	(0.067)	(0.084)
Monetary policy fram.	2.514***	2.350***	1.607***	2.108***	3.266***	2.695***	2.163***	2.734***
	(0.330)	(0.283)	(0.361)	(0.520)	(0.274)	(0.236)	(0.297)	(0.431)
Observations	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422
Number of countries	64	64	64	64	64	64	64	64
Crisis obs.	164	164	164	164	164	164	164	164
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Democratic accountability	-0.091*	-0.141***	-0.045	-0.159**	-0.193***	-0.199***	-0.148**	-0.188**
	(0.053)	(0.048)	(0.062)	(0.079)	(0.051)	(0.044)	(0.059)	(0.075)
Monetary policy fram.	0.500***	-0.021	0.774***	0.453*	-1.613***	-2.004***	-1.553***	-1.774***
	(0.170)	(0.147)	(0.193)	(0.265)	(0.200)	(0.196)	(0.218)	(0.351)
Observations	1,277	1,277	1,277	1,277	1,471	1,471	1,471	1,471
Number of countries	61	61	61	61	65	65	65	65
Crisis obs.	166	166	166	166	173	173	173	173

Note: Standard errors are reported in parentheses. *; **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider cycle-friendly clauses in budget balance rules.

Table D8: Sensitivity to bureaucracy quality as an additional control variable

	Bureaucracy quality							
	Expenditure rule				Budget balance rule			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.423***	-0.090	-0.137	-0.453***	-0.309***	-0.037	-0.025	-0.423***
	(0.099)	(0.074)	(0.121)	(0.142)	(0.097)	(0.076)	(0.118)	(0.144)
Fiscal rule	-1.730***	-1.857***	-2.020***	-1.283***	-0.238	-0.468***	-0.444**	-0.300
	(0.207)	(0.184)	(0.227)	(0.355)	(0.194)	(0.164)	(0.214)	(0.326)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Debt rule				Number of rules			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.726***	-0.430***	-0.366***	-0.828***	-0.629***	-0.308***	-0.366***	-0.634***
	(0.112)	(0.085)	(0.129)	(0.173)	(0.108)	(0.082)	(0.128)	(0.159)
Fiscal rule	-2.489***	-2.560***	-2.357***	-2.667***	-0.771***	-0.779***	-0.850***	-0.659***
	(0.268)	(0.216)	(0.263)	(0.489)	(0.089)	(0.073)	(0.094)	(0.155)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Expenditure rule (1) (dummies)				Budget balance rule (2) (dummies)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.522***	-0.234***	-0.242**	-0.587***	-0.449***	-0.064	-0.162	-0.463***
	(0.101)	(0.080)	(0.123)	(0.153)	(0.104)	(0.076)	(0.124)	(0.143)
Rule with clause	-1.208***	-1.679***	-1.544***	-1.106***	-3.896***	-3.744***	-4.147***	-2.934***
	(0.236)	(0.200)	(0.255)	(0.385)	(0.450)	(0.372)	(0.496)	(0.787)
Rule without clause	-2.901***	-2.620***	-2.992***	-2.912***	0.835***	0.233	0.425	0.445
	(0.321)	(0.275)	(0.331)	(0.702)	(0.238)	(0.185)	(0.274)	(0.360)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	Expenditure rule (1) (quadratic)				Budget balance rule (2) (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.522***	-0.234***	-0.242**	-0.587***	-0.449***	-0.064	-0.162	-0.463***
	(0.101)	(0.080)	(0.123)	(0.153)	(0.104)	(0.076)	(0.124)	(0.143)
Rule flex.	-1.931**	-4.096***	-3.186***	-1.514	-16.420***	-15.209***	-17.013***	-12.183***
	(0.920)	(0.780)	(0.993)	(1.582)	(1.733)	(1.441)	(1.874)	(3.111)
Rule flex. (squared)	-0.971	1.476*	0.195	-1.398	17.255***	15.442***	17.438***	12.628***
	(1.004)	(0.853)	(1.071)	(1.902)	(1.699)	(1.415)	(1.798)	(3.117)
Observations	928	928	928	928	928	928	928	928
Number of countries	43	43	43	43	43	43	43	43
Crisis obs.	128	128	128	128	128	128	128	128
	E.R. regime (dummies)				E.R. regime (quadratic)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.425***	-0.252***	-0.194**	-0.569***	-0.340***	-0.204***	-0.143*	-0.470***
	(0.070)	(0.053)	(0.079)	(0.099)	(0.068)	(0.053)	(0.076)	(0.098)
E.R. fixed/ E.R.R.	0.919***	0.991***	0.992***	0.249	-0.383***	-0.574***	-0.436***	-0.416***
	(0.138)	(0.119)	(0.158)	(0.204)	(0.065)	(0.056)	(0.075)	(0.101)
E.R. floating/ E.R.R. (squared)	0.915***	0.912***	0.815***	1.082***	0.021***	0.033***	0.024***	0.026***
	(0.119)	(0.107)	(0.144)	(0.178)	(0.004)	(0.003)	(0.004)	(0.006)
Observations	1,463	1,463	1,463	1,463	1,463	1,463	1,463	1,463
Number of countries	65	65	65	65	65	65	65	65
Crisis obs.	173	173	173	173	173	173	173	173
	Central bank independence (CWN)				Central bank preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.440***	-0.261***	-0.279***	-0.457***	-0.516***	-0.279***	-0.287***	-0.532***
	(0.074)	(0.058)	(0.085)	(0.105)	(0.081)	(0.059)	(0.088)	(0.109)
Monetary policy fram.	2.647***	2.469***	1.585***	2.379***	3.382***	2.699***	2.129***	2.925***
	(0.336)	(0.290)	(0.364)	(0.538)	(0.284)	(0.241)	(0.303)	(0.442)
Observations	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422
Number of countries	64	64	64	64	64	64	64	64
Crisis obs.	164	164	164	164	164	164	164	164
	Central bank preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Bureaucracy quality	-0.386***	-0.358***	-0.195**	-0.649***	-0.459***	-0.294***	-0.227***	-0.587***
	(0.069)	(0.061)	(0.080)	(0.110)	(0.068)	(0.051)	(0.076)	(0.098)
Monetary policy fram.	0.651***	0.128	0.863***	0.690***	-1.737***	-2.103***	-1.597***	-2.019***
	(0.170)	(0.148)	(0.192)	(0.268)	(0.204)	(0.199)	(0.219)	(0.365)
Observations	1,277	1,277	1,277	1,277	1,471	1,471	1,471	1,471
Number of countries	61	61	61	61	65	65	65	65
Crisis obs.	166	166	166	166	173	173	173	173

Note: Standard errors are reported in parentheses. *; **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. (1) Here we consider the possibility that an expenditure rule can be accompanied by an investment-friendly clause. (2) Similarly, we also consider cycle-friendly clauses in budget balance rules.

Table D9: Results obtained by simultaneously considering the different policy frameworks

	Central Bank Independence (CWN)				Central Bank Preferences (CWN_OBJ)			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Number of rules	**-0.760*** **	**-0.902*** **	**-0.823*** **	**-0.644*** **	**-0.509*** **	**-0.677*** **	**-0.715*** **	**-0.407*** **
	(0.092)	**(0.079)**	**(0.096)**	**(0.159)**	**(0.085)**	**(0.074)**	**(0.095)**	**(0.144)**
Dummy E.R. fixed	**0.188**	**0.327***	**0.267**	**0.583***	**0.790*** **	**0.890*** **	**0.694*** **	**0.890*** **
	(0.213)	**(0.185)**	**(0.224)**	**(0.330)**	**(0.216)**	**(0.180)**	**(0.227)**	**(0.333)**
Dummy E.R. floating	**1.857*** **	**1.707*** **	**1.193*** **	**2.523*** **	**1.114*** **	**1.186*** **	**0.684*** **	**1.951*** **
	(0.226)	**(0.169)**	**(0.235)**	**(0.374)**	**(0.206)**	**(0.156)**	**(0.220)**	**(0.328)**
CWN	**5.651*** **	**5.597*** **	**4.012*** **	**5.538*** **				
	(0.540)	**(0.444)**	**(0.512)**	**(0.913)**				
CWN_OBJ					**3.056*** **	**2.784*** **	**1.881*** **	**3.062*** **
					(0.414)	**(0.320)**	**(0.419)**	**(0.645)**
GDP per capita	-0.001	0.001	0.000	-0.000	0.002	0.006***	0.003	0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Inflation	0.003***	0.003***	0.004**	0.002*	0.004***	0.003***	0.004***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Bank credit / GDP	0.052***	0.057***	0.042***	0.042***	0.050***	0.055***	0.040***	0.037***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.003)	(0.008)
Credit-to-GDP gap	3.466***	2.563***	1.842***	3.853***	2.452***	1.667***	1.106**	3.132***
	(0.435)	(0.336)	(0.445)	(0.657)	(0.417)	(0.324)	(0.438)	(0.630)
Public debt / GDP	0.046***	0.048***	0.037***	0.054***	0.047***	0.048***	0.039***	0.051***
	(0.004)	(0.003)	(0.004)	(0.007)	(0.004)	(0.003)	(0.004)	(0.007)
Simultaneous crisis	0.025***	0.023***	0.014**	0.058***	0.023***	0.021***	0.014**	0.054***
	(0.007)	(0.006)	(0.007)	(0.015)	(0.007)	(0.006)	(0.007)	(0.015)
Currency crisis	1.191***	0.551***	0.923***	2.051***	1.267***	0.576***	0.886***	2.096***
	(0.166)	(0.126)	(0.157)	(0.255)	(0.161)	(0.122)	(0.153)	(0.252)
Discret. gov. consumption	-3.248***	-1.239*	-2.520**	-0.792	-2.190**	-0.088	-1.505	-0.185
	(0.979)	(0.696)	(0.982)	(1.379)	(0.915)	(0.622)	(0.944)	(1.229)
CB assets	0.055***	-0.002	-0.001	0.011	0.055***	0.008	-0.005	0.021
	(0.013)	(0.012)	(0.013)	(0.020)	(0.013)	(0.010)	(0.013)	(0.019)
Constant	-8.247***	-8.091***	-6.277***	-10.296***	-7.415***	-6.964***	-5.405***	-8.897***
	(0.721)	(0.618)	(0.670)	(1.208)	(0.660)	(0.594)	(0.658)	(1.066)
Observations	945	945	945	945	945	945	945	945
Number of countries	45	45	45	45	45	45	45	45
Crisis obs.	129	129	129	129	129	129	129	129
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table D10: Results obtained by simultaneously considering the different policy frameworks

	Central Bank Preferences (CONS_W)				Inflation targeting			
	loss_5years	loss_all	trend_loss	cycle_loss	loss_5years	loss_all	trend_loss	cycle_loss
Number of rules	**-0.503*** **	**-0.695*** **	**-0.682*** **	**-0.296** **	**-0.420*** **	**-0.496*** **	**-0.600*** **	**-0.235***
	(0.083)	**(0.071)**	**(0.093)**	**(0.147)**	**(0.082)**	**(0.070)**	**(0.091)**	**(0.137)**
Dummy E.R. fixed	**0.618*** **	**0.888*** **	**0.912*** **	**0.417**	**0.782*** **	**0.817*** **	**0.849*** **	**0.388**
	(0.192)	**(0.164)**	**(0.216)**	**(0.310)**	**(0.192)**	**(0.167)**	**(0.216)**	**(0.296)**
Dummy E.R. floating	**0.812*** **	**0.751*** **	**0.502** **	**1.455*** **	**1.340*** **	**1.715*** **	**0.944*** **	**2.087*** **
	(0.216)	**(0.171)**	**(0.228)**	**(0.339)**	**(0.211)**	**(0.173)**	**(0.218)**	**(0.350)**
CONS_W	**1.400*** **	**0.475** **	**1.514*** **	**1.056** **				
	(0.271)	**(0.219)**	**(0.282)**	**(0.483)**				
Inflation targeting					**-0.428***	**-1.778*** **	**-0.600** **	**-1.172** **
					(0.257)	**(0.259)**	**(0.264)**	**(0.496)**
GDP per capita	-0.000	0.001	0.001	-0.001	-0.001	0.002	0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Inflation	0.004***	0.003***	0.005***	0.005***	0.002	0.001	0.002	0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Bank credit / GDP	0.046***	0.048***	0.040***	0.024***	0.046***	0.053***	0.040***	0.029***
	(0.004)	(0.003)	(0.003)	(0.006)	(0.004)	(0.003)	(0.003)	(0.006)
Credit-to-GDP gap	1.583***	1.236***	0.540	4.218***	2.092***	1.519***	0.901**	3.213***
	(0.407)	(0.334)	(0.442)	(0.682)	(0.387)	(0.305)	(0.415)	(0.585)
Public debt / GDP	0.046***	0.045***	0.038***	0.048***	0.045***	0.045***	0.038***	0.048***
	(0.004)	(0.003)	(0.004)	(0.008)	(0.004)	(0.003)	(0.004)	(0.006)
Simultaneous crisis	0.021***	0.023***	0.009	0.049***	0.028***	0.023***	0.017**	0.052***
	(0.007)	(0.006)	(0.007)	(0.015)	(0.006)	(0.006)	(0.007)	(0.015)
Currency crisis	1.130***	0.862***	0.884***	1.663***	1.141***	0.402***	0.901***	1.686***
	(0.150)	(0.130)	(0.152)	(0.266)	(0.149)	(0.117)	(0.148)	(0.230)
Discret. gov. consumption	-0.780	-0.175	-0.406	-0.309	-0.741	0.886	-0.780	0.850
	(0.840)	(0.690)	(0.880)	(1.263)	(0.817)	(0.576)	(0.857)	(1.141)
CB assets	0.072***	0.033***	0.033**	0.075***	0.068***	0.012	0.005	0.033*
	(0.013)	(0.011)	(0.014)	(0.023)	(0.013)	(0.010)	(0.012)	(0.019)
Constant	-5.528***	-4.719***	-4.690***	-6.523***	-4.803***	-4.644***	-3.846***	-5.698***
	(0.608)	(0.552)	(0.603)	(0.904)	(0.590)	(0.541)	(0.587)	(0.812)
Observations	817	817	817	817	970	970	970	970
Number of countries	42	42	42	42	45	45	45	45
Crisis obs.	121	121	121	121	130	130	130	130
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Appendix E - On crises probability and conditional losses

Table E1: Mean comparison tests

	Fiscal rules			Exchange rate regime
Group 1	No rule	No BBR or BBR without clause	No ER or ER without clause	Corner ERR
Group 2	One rule or more	BBR with clause	ER with clause	Intermediate ERR
Observations	977	977	977	1,713
Number of countries	45	45	45	67
Gr. 1 mean	0.135	0.130	0.133	0.150
Gr. 2 mean	0.131	0.156	0.132	0.097
Mean-comparison tests				
gr.1 mean $>$ gr.2 mean p.value	0.440	0.758	0.481	0.001
gr.1 mean $\neq$ gr.2 mean p.value	0.881	0.484	0.962	0.001
gr.1 mean $<$ gr.2 mean p.value	0.560	0.242	0.519	0.999
	Monetary policy framework			
Group 1	Low level of CWN	Low level of CWN_OBJ	Low level of CONS_W	Non IT countries
Group 2	High level of CWN	High level of CWN_OBJ	High level of CONS_W	IT countries
Observations	1,635	2,038	1,699	1,723
Number of countries	66	66	62	67
Gr. 1 mean	0.103	0.096	0.123	0.125
Gr. 2 mean	0.161	0.108	0.170	0.070
Mean-comparison tests				
gr.1 mean $>$ gr.2 mean p.value	0.998	0.763	0.981	0.003
gr.1 mean $\neq$ gr.2 mean p.value	0.004	0.474	0.037	0.005
gr.1 mean $<$ gr.2 mean p.value	0.002	0.237	0.019	0.997

Notes: Group mean can be interpreted as the percentage of years during which a banking crisis occurred. BBR, ER and ERR correspond to budget balance rule, expenditure rule and exchange rate regime, respectively. A "high" level of CBI/CBC corresponds to the fourth quartile of the sample, while the observations contained in the first three quartiles are associated to a "low" level.

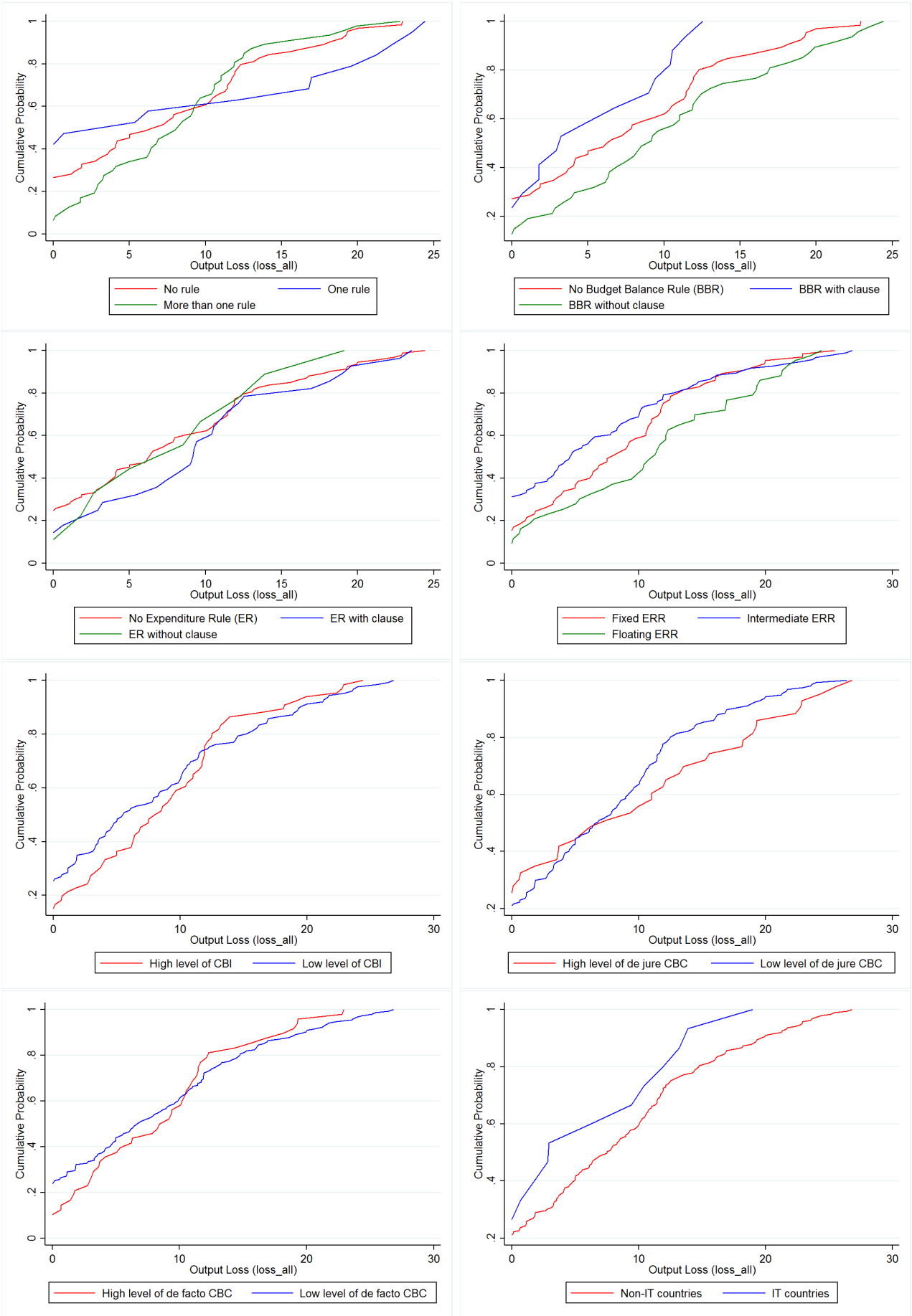

Figure E1: Cumulative distribution functions of conditional losses, with respect to different policy frameworks

Appendix F - Graphical representation of the results

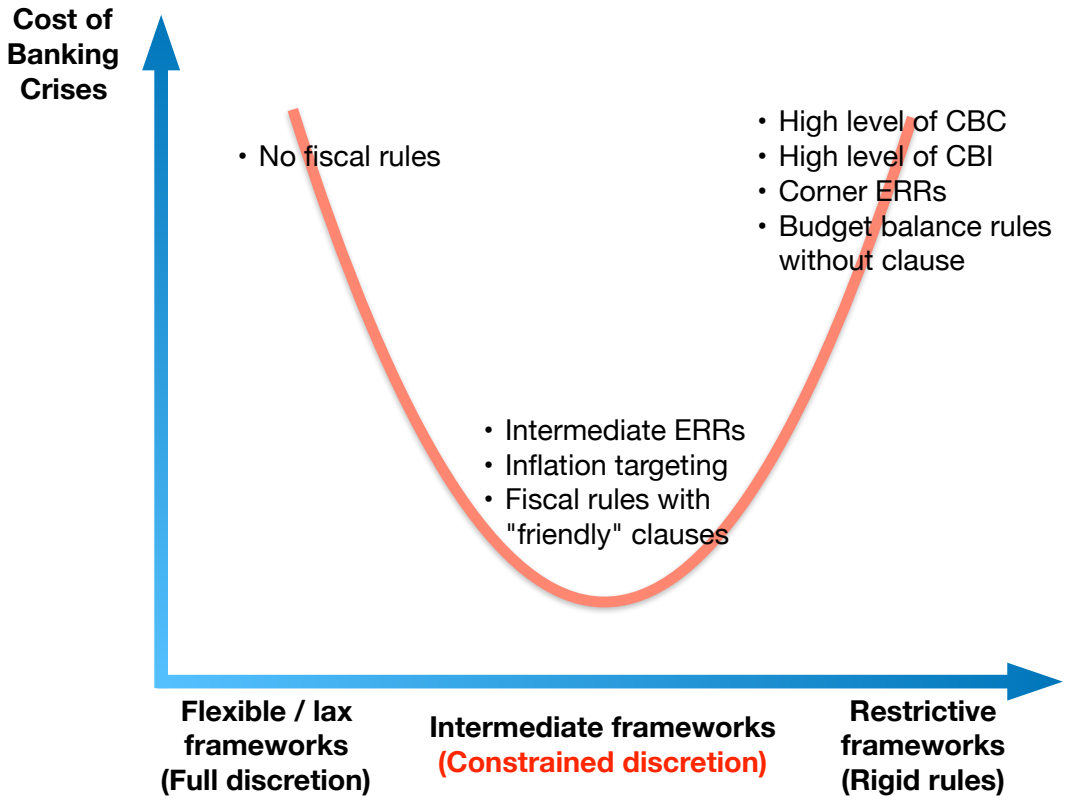

Figure F1: Graphical representation of the results