MPRA

Munich Personal RePEc Archive

The choice of adopting inflation targeting in emerging economies: Do domestic institutions matter?

Yannick Lucotte

Laboratoire d'Economie d'Orléans, Université d'Orléans, CNRS

November 2010

The choice of adopting inflation targeting in emerging economies: Do domestic institutions matter?[*]

Yannick LUCOTTE[†]

Abstract

Over the last decade, a growing number of emerging countries has adopted inflation targeting as monetary policy framework. In a recent paper, Freedman and Laxton (2009) ask the question "Why Inflation Targeting?". This paper empirically investigates this question by analyzing a large set of institutional and political factors potentially associated with a country's choice of adopting IT. Using panel data on a sample of thirty inflation targeting and non-inflation emerging countries, for the period 1980-2006, our results suggest that central bank independence, policy-makers' incentives, and characteristics of political system play an important role in the choice of IT, while the level of financial development and political stability do not seem to matter. Empirical findings are confirmed by extensive robustness tests.

Keywords: Inflation targeting, central bank independence, financial development, political institutions, emerging countries.

JEL Codes: E52, E58.

[†] Corresponding author: LEO – Université d'Orléans, UMR CNRS 6221, Faculté de Droit d'Economie et de Gestion, Rue de Blois, BP 6739 – 45067 Orléans Cedex 2, France. *E-mail*: yannick.lucotte@etu.univ-orleans.fr

1. Introduction

Over the last decade, inflation targeting (hereafter IT) is becoming the monetary policy framework of choice in a growing number of emerging countries. Thus, by the end of 2009, there were nineteen emerging economies which have adopted this monetary policy strategy, predominantly Latin American and Central and Eastern European countries. Moreover, besides these countries, several other emerging countries have expressed the wish to move to IT at short-medium term[3].

According to Amato and Gerlach (2002), this evolution of monetary policy constitutes the most important change in the framework of monetary policy since the collapse of the Bretton Woods system in 1971. The high popularity of IT in emerging countries can nevertheless be explained by the relative benefits of this monetary policy framework on economic performances observed in countries that have adopted IT, and corroborated by a significant body of empirical literature. For instance, using a propensity score matching methodology for a large sample of developing and emerging economies, Lin and Ye (2009) find that the level and variability of inflation are in average lower for inflation targeters than for non-targeters. Furthermore, we think that the choice of IT is a pragmatic response to difficulties of central banks in conducting their monetary policy using an exchange rate peg or a monetary aggregate as an intermediate target.

Although the concept of IT is not clearly defined in the literature (Kohn, 2005; Schmitt-Grohé, 2005), many authors have proposed formal characteristics that may distinguish IT from alternative monetary policy frameworks. Indeed, from the pioneer works of Bernanke *et al.* (1999) and Mishkin (2000), the criteria that characterize IT are: *(i)* a public announcement of a medium-term numerical inflation target; *(ii)* an institutional commitment to price stability as the primary monetary policy objective; *(iii)* the use of an information-inclusive strategy to set monetary policy instruments; *(iv)* and the adoption of high levels of transparency and accountability for the conduct of monetary policy. According to Bernanke *et al.* (1999), IT offers a framework of "constrained discretion" where the official target imposes the constraint, and the discretion is the scope for monetary authorities to take into account short-

---

[3] These countries are: Albania, Algeria, Argentina, Armenia, Croatia, Dominican Republic, Georgia, Honduras, Jamaica, Kazakhstan, Kenya, Kyrgyzstan, Mauritius, Mongolia, Russia, Sri Lanka, Tanzania, Uganda, and Venezuela (Pétursson, 2004).

term disturbances to output or financial stability. This flexibility in the conduct of monetary policy is particularly important for emerging economies that are often adversely affected by external shocks (Fraga *et al.*, 2003).

These considerations suggest therefore that the successful implementation of IT requires the fulfillment of several preconditions. The literature has identified some economic and institutional prerequisites that countries should satisfy if IT regime is to operate successfully[4]. These requirements include in particular an independent, transparent and accountable central bank with a clear price stability mandate, a sound fiscal policy, a well-developed financial market, a flexible exchange rate regime, relatively low inflation rates, and well-developed statistic and econometric models to understand monetary policy transmission mechanisms and to forecast inflation. The experience of emerging countries shows nonetheless that the non fulfillment of all of these requirements is not in itself an impediment to the adoption and success of IT. This emphasizes the fact that implementing IT is a gradual process with economic and institutional reforms before and after the official adoption of this monetary policy regime.

Ultimately, and following Carare *et al.* (2002) and Gonçalves and Carvalho (2008), we think that the country's decision to adopt IT is not random, but is the result of a weighing of the costs and benefits of this monetary policy framework against alternatives. This is especially true in emerging market economies, where reforms imposed by the adoption of IT can generate important economic and political costs, while the benefits on economic performances are uncertain. Paradoxically, while the question of preconditions for adopting IT is predominant in the literature, the number of empirical studies devoted to the determinants driving the choice of IT is relatively small. To the best of your knowledge, ten papers have empirically attempted to identify the factors associated with the choice of implementing this monetary policy strategy[5]. However, none of these papers have addressed this issue for emerging countries only, while reasons which have driven this category of countries to choose IT may differ from industrial countries. Moreover, these papers have focused on a relatively small set of explanatory variables potentially linked with a country's decision to switch to IT, particularly concerning institutional and political factors. Finally,

---

[4] These preconditions have been especially underlined in the literature on IT in emerging market economies, such as Masson *et al.* (1997), Mishkin (2000), Amato and Gerlach (2002), and Carare *et al.* (2002).

[5] These ten studies are provided by Gerlach (1999), Mishkin and Schmidt-Hebbel (2001), Truman (2003), Carare and Stone (2006), Hu (2006), Baltensperger *et al.* (2007), Calderón and Schmidt-Hebbel (2008), Gonçalves and Carvalho (2008), Levya (2008), and Mukherjee and Singer (2008). See notably Pétursson (2004) for a detailed discussion of empirical results found by pre-2004 studies.

using different estimation methodologies, time coverage and country samples, these articles provide mixed results and therefore, come to different conclusions concerning the significant factors associated with the choice of IT.

Accordingly, the aim of this paper is to contribute to the existing empirical literature in two ways. First, we focus our analysis on emerging economies by considering a large sample of targeters and non-targeters countries over the period of 1980-2006. Second, we extend the number of explanatory variables considered by previous studies by examining a large set of institutional and political factors potentially associated with a country's choice of IT.

The rest of the paper is structured as follows. Before turning to the empirical analysis, we turn to the theoretical framework that guides our work and formulate some propositions linking domestic institutions and the choice of adopting IT in section 2. Section 3 presents the data and gives some preliminary statistical findings. Section 4 describes the econometric methodology used to identify institutional determinants of IT adoption in emerging economies, discusses our empirical results, and reports several robustness checks. The last section concludes.

2. **Domestic institutions and the choice of IT: a theoretical framework**

A recent body of literature on the political economy of monetary institutions addresses the question of the interaction between institutions and the choice of monetary policy regime. This literature develops various theoretical arguments implying that institutional framework might be an important determinant of monetary institutions, especially concerning the choice of exchange-rate regime or the choice to delegate monetary policy to an independent central bank. On the basis of this literature and the literature on IT, we formulate some propositions for explaining how institutional arrangements may be associated with a country's choice of adopting an inflation target as a nominal anchor for monetary policy. The links between institutional setting and the choice of an IT strategy are analyzed by considering two categories of domestic institutions: monetary and financial institutions, and political institutions.

2.1. *Monetary and financial institutions*

As noted above, the literature on IT in emerging market economies suggests that this monetary policy strategy should be adopted only if some institutional preconditions are met. One of them is Central bank independence (CBI). Indeed, independence able to insulate the

central bank from political pressures to finance fiscal deficits and produce over-expansionary monetary policies that would lead to inflation above target. However, in some emerging countries, we observed that governments have passed legislation giving greater independence to their central bank only after the adoption of IT. In addition, according to Gerlach (1999), by "tying the government's hands" with an official inflation target, IT can be viewed as a substitute for CBI. Despite the absence of a conclusive empirical answer to the question whether independent central banks are more likely to adopt IT or not, we think nonetheless that a sufficient degree of independence (especially instrument independence) is necessary before adopting IT to ensure the success and long-term sustainability of this monetary policy strategy.

Proposition 1: *The more independent the central bank, the higher the probability of a country adopting IT.*

Another important prerequisite for successful IT stressed by the literature is a healthy financial and banking system. Several reasons can be advanced to explain the great importance of well-functioning financial system (both financial markets and intermediaries) under an IT regime. First, and it is true for any other monetary policy strategy, a sound financial system is essential to guarantee an efficient transmission of monetary policy through the interest rate channel, but also through the credit channel. Second, according to Mishkin (2004), a weak banking sector is potentially problematic to achieve inflation target, because the central bank would be hesitant to raise short-term interest rates for fear that this will impact the profitability of banks and lead to a collapse of the financial system. Third, countries characterized by weak financial institutions are more vulnerable to a sudden stop of capital outflows, causing a sharp depreciation of the exchange rate which leads to upward pressures on the inflation rate (Mishkin, 2004). Fourth, a consequence of lack of large domestic capital markets is an important accumulation of foreign currency external liabilities by firms, households and the government, while their assets are denominated in domestic currency. This liability dollarization makes the financial system more vulnerable to a depreciation of the domestic currency[6] by reducing the net worth of borrowers through a balance sheets effect. As described in Mishkin (1996), by increasing adverse selection and moral hazard problems, this deterioration of balance sheets can ultimately lead to a complete collapse of the banking system. The rescue of the banking system would dramatically increase

---

[6] As noted earlier, IT regime requires a single nominal anchor, and so theoretically exchange rate flexibility.

5

public debt and the risk of fiscal dominance (Burnside *et al.*, 2001). Finally, as outlined in Woo (2003), a well-developed domestic capital market enables the public treasury to diversify its sources of funds (e.g. by issuing bonds), and then reduces incentive to finance public deficits through inflation. Given these arguments, it seems essential for a country to have strong financial institutions before adopting IT. Moreover, Cukierman (1992) argues that the degree of financial depth is positively correlated with the level of CBI, in the sense that broad financial markets are more likely to grant their central bank more independence in order to avoid potential disruptions in the process of financial intermediation. Posen (1993, 1995) explores this intuition by developing the concept of "financial opposition to inflation" and argues that CBI may be determined by the relative political influence of the financial sector[7]. We thus expect that countries with relatively developed financial sectors have a stronger financial opposition to inflation than countries characterized by weak financial systems, and therefore, are more likely to adopt IT.

Proposition 2*: The more developed the financial institutions, the higher the probability of a country adopting IT.*

2.2. Political institutions

Political economy literature argues that policy-makers' incentives and characteristics of political system play an important role in the choice of a monetary policy regime. Following this literature, we formulate three propositions which aim to explain how political institutional setting should be related with the choice of adopting IT.

The choice of delegating the monetary policy to an independent central bank has received significant attention in the literature[8]. Several theoretical and empirical contributions have focused in particular on the link between domestic political institutions and the degree of central bank autonomy. One of the earliest studies was conducted by Cukierman (1992), who investigated the influence of political instability on CBI. The author argues and presents supporting evidence that greater political instability leads to a more independent central bank. More precisely, he shows that the higher the party political instability, the more independent the central bank will be, whereas a high level of regime political instability is negatively

---

[7] Posen (1995) develops a measure of "effective financial opposition to inflation" based on four criteria: *(i)* the level of universal banking; *(ii)* the independence of the banking sector from central bank regulation; *(iii)* the degree of federalism; and, *(iv)* the degree of fractionalization of the political party system. Nonetheless, in many studies, the financial opposition to inflation is proxied with an indicator of "financial depth", such as the liquid liabilities (M3) to GDP ratio.

[8] See Eijffinger and De Haan (1996) for a detailed literature review on the determinants of CBI.

related with CBI[9]. This positive relationship between party political instability and CBI could be explained by the fact that when politicians in office anticipate that they have a great probability to lose upcoming elections, they have a stronger interest in delegating authority to central bank in order to "tie the hands" of the future government, i.e. restrict the range of policy actions available (Eijffinger and De Haan, 1996). Multiple empirical studies have tried to test this positive relationship between party political instability and CBI but results are ambiguous. For example, while Bagheri and Habibi (1998) confirm this relationship for a sample of western democracies and highly democratic developing countries, Farvaque (2001) shows *a contrario* for a sample of twenty-one OECD countries that more-stability oriented societies give more independence to their central bank. Gonçalves and Carvalho (2008) test the impact of political instability on the likelihood of adopting IT but find an insignificant negative relationship[10].

Following Farvaque (2001), we expect that political stability (instability) affects positively (negatively) the probability of a country implementing an IT strategy. Indeed, we think that to be credible, and so efficient, this monetary policy framework requires a commitment of both government and central bank to long-term price-stability, and therefore a relative political stability.

Proposition 3: *The greater the political stability, the higher the probability of a country adopting IT.*

A second body of political economy literature focuses attention on diverging interests between decision-makers. More particularly, some papers have studied how the presence of checks and balances (i.e. multiple veto players) enhances the effects of delegation to an independent agency. Following Tsebelis (2002), we define veto players as the individual and collective actors (individual politicians, political parties, institutions, organizations) who have the power to block a proposed change in current policies. In other words, veto players refer to decision makers whose agreement is necessary before policies can be changed. In the context of monetary policy, Moser (1999) and Keefer and Stasavage (2003) show theoretically that the delegation of monetary policy to an independent central bank is more likely to enhance

---

[9] *"Party political instability refers to the frequent change of government between competing political parties such as left wing and right wing, within a political regime"*, while *"regime political instability measures the frequency of irregular changes of political regime such as revolution, coup d'état, etc."* (Bagheri and Habibi, 1998).

[10] Gonçalves and Carvalho (2008) use the index of political instability compiled in the Political Handbook of the World which measures the frequency of changes in government since the 1970's.

credibility ("time consistency") in the presence of strong checks and balances. Indeed, in the presence of multiple veto players in a government, it becomes harder to reverse a decision to delegate, giving thus to the central bank greater scope to reduce the inflation bias. Moreover, theses authors show that this effect increases with the political polarization of veto players, i.e. with the polarization of inflation-output preferences. The empirical investigation conducted by Keefer and Stasavage (2002) for a sample of seventy-eight developed and developing countries over the period from 1975 to 1994 supports the argument that CBI is more effective as an anti-inflationary device in the presence of multi veto players in government[11]. Extending this argument, some contributions have attempted to assess whether the number of veto players in a government is associated with the choice of monetary policy regime. Moser (1999) classify OECD countries in three groups (countries with no, weak, and strong checks and balances) and shows that the legal CBI is significantly higher in countries whose legislative decision rules are characterized by strong checks and balances. Considering an index of partisan veto players, Hallerberg (2002) finds that the number of veto players is positively associated with the level of CBI in OECD countries.

Following these theoretical and empirical findings, we hypothesize that the structure of political decision in general, and the number of institutional and partisan veto players in a political system in particular, are important in explaining the choice of IT. Indeed, there is some evidence that countries with a great number of veto players in the legislative and executive power may be unable to conduct myopic fiscal policies which increase the fiscal domination. Thus, we expect that the larger the number of veto players and the greater the separation of powers in a political system, the more credible the commitment to price stability and so, the higher the likelihood of implementing an inflation target approach.

Proposition 4: *The larger the number of institutional and partisan veto players, the higher the probability of a country adopting IT.*

Finally, in line with the previous proposition, we think that the probability of adopting IT should also be affected by the sub-national political structure. More precisely, we hypothesize that the likelihood of implementing an IT strategy is positively related to the degree of fiscal federalism. Some arguments have been developed in the literature to explain the direct or

---

[11] To test this proposition, Keefer and Stasavage (2003) include in their inflation equation an interaction term between CBI (*legal* index of CBI) and CHECK (index which measures the number of veto players present in a political system). They find a negative and significant relationship between this interaction term and the logarithm of inflation.

indirect positive relationship between the degree of federalism and the choice of politicians to implement institutional reforms which grant their central bank more independence. First, sub-national entities can be viewed as additional veto players which have veto power over national policy decisions. For example, relying on the case of Germany, Lohmann (1998) notes that countries where provincial governments appoint a part of the central bank's council are more likely to have councils with a significant proportion of members appointed by the current government's political opponents. Second, Posen (1993) argues that countries characterized by a high degree of decentralization are expected to have a more effective financial opposition. The reason is that federalism increases proximity between actors and so, financial sector has a better access to decision-makers and can easier voice its inflation aversion. Thus, according to this author, independent central banks tend to be associated with federal systems. Finally, when constraints on fiscal policy execution emanating from a federal structure are too high, an authority could make the choice to give more independence to its central bank in order to harden its politicians' budget constraints. Farvaque (2001) provides evidence that federalism is positively associated with CBI. Given these arguments, we expect a positive relationship between federalism and the probability of adopting IT.

Proposition 5: *The higher the degree of federalism and decentralization, the higher the probability of a country adopting IT.*

3. Data and descriptive findings

To test our propositions, we examine a large set of institutional and political variables that could explain the likelihood that an emerging country pursues an IT strategy. Our panel dataset consists of thirty emerging countries, inflation targeters and non-inflation targeters, over the period of 1980-2006[12]. The data are drawn from various sources, including in particular the World Bank's World Development Indicators (WDI) 2008 and the Database of Political Institutions (DPI).

3.1. Data[13]

Dependent variable and sample countries. The endogenous variable is a binary variable taking the value 1 if a country operates with an IT framework at the year *t*, and 0 otherwise. In

---

[12] The data are not available for all countries on the whole period, so we use an unbalanced panel data. The list of countries that constitute our sample is given in Table 1. See appendix B for an overview of descriptive statistics and more details concerning missing observations.

[13] See Appendix A for variables definitions and sources.

this paper, we adopt the classification of IT countries proposed by Levya (2008), which tabulates two IT adoption dates for each country having adopted this monetary policy framework by the end of 2005: one corresponding to a partial adoption (*IT_PA*) and the second to a fully-fledged adoption (*IT_FF*)[14]. According to this classification, our sample of inflation targeters is composed of Brazil, Chile, Colombia, Czech Republic, Guatemala, Hungary, Indonesia, Israel, Mexico, Peru, Philippines, Poland, Romania, Slovak Republic, South Africa, South Korea, Thailand and Turkey[15]. Concerning the control group, i.e. the non-IT countries, we consult the Standard & Poor's Emerging Market Index, the Morgan Stanley Capital International Emerging Market Index, and the IMF's International Capital Markets Department's list of emerging markets. Following Joyce and Nabar (2009), we consider the countries which appear on at least two of these three lists. Table 1 lists the eighteen targeting and the twelve non targeting countries, and the years in which IT countries have adopted this monetary policy framework.

As shown in Table 1, four countries (Chile, Israel, Mexico, and Peru) started using a partial IT framework before switching to a full-fledged IT. In fact, during this transition period, central banks of these countries have maintained an additional nominal anchor for monetary policy (typically an exchange rate band). Moreover, according to Mishkin and Schmidt-Hebbel (2007), a partial IT is also characterized by the non-fulfillment of key preconditions for IT and the non-establishment of operational features of IT (such as publishing inflation reports that contain inflation projections).

---

[14] Levya (2008) adopt the "half-year rule": if IT is adopted in the second half of any year *t*, the year *t+1* is considered as the adoption year. Note that we choose this classification because it is the most recent in the literature. Rose (2007) provides also a classification of IT countries through 2004 by considering two dates: default and conservative start dates.

[15] Note that Turkey is included in our sample of inflation targeters since this country has adopted IT in January 2006.

Table 1: Country samples and dates of IT adoption

	Partial adoption	Fully-fledged adoption
Inflation targeting countries		
Brazil	1999	1999
Chile	1991	2000
Colombia	2000	2000
Czech Republic	1998	1998
Guatemala	2005	2005
Hungary	2001	2001
Indonesia	2005	2005
Israel	1992	1997
Mexico	1995	2001
Peru	1994	2002
Philippines	2002	2002
Poland	1999	1999
Romania	2005	2005
Slovak Republic	2005	2005
South Africa	2000	2000
South Korea	1998	1998
Thailand	2000	2000
Turkey	2006	2006
Non-inflation targeting countries		
Argentina	Jordan	Russia
China	Malaysia	Sri Lanka
Egypt	Morocco	Venezuela
India	Pakistan	Zimbabwe

Independent variables. Contrary to previous papers that have assessed the role of CBI in the choice of IT using *de jure* measures of independence, we use in this paper a *de facto* index of CBI: the turnover rate of central bank governors. This indicator is an inverse proxy of CBI, i.e. a higher turnover rate indicates a lower level of independence. We use this index of CBI for two principal reasons. First, according to Cukierman (1992), the turnover rate of central bank governors is a better indicator of CBI than indicators based of central bank laws, especially for emerging and developing countries where the rule of law is less embedded in the political cultural than in industrialized countries. Second, information on the real term in office of central bank governors is easily available for a large set of countries. Using the new data set on central bank governors provided by Dreher *et al.* (2008) and information provided by central bank websites, we calculate the five-year (*TOR_5*) central bank governors turnover rate. We expect that the likelihood of adopting IT is higher in countries characterized by low level turnover rates, i.e. the sign of the coefficient of *TOR_5* is expected to be negative.

Following the empirical financial development literature, we use the ratio of private credit by deposit money banks and other financial institutions to GDP (*PCRED*) as proxy of financial

depth. This variable is taken from WDI. As discussed in the previous section, countries that have developed financial systems are expected to have a greater likelihood of switching to IT than countries with low financial depth.

Concerning political institutions variables, we draw data from two major datasets devoted to political and institutional characteristics of countries, and largely used in the literature. These databases are the DPI compiled by Beck *et al.* (2001) and Keefer and Stasavage (2003), and the International Country Risk Guide (ICRG) dataset.

As noted in the previous section, political stability is expected to be positively related with the probability of adopting IT. To test this relationship, we consider the government stability index (*GSTAB*) computed by ICRG, which assesses the government's ability to carry out its declared program(s) and its ability to stay in office, and taking values from 0 (very low stability) to 12 (very high stability). This variable is the sum of three subcomponents (government unity, legislative strength, and popular support), each with a maximum score of four points and a minimum score of zero point. We expect a positive relationship between this variable and the probability of adopting IT.

To test our proposition 4, we use three complementary variables extracted from DPI. The two first variables assess the existence of partisan veto players (i.e. the ideological polarization in the legislature), while the third variable measures the number of institutional veto players. The first variable (*POLARIZ*) corresponds to the ideological distance, in a left-center-right scale, between the chief executive's party and the four principal parties of the legislature. It is calculated by subtracting the chief executive's party's value and the values of the three largest government parties and the largest opposition party. Indeed, the distance between right (or left) and center is equal to one, while the distance between the right and the left is two[16]. The second (*FRAC*) measures the partisan fragmentation and is defined as the probability that two deputies picked at random from the legislature are of different parties. The third variable counts the number of veto players in a political system, accounting for party affiliations, electoral rules, and electoral competitiveness (*CHECKS*). Indeed, this variable provides a good approximation of the institutional rigidity of checks and balances. We also expect that these three variables are positively related with the likelihood of implementing IT regime.

Finally, to test if the probability of a country adopting IT increases with the degree of federalism and decentralization, we consider a variable (*FED*) drawn from DPI which

---

[16] Note that *POLARIZ* is equal to zero if elections are not competitive or if the chief executive's party has an absolute majority in all houses with lawmaking powers. See Keefer (2007) for most details.

measures whether state/province governments are directly locally elected. This variable takes the value zero if neither provincial executive nor provincial legislature is locally elected, the value one if the executive is appointed but the legislative elected, and the value two if executive and legislative are both locally elected. We think therefore that this index constitutes a good proxy for constraints on fiscal policy execution emanating from a federal structure of government[17].

Control variables. Besides these institutional and political variables, we consider a set of control variables to capture other factors considered in the literature as potentially relevant for understanding the choice of IT. These variables reflect the countries' economic structure and the macroeconomic performances and consist of: the log of real GDP per capita, the lagged inflation rate, the exchange rate regime, and the trade openness.

The log of real GDP per capita (*LRGDP*) is included as a control variable to capture the differences in the level of economic development between countries. Indeed, some empirical studies have shown that poorer countries tend to have less well-developed tax administrations, and so a lower capacity to levy and collect taxes (see, e.g., Chelliah, 1971). Under these conditions, governments rely more heavily on seigniorage revenue to finance budget deficits and have a lower incentive to adopt IT. Moreover, according to Walsh (2005), GDP per capita may serve as a proxy for structural rigidities. *LRGDP* is expected to have a positive effect on the probability of adopting IT regime.

We also control for the lagged rate of inflation (*CPI_1*), measured by annual percentage change of consumer prices, and we expect this variable to be negatively associated with the likelihood of implementing IT strategy[18]. Indeed, according to the literature (e.g., Masson *et al.*, 1997; Truman, 2003), a country should adopt IT only after a successful disinflation process.

Finally, we consider as control variables the exchange rate flexibility (*EXCH*) and the trade openness (*OPEN*). As emphasized previously, exchange rate flexibility is theoretically required by IT in order to avoid potential conflict between the inflation target and the exchange rate target. We think therefore that countries with flexible exchange rate

---

[17] Note that DPI provides a better proxy than the variable *FED*, which measures whether state/province governments have authority over taxing, spending or legislating, but this index is only available for a limited number of countries.

[18] Inflation rate is lagged one period to avoid a potential simultaneity/endogeneity bias between inflation targeting adoption and inflation level.

arrangements are relatively more resilient to exchange rate fluctuations, and so, more likely to adopt IT (IMF, 2006). To measure the degree of exchange rate flexibility, we use the annual "fine" classification developed by Reinhart and Rogoff (2004) that divides *de facto* exchange rate regimes into fourteen categories (category 1 corresponding to the less flexible and 14 to the less rigid). Trade openness, measured as the ratio of exports plus imports to GDP, is introduced as a proxy for exposure degree to external shocks. Following Pétursson (2004), we expect that the probability of adopting an inflation target increases with trade openness, because of the difficulty of maintaining a fixed exchange rate in an economy highly vulnerable to external shocks. In addition, as noted in introduction, IT framework provides sufficient flexibility to deal with the short-term consequences of shocks. Moreover, according to Romer (1993) and Lane (1997), the larger the degree of openness, the weaker the incentives for policymakers to generate an inflationary bias and so, the greater the CBI. Hence, we expect *EXCH* and *OPEN* to be positively related with the probability of adopting IT.

3.2. Descriptive findings

Before turning to the econometric analysis, we present some descriptive statistics for the explanatory variables we use in the regressions. This statistical analysis may be helpful in suggesting a preliminary answer to the question whether factors presented in the previous section are associated with the choice of IT in emerging economies. Our statistical analysis proceeds in two steps. First, we calculate the correlations among the variables discussed above to identify the explanatory variables strongly correlated with IT, and to detect potential multicollinearity between the independent variables. Second, we divide our sample of countries into two groups, inflation targeters and non-inflation targeters, and we test whether the mean value of each explanatory variable is the same for the two monetary regimes (IT and non-IT) before the adoption of IT.

Correlations. Table 2 reports the correlation coefficients between the variables. First, we can see that none of the explanatory variables are highly and significantly correlated with IT dummy. Nonetheless, it is important to note that all significant correlation coefficients between institutional variables and IT dummy (*IT_PA* and *IT_FF*) exhibit the expected sign. Second, we do not suspect a potential multicollinearity problem because none of the independent variables are highly and significantly correlated among themselves.

Table 2: Correlation coefficients

	IT_PA	IT_FF	CPI_1	LRGDP	EXCH	OPEN	TOR_5	PCRED	GSTAB	POLARIZ	FRAC	CHECKS	FED
IT_PA	1.00												
IT_FF	0.88***	1.00											
CPI_1	-0.01	-0.01	1.00										
LRGDP	0.09***	0.08***	-0.05***	1.00									
EXCH	0.14***	0.13***	0.10***	-0.01	1.00								
OPEN	-0.03**	-0.01	-0.04**	0.27***	-0.32***	1.00							
TOR_5	-0.03**	-0.04**	0.07***	-0.04***	0.23***	-0.13***	1.00						
PCRED	-0.01	-0.01	-0.06***	0.67***	-0.06***	0.19***	-0.09***	1.00					
GSTAB	0.06***	0.05***	-0.09***	0.28***	-0.19***	0.23***	-0.29***	0.23***	1.00				
POLARIZ	0.15***	0.13***	0.02	0.44***	0.04**	0.01	0.03*	0.31***	0.14***	1.00			
FRAC	0.14***	0.12***	0.04**	0.32***	0.00	0.08***	0.03**	0.18***	0.21***	0.47***	1.00		
CHECKS	0.14***	0.13***	-0.01	0.39***	0.01	0.06***	0.00	0.29***	0.13***	0.61***	0.53***	1.00	
FED	0.03*	0.05***	-0.03	0.29***	0.14***	-0.09**	-0.03*	0.32***	0.03	0.25***	0.12***	0.33***	1.00

Note: *, **, *** refer to statistical significance at the 10%, 5% and 1% respectively.

Means value comparisons. Table 3 presents the means comparison tests for the different explanatory variables. For the targeters, averages are calculated using the five year period prior to the adoption of IT (*IT_PA* and *IT_FF*). Concerning the non-targeters, we follow Ball and Sheridan (2003) suggestion and consider as the "year of adoption" the mean of the adoption dates in the targeters group. This date is so the same for all non-targeting countries, respectively 2000 if we consider partial adoption dates and 2001 in the case of fully-fledged adoption. First, and interestingly, non-inflation targeters exhibit on average a lower turnover rate of central bank governors than IT countries. This result, opposite to our proposition 1, seems to indicate that the precondition of CBI has not been fulfilled by emerging economies, and in a way, corroborates the substitutability argument developed by Gerlach (1999). Concerning financial depth, results suggest that non-IT countries have more developed financial markets than inflation targeters, but the mean difference is not statistically significant. Concerning political institutions variables, non-inflation targeters exhibit on average higher government stability than IT countries. This statistical result is contrary to our proposition 3. Conversely, except for *CHECKS*, statistical findings seem to support our proposition 4 linking political system's decision-making process and the probability of a country adopting IT, since the number of institutional and partisan veto players is largest in IT countries. Our proposition 5 linking the degree of federalism and the choice of adopting IT is not confirmed by the data. Finally, concerning control variables, we find that on average, IT countries have higher level of economic development and higher exchange rate flexibility than non inflation targeters, while mean differences of inflation rate and trade openness are not statistically significant at conventional critical values.

Although these latter results give a first interesting indication on the key role played by institutions in the choice of implementing or not an IT framework for monetary policy, they need to be interpreted with caution because this kind of analysis requires choosing a base year for non-IT countries, this choice obviously influencing statistical findings.

Table 3: Means comparison tests

	Partial adoption			Fully-fledged adoption		
	Targeters	Non-targeters	Pr (|T|>|t|)	Targeters	Non-targeters	Pr (|T|>|t|)
Monetary and financial institutions						
TOR_5	**0.26**	**0.13**	**0.00**	**0.22**	**0.16**	**0.03**
PRCRED	47.19	51.51	0.57	48.70	52.63	0.61
Political institutions						
GSTAB	**7.60**	**8.73**	**0.00**	**8.29**	**9.42**	**0.00**
POLARIZ	**0.70**	**0.29**	**0.00**	**0.77**	**0.32**	**0.00**
FRAC	**0.69**	**0.56**	**0.00**	**0.70**	**0.66**	**0.00**
CHECKS	3.61	3.86	0.60	3.81	3.78	0.95
FED	1	1.02	0.89	1	1	1.00
Control variables						
CPI	164.81	17.37	0.12	35.88	13.29	0.34
LRGDP	**8.01**	**7.24**	**0.00**	**8.05**	**7.26**	**0.00**
OPEN	69.09	66.90	0.76	70.05	67.27	0.71
EXCH	**9.46**	**6.71**	**0.00**	**9.54**	**6.24**	**0.00**

4. Econometric evidence

The main objective of our empirical analysis is to identify the main institutional and political determinants driving the choice of IT in emerging countries. Thus, after presenting econometric methodology used, we discuss our results. Finally, we perform several sensitivity analyses that check the robustness of our empirical results.

4.1. Econometric methodology

We begin by investigating whether the institutional variables described in the previous section are related to the choice of adopting IT in emerging economies. Given the nature of the dependent variable, the binary decision to adopt (or not adopt) an IT regime is modeled with a probit model[19]. Moreover, given the nature of our country sample and since the institutional variables considered are often time-invariant or characterized by a little within variance, we

---

[19] More precisely, using panel data, we model the choice of adopting and having in place an IT regime, since none of emerging countries having implemented this monetary policy framework has renounced it to date.

use a random-effects probit model. The general structure of the model we estimate is as follows:

$$IT_{it}^* = \alpha + \delta' INST_{it} + \beta' X_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

where IT_{it}^* is an unobserved latent variable which describes the choice of adopting IT, while the subscripts i and t denote country and year, respectively. α refers to the constant term, $INST_{it}$ is the vector of institutional determinants of the IT regime choice, and X_{it} is the vector of control variables. Unobserved country heterogeneity is captured by μ_i, δ' and β' are the vector of coefficient estimates, and ε_{it} is the error term. The error term is assumed to be normally, independently and identically distributed with a mean of zero and a variance of σ^2. Although IT_{it}^* is unobservable, we do observe the choice of implementing IT for country i at year t. The observed binary variable characterizing the country's decision to adopt IT is related to the latent variable IT_{it}^* such that:

$$IT = \begin{cases} 1 \ if \ IT_{it}^* > 0 \\ 0 \ if \ IT_{it}^* \leq 0 \end{cases} \tag{2}$$

taking the value of 1 if a country has in place an IT regime at the year t and 0 otherwise.

Before discussing empirical findings, it is relevant to note that our results need to be interpreted with caution for two reasons. First, the random effects model assumes μ_i uncorrelated with right-hand-side variables. But, according to Mundlak (1978), the probability of no correlation between individual-specific effects and some explanatory variables is low. Second, it is possible to suspect the existence of a potential endogeneity bias since the implementation of IT is a gradual process with economic and institutional reforms before and after the official adoption of this monetary policy framework (see, e.g., Batini and Laxton, 2006) and, as shown by some empirical studies, the adoption of IT in emerging economies has improved economic performances.

4.2. Results

The estimation results of the probit model are shown in table 4. In order to identify and quantify the impact of domestic institutions described above on the probability of adopting IT, estimations are performed separately for each institutional variable on the same set of control variables. Also, from an econometric point of view, this approach allows to avoid a potential collinearity problem between institutional variables, especially between variables taken from DPI. Moreover, as emphasized previously, for each specification we consider two dates of IT adoption: partial adoption (*IT_PA*) and fully-fledged adoption (*IT_FF*). Nonetheless, overall, we can see that there are few differences between results provided by *IT_PA* and *IT_FF*,

which lead to very similar coefficients and statistical significance levels. This can be explained by the fact that only four countries of our sample of inflation targeters started using a partial IT framework. Concerning the explanatory power of our probit model, it is relatively high with a pseudo-R^2 comprised between 0.55 and 0.63 in the case of partial adoption, and between 0.61 and 0.65 in the case of fully-fledged adoption.

The first two columns report the results for monetary and financial institutions, while columns (3) to (7) report the results for political institutions. As can be seen in column (1), the turnover rate of central bank governors is significantly and negatively associated with the probability of IT adoption. This result, opposite to Gerlach (1999), confirms our proposition 1 and shows that CBI is an important pre-condition for successful IT.

Concerning financial depth (column 2), we find a negative but insignificant relationship between the ratio of private credit by deposit money banks and other financial institutions to GDP and the likelihood of adopting IT. This result seems to indicate that emerging countries have made the choice to implement an IT strategy in the presence of weak financial markets. This choice could nonetheless be explained by the fact that these countries have maintained an implicit exchange rate target after the adoption of IT to avoid a potential collapse of the financial sector, as described in section 2 (see, e.g., Edwards, 2006; Aizenman *et al.*, 2008; and, Kisinbay *et al.*, 2009).

Turning to the political factors, the evidence from the probit model corroborates partially theoretical arguments developed in section 2. First, results reported in column (3) of table 4 show that government stability is not related with IT adoption in emerging economies, since the estimated coefficient of *GSTAB* is not statistically significant. This result, contrary to our proposition 3, is nonetheless consistent with empirical findings of Gonçalves and Carvalho (2008) and could be explained by the proxy of political stability used.

Second, results regarding the link between the number of institutional and partisan veto players and the probability of adopting IT are conform to our expectations. Indeed, as shown in columns (4), (5) and (6), there exists a positive and significant relationship between *POLARIZ*, *FRAC*, and *CHECKS*, and the likelihood of adopting IT. These results are consistent with those found by Moser (1999) and Hallerberg (2002), and with our statistical findings. Hence, the probability of switching to IT in emerging countries increases with the number of institutional and partisan veto players, measured here by three complementary variables.

Third, concerning the link between the degree of federalism and decentralization and the probability of adopting IT, we find more ambiguous results. Indeed, results reported in the last

column show a positive relationship between *FED* and *IT_PA* but only statistically significant at the 10% level, while we find a positive but insignificant relationship *FED* and *IT_FF*. Finally, concerning control variables, all coefficients have the expected sign and are overall statistically significant. Thus, results indicate that the log of real GDP per capita, the exchange rate flexibility, and the trade openness are positively associated with a greater likelihood of adopting IT, while the lagged inflation rate is negatively related to this probability. These latter results are similar to those found by recent empirical studies, such as Hu (2006), Calderón and Schmidt-Hebbel (2008), and Levya (2008).

Table 4: Monetary, financial and political institutions and the choice of adopting IT, probit regression results

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
	IT_PA	IT_FF	IT_PA	IT_FF	IT_PA	IT_FF	IT_PA	IT_FF	IT_PA	IT_FF	IT_PA	IT_FF	IT_PA	IT_FF
TOR_5	-3.791***	-4.48**												
	(1.38)	(1.76)												
PCRED			-0.003	-0.012										
			(0.01)	(0.01)										
GSTAB					0.088	-0.062								
					(0.09)	(0.09)								
POLARIZ							1.259***	0.819**						
							(0.41)	(0.36)						
FRAC									4.973***	5.478***				
									(1.81)	(1.92)				
CHECKS											0.756***	0.455***		
											(0.21)	(0.15)		
FED													1.587*	0.779
													(0.91)	(0.94)
CPI_1	-0.136***	-0.371***	-0.141***	-0.348***	-0.134***	-0.353***	-0.139***	-0.379***	-0.149***	-0.402***	-0.167***	-0.346***	-0.128***	-0.326***
	(0.29)	(0.07)	(0.02)	(0.06)	(0.03)	(0.06)	(0.03)	(0.07)	(0.03)	(0.07)	(0.03)	(0.06)	(0.03)	(0.06)
LRGDP	5.841***	10.623***	6.759***	8.095***	5.844***	4.904***	4.957***	6.613***	6.044***	7.186***	10.244***	6.094***	10.339***	9.889***
	(1.82)	(0.86)	(1.47)	(0.92)	(0.51)	(1.56)	(1.46)	(1.88)	(1.31)	(0.91)	(0.91)	(1.67)	(0.69)	(0.72)
EXCH	0.291***	0.382***	0.258***	0.309***	0.331***	0.292***	0.285***	0.321***	0.313***	0.416***	0.427***	0.342***	0.306***	0.298***
	(0.08)	(0.13)	(0.07)	(0.09)	(0.08)	(0.08)	(0.07)	(0.09)	(0.08)	(0.11)	(0.09)	(0.09)	(0.09)	(0.09)
OPEN	0.033***	0.032*	0.041***	0.034**	0.043***	0.037***	0.041**	0.037***	0.047***	0.029	0.061***	0.031**	0.054***	0.038**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	-52.32***	-91.07***	-50.70***	-69.71***	-54.94***	-44.23***	-47.91***	-60.36***	-59.40***	-67.11***	-95.53***	-56.19***	-93.46***	-87.06***
	(14.56)	(7.79)	(12.52)	(8.27)	(5.05)	(12.85)	(12.51)	(16.30)	(11.61)	(8.57)	(8.41)	(14.39)	(5.86)	(6.43)
Nb. of observations	688	688	674	674	589	589	605	605	652	652	684	684	590	590
Nb. of countries	30	30	30	30	30	30	30	30	30	30	30	30	27	27
LR test	137.6***	68.8***	129.7***	43.4***	121.7***	53.6***	108.6***	26.5***	128.9***	70.1***	126.2***	63.4***	158.9***	73.8***
Log likelihood	-105.86	-92.01	-110.38	-96.09	-96.57	-85.37	-89.36	-77.77	-102.55	-90.16	-96.50	-93.21	-96.95	-89.42
Pseudo-R2	0.60	0.65	0.58	0.63	0.55	0.61	0.60	0.65	0.59	0.64	0.63	0.64	0.59	0.62

Note: Standard errors are reported between brackets. *, **, *** refer to statistical significance at the 10%, 5% and 1% respectively.

4.3. Robustness and sensitivity analysis

We check the robustness of our empirical results in several ways. In order to economize space, in this sub-section, we present only the estimated coefficients of explanatory variables of interest. Results for control variables can be provided upon request.

First, we want to check whether results are robust to changes in the sample of non-IT countries (i.e. the control group). Thus, we consider three different samples of non-IT economies with available data extracted from Gonçalves and Salles (2008), Batini and Laxton (2006), and Lin and Ye (2009). Due to data availability, these samples are composed of twenty, twenty-five, and twenty-three countries, respectively. Furthermore, we consider a fourth sample composed of countries which appear in these three samples. This intersected sample is composed of ten countries. Appendix C details these different country samples. Results for these four country samples are reported in rows (1) to (4) of table 5. They are consistent with those found in the previous sub-section.

Second, we check the robustness of our results to the inclusion of additional control variables in the initial probit model. More precisely, we introduce separately in Eq. (1) two other variables that could explain the adoption of IT by emerging countries. These variables are the central government debt-to-GDP ratio (*DEBT*) provided by Jaimovich and Panizza (2010), and the number of countries (industrialized and emerging) that have adopted IT at the year *t* (*NUM_IT*)[20]. The stock of public debt is included to account for countries' fiscal soundness, frequently noted as a precondition for the adoption of IT. Indeed, large public debt levels raise the risk of fiscal dominance, i.e. the risk that in the long run the central bank need to monetize the public debt (see, e.g., Amato and Gerlach, 2002). Following Truman (2003), Hu (2006), and Calderón and Schmidt-Hebbel (2008), we therefore expect a negative relationship between the public debt-to-GDP ratio and the probability of adopting IT. Concerning the second additional control variable, it is introduced to account for a potential "popularity effect" of IT. Indeed, although they do not satisfy most of the preconditions theoretically required for adopting IT, a growing number of emerging countries has adopted this monetary policy framework over the last decade and, as emphasized in introduction, many other have expressed an interest in moving to IT at short-medium term. This increasing popularity of IT among emerging economies can nonetheless be explained by the relative good

---

[20] Note that data on public debt are not available for Romania.

macroeconomic performance of inflation targeters, and by "promotion" efforts made by the IMF to support and encourage emerging countries to adopt IT (Epstein, 2006). Hence, we expect this variable to be positively related with the likelihood of adopting IT. The estimation results included as additional control variables the stock of public debt ant the number of IT countries around the world are shown in rows (5) and (6) of table 5, respectively. The inclusion of these variables in the model does not change our results significantly. Concerning the estimated coefficients of additional control variables, they have the expected sign and are statistically significant at conventional critical values in all regressions.

Third, we check whether our results are robust to different sample periods. We then re-estimate the initial probit model by dropping the pre-1990 observations. Row (7) of table 5 reports the results from this probit regression. Our results do not change for the new sample period.

Fourth, since some countries of our sample have experienced hyperinflation, it is possible that outliers associated with high-inflation episodes affect the results of our regressions. This possibility is accounted in row (8) of table 5 by dropping all hyperinflation periods (defined as an annual inflation rate $\geq 40\%$). Results are very similar to those reported in table 4. Interestingly, the estimated coefficient of lagged inflation rate is still negative and statistically significant at the 1% level.

Table 5: Domestic institutions and the choice of adopting IT, robustness checks

Equation	TOR_5	PCRED	GSTAB	POLARIZ	FRAC	CHECKS	FED
Partial adoption							
(1) GS sample	-3.91***	-0.01	0.10	1.28***	5.36***	0.64***	2.28***
	(1.41)	(0.01)	(0.08)	(0.34)	(1.80)	(0.16)	(0.66)
(2) BL sample	-3.62***	-0.00	0.08	1.25***	5.74***	0.75***	2.19***
	(1.30)	(0.01)	(0.09)	(0.42)	(1.78)	(0.21)	(0.76)
(3) LY sample	-3.66***	-0.01	0.11	1.21***	4.89***	0.63***	1.23*
	(1.21)	(0.01)	(0.08)	(0.32)	(1.50)	(0.16)	(0.64)
(4) Both samples	-3.79***	-0.00	0.08	1.19***	5.89***	0.78***	2.46**
	(1.32)	(0.01)	(0.09)	(0.39)	(2.05)	(0.22)	(1.02)
(5) Adding public debt	-6.08***	-0.01	0.08	1.16***	4.95***	0.58***	1.82*
	(2.23)	(0.01)	(0.12)	(0.35)	(1.89)	(0.22)	(1.01)
(6) Adding "popularity effect"	-4.38*	-0.05**	0.05	2.21***	6.46*	0.65**	-1.99
	(2.58)	(0.02)	(0.18)	(0.84)	(3.81)	(0.31)	(1.20)
(7) Post-1990 sample	-4.54**	-0.03**	-0.05	1.30**	4.76**	0.64***	-2.28
	(1.87)	(0.01)	(0.10)	(0.53)	(2.01)	(0.22)	(1.37)
(8) No hyperinflation periods	-7.78***	0.01	0.07	1.37***	5.87***	0.73***	2.66**
	(2.19)	(0.01)	(0.10)	(0.48)	(1.87)	(0.19)	(1.29)
Fully-fledged adoption							
(1) GS sample	-3.33***	-0.01	-0.04	0.83***	5.87***	0.49***	1.07*
	(1.20)	(0.01)	(0.09)	(0.30)	(1.55)	(0.16)	(0.56)
(2) BL sample	-4.24***	-0.01	-0.07	0.84**	6.93***	0.47***	1.16
	(1.64)	(0.01)	(0.09)	(0.39)	(2.39)	(0.17)	(0.95)
(3) LY sample	-3.29***	-0.01	-0.01	0.80***	5.52***	0.49***	1.47*
	(1.24)	(0.01)	(0.09)	(0.29)	(1.46)	(0.14)	(0.77)
(4) Both samples	-3.53***	-0.01	-0.06	0.70**	5.50***	0.48***	0.92
	(1.36)	(0.01)	(0.09)	(0.34)	(2.00)	(0.15)	(0.93)
(5) Adding public debt	-4.62***	-0.02***	-0.06	0.94***	4.71**	0.26*	0.36
	(1.58)	(0.01)	(0.09)	(0.32)	(2.25)	(0.14)	(0.60)
(6) Adding "popularity effect"	-3.91	-0.02	-0.18	2.28**	5.57*	0.20	-0.23
	(2.95)	(0.02)	(0.18)	(0.96)	(3.26)	(0.17)	(0.74)
(7) Post-1990 sample	-3.78***	-0.02***	-0.12	0.68**	3.76**	0.27**	-0.01
	(1.32)	(0.01)	(0.09)	(0.29)	(1.60)	(0.13)	(0.58)
(8) No hyperinflation periods	-4.48**	-0.01	-0.06	0.82**	5.47***	0.45**	0.78
	(1.76)	(0.01)	(0.09)	(0.36)	(1.92)	(0.15)	(0.94)

Note: Standard errors are reported between brackets. *, **, *** refer to statistical significance at the 10%, 5% and 1% respectively.

Fifth, we test whether our results are sensitive to the model used. We thus re-estimate Eq. (1) using an alternative non-linear probabilistic model (logit model) and a linear probability model (GLS estimator), and we compare results of these two specifications and with those obtained with probit model. Table 6 presents the estimated coefficients of explanatory variables of interest across these three models. We can see that the sign and the significance of estimated parameters obtained with the probit model (column 1) tend to be closer to those obtained with the logit (column 2) and the linear probability model (column 3). Note nonetheless that the coefficient of GSTAB becomes positive and significant with the random effects estimation method (GLS estimator), while it stays insignificant with the logit model.

Table 6: Comparison of binary models and estimated coefficients

Variable	Probit (1)		Logit (2)		GLS (3)	
	IT_PA	IT_FF	IT_PA	IT_FF	IT_PA	IT_FF
	-3.791***	-4.48**	-7.53***	-7.15**	-0.39***	-0.34***
TOR_5	(1.38)	(1.76)	(2.60)	(2.82)	(0.06)	(0.06)
	-0.003	-0.012	-0.00	-0.02	-0.00	-0.00
PCRED	(0.01)	(0.01)	(0.01)	(0.02)	(0.00)	(0.00)
	0.088	-0.062	0.12	-0.11	0.03***	0.02***
GSTAB	(0.09)	(0.09)	(0.17)	(0.18)	(0.00)	(0.00)
	1.259***	0.819**	2.33***	1.43**	0.12***	0.08***
POLARIZ	(0.41)	(0.36)	(0.75)	(0.60)	(0.02)	(0.02)
	4.973***	5.478***	9.18***	9.73***	0.22***	0.15**
FRAC	(1.81)	(1.92)	(3.45)	(3.42)	(0.07)	(0.07)
	0.756***	0.455***	1.26***	0.80***	0.02***	0.01**
CHECKS	(0.21)	(0.15)	(0.33)	(0.28)	(0.00)	(0.00)
	1.587*	0.779	3.21**	1.42	0.04	0.06*
FED	(0.91)	(0.94)	(1.54)	(1.86)	(0.03)	(0.03)

Note: Standard errors are reported between brackets. *, **, *** refer to statistical significance at the 10%, 5% and 1% respectively.

Finally, we try to check if the non-significance of some right-hand-side variables in most specifications is not due to measures used. Thus, we re-estimate Eq. (1) by exploring alternative measures of financial depth and political stability. For brevity sake, results of estimations using these alternative variables are not reported, but are available upon request. Concerning financial depth, we use three proxies taken from the database of financial development and structure of Beck and Demirgüç-Kunt (2009): the ratio of deposit money banks assets to GDP (*DMBA*), liquid liabilities as a percentage of GDP (*LLGDP*), and the total amount of outstanding domestic debt securities issued by public domestic entities as a percentage of GDP (*PUBOND*)[21]. The two first variables are proxies of financial development commonly used in the literature, while we consider a proxy of government bond market liquidity in order to test the argument of Woo (2003) developed in section 2. As private credit-to-GDP ratio, we find that *DMBA* and *LLGDP* are not significantly related to the probability of adopting IT. Conversely, results show a positive and significant relationship between *PUBOND* and the likelihood of IT adoption. This latter result, consistent with those found by Woo (2003), means that countries with more developed government bond markets are more capable of financing public deficits without resorting to seigniorage, and therefore have a higher probability of adopting IT.

---

[21] Note that data on liquid liabilities and deposit money bank assets are not available for China and Zimbabwe.

Concerning political stability, the number of indexes available over a long period of time is relatively limited. Therefore, in order to test whether our results are not sensitive to the choice of the political stability measure, we consider two proxies. The first proxy we use is the government stability index (*STABS*) provided by DPI. This variable is calculated by dividing the number of exits of veto players between year *t* and year *t+1* by the total number of veto players in year *t*. Veto players considered are the president and the largest party in the legislature for a presidential system, and the prime minister and the parties in the government coalition for a parliamentary system. This variable is therefore on a 0-1 scale, with zero representing no exits and one representing the exit and replacement of all veto players. We then consider the Polity2 index (*POLITY2*) developed by the Polity IV Project as an overall measure of political stability. This variable assesses whether a country is more democratic or authoritarian. This index takes values from -10 (very autocratic) to +10 (very democratic) and is constructed by subtracting the "democracy" score from the "autocracy" score[22]. Our results suggest nonetheless that they are somewhat sensitive to the choice of the political stability measure, since we find that the government stability index computed by DPI yields similar results than those obtained with *GSTAB*, while results exhibit a positive and significant relationship between Polity2 index and the probability of adopting IT in emerging economies. This latter result is confirmed if, following Yang (2008) and Ehrhart (2009), we normalize the Polity2 index to a range of [0; 1], with zero corresponding to a situation of "full autocracy" and one to a situation of "full democracy".

In summary, we find our empirical results highly robust to changes in the sample of non-IT countries, in the control variables, and in the sample period. We also find that our results do not change substantially if we consider a logit model and alternative measures for non-significant variables.

5. Conclusions

The main purpose of this paper was to identify the major institutional and political factors driving the choice of adopting IT in emerging economies. After providing a comprehensive survey on the institutional and political factors potentially related to IT adoption, we empirically test our propositions using a panel probit model and perform many robustness tests to check the sensitivity of our results.

---

[22] See the dataset users' manual available at http://www.systemicpeace.org/inscr/p4manualv2007.pdf for a detail description of this index.

Using a dataset covering thirty IT and non-IT emerging countries, from 1980-2006, our empirical results suggest three important findings. First, it appears that CBI, proxied by the turnover rate of central bank governors, is positively related with the choice of adopting IT. This result, opposite to Gerlach (1999), suggests therefore that central bank autonomy is an important precondition for the adoption and success of IT strategy. Second, results show that the financial development precondition, proxied by many indicators, is not satisfied in emerging countries having adopted IT. Nonetheless, this result is not surprising since most of IT emerging countries have maintained an implicit exchange rate target after the adoption of this monetary policy framework. Furthermore, in accordance with results found by Woo (2003), we find a positive and significant relationship between government bond market liquidity and the probability of adopting IT.

Finally, empirical findings support that policymakers' incentives and characteristics of political system matter in the choice of adopting IT in emerging market economies. Thus, we find that the presence of checks and balances in the political system increases the probability that a country adopts IT. This result is highly robust to measures used for capturing the presence of checks and balances, since we find a positive and significant effect between the number of institutional veto players and the likelihood of adopting IT, but this relationship is also confirmed when we use a variable capturing the existence of partisan veto players. Concerning the link between the degree of federalism and the probability of adopting IT, we find a positive and significant relationship. However, results are sensitive to the IT adoption date considered. Finally, we do not find a significantly relationship between the degree of political stability and the likelihood of adopting IT in emerging economies.

References

Aizenman, J., Hutchinson, M. and I. Noy, 2008, Inflation targeting and real exchange rate in emerging markets, NBER Working Paper 14561, National Bureau of Economic Research, Cambridge.

Amato, J.D. and S. Gerlach, 2002, Inflation targeting in emerging market and transition economies: Lessons after a decade, European Economic Review 46, 781-790.

Bagheri, F.M. and N. Habibi, 1998, Political institutions and central bank independence: a cross-country analysis", Public Choice 96, 187-204.

Ball, L. and N. Sheridan, 2003, Does inflation targeting matter?, NBER Working Paper 9577, National Bureau of Economic Research, Cambridge.

Baltensperger, E., Fischer, A.M. and T.J. Jordan, 2007, Strong goal independence and inflation targets, European Journal of Political Economy 23, 88-105.

Batini, N. and D. Laxton, 2006, Under what conditions can inflation targeting be adopted? The experience of emerging markets, Central Bank of Chile Working Paper 406.

Beck, T. and A. Demirgüç-Kunt, 2009, Financial institutions and markets across countries and over time – Data and analysis, World Bank Policy Research Working Paper 4943.

Beck, T., Clarke, G., Groff, A., Keefer, P. and P. Walsh, 2001, New tools in comparative political economy: the Database of Political Institutions, World Bank Economic Review 15, 165-176.

Bernanke, B.S., Laubach, T. Mishkin, F.S. and A.S. Posen, 1999, Inflation targeting: lessons from the international experience, Princeton University Press.

Burnside, C., Eichenbaum, M. and S. Rebelo, 2001, Prospective deficits and the Asian currency crisis, Journal of Political Economy 109, 1115-1197.

Calderón, C. and K. Schmidt-Hebbel, 2008, What drives the choice of inflation targets in the world?, mimeo.

Carare, A. and M. Stone, 2006, Inflation targeting regimes, European Economic Review 50, 1297-1315.

Carare, A., Schaechter, A. and M. Stone, 2002, Establishing initial conditions in support of inflation targeting, IMF Working Paper, WP/02/102.

Chelliah, R.J., 1971, Trends in taxation in developing countries, IMF Staff Papers 18, 254-331.

Cukierman, A., 1992, Central bank strategy, credibility, and independence, MIT Press, Cambridge, MA.

Dreher, A, Sturm, J.E. and J. De Haan, 2008, Does high inflation cause central bankers lose their job? Evidence based on a new dataset, European Journal of Political Economy 24, 778-787.

Edwards, S., 2006, The relationship between exchange rates and inflation targeting revisited, NBER Working Paper 12163, National Bureau of Economic Research, Cambridge.

Ehrhart, H., 2009, Assessing the relationship between democracy and domestic taxes in developing countries, Etudes et Documents E 2009.30, Centre d'Etudes et de Recherches sur le Développement International.

Eijffinger, S.C.W. and J. De Haan, 1996, The political economy of central bank independence, Special Papers in International Economics 19, May, Princeton University.

Epstein, G., 2006, Too much, too soon: IMF conditionality and inflation targeting, Bretton Woods Project, article available at: http://www.brettonwoodsproject.org/art-542599

Farvaque, E., 2001, Political determinants of central bank independence, Economic Letters 77, 131-135.

Fraga, A., Goldfajn, I. and A. Minella, 2003, Inflation Targeting in Emerging Market Economies, NBER Working Paper 10019, National Bureau of Economic Research, Cambridge.

Freedman, C. and D. Laxton, 2009, Why inflation targeting, IMF Working Paper, WP/09/86.

Gerlach, S., 1999, Who targets inflation explicitly?, European Economic Review 43, 1257-1277.

Gonçalves, C.E.S. and A. Carvalho, 2008, Who chooses to inflation target?, Economics Letters 99, 410-413.

Hallerberg, M., 2002, Veto players and the choice of monetary institutions, International Organization 56, 775-802.

Hu, Y., 2006, The choice of inflation targeting – an empirical investigation, International Economics and Economic Policy, 27-42.

International Monetary Fund (IMF), 2006, Inflation targeting and the IMF, Unpublished manuscript, Policy and Development Review Department, and Research Department, available at: http://imf.org/external/np/pp/eng/2006/031606.pdf

Jaimovich, D. and U. Panizza, 2010, Public debt around the world: a new dataset of central government debt, Applied Economics Letters 17, 19-24.

Joyce, P.J. and M. Nabar, 2009, Sudden stops, banking crises and investment collapses in emerging markets, Journal of Development Economics 90, 314-322.

Keefer, P., 2007, DPI 2006 – Database on Political Institutions: changes and variable definitions, Washington, DC: World Bank, December.

Keefer, P. and D. Stasavage, 2003, The limits of delegation: veto players, central bank independence and the credibility of monetary policy, American Political Science Review 97, 407-423.

Keefer, P. and D. Stasavage, 2002, Checks and balances, private information, and the credibility of monetary commitments, International Organization 56, 751-774.

Kisinbay, T., Shimizu, S., Nordstrom, A., Respreto, J., Roger, S. and M. Stone, 2009, The role of exchange rate in inflation-targeting emerging economies, IMF Occasional Paper 267.

Kohn, D.L., 2005, Comments on Marvin Goodfriend's "Inflation targeting in the United States", in: Bernanke B.S and M. Woodford (eds.), The Inflation targeting debate, University of Chicago Press, Chicago.

Lane, P., 1997, Inflation in open economies, Journal of International Economics 42, 327-347.

Levya, G., 2008, The choice of inflation targeting, Central Bank of Chile Working Paper 475.

Lin, S. and H. Ye, 2009, Does inflation targeting make a difference in developing countries?, Journal of Development Economics 89, 118-123.

Lohmann, S., 1998, Institutional checks and balances and the political control of the money supply, Oxford Economic Papers 50, 360-377.

Masson, P.R., Savastano, M.A. and S. Sharma, 1997, The scope for inflation targeting in developing countries, IMF Working Paper, WP/97/130.

Mishkin, F.S., 2004, Can inflation targeting work in emerging market countries?, NBER Working Paper 10646, National Bureau of Economic Research, Cambridge.

Mishkin, F.S., 2000, Inflation targeting in emerging-market countries, American Economic Review 90, 105-109.

Mishkin, F.S., 1996, Understanding financial crises: a developing country perspective, Annual World Bank Conference on Development Economics, 29-62.

Mishkin, F.S. and K. Schmidt-Hebbel, 2007, Does inflation targeting make a difference?, NBER Working Paper 12876, National Bureau of Economic Research, Cambridge.

Mishkin, F.S. and K. Schmidt-Hebbel, 2001, One decade of inflation targeting in the world: what do we know and what do we need to know?, NBER Working Paper 8397, National Bureau of Economic Research, Cambridge.

Moser, P., 2003, Checks and balances, and the supply of central bank independence, European Economic Review 43, 1569-1593.

Mukherjee, B. and D.A. Singer, 2008, Monetary institutions, partisanship, and inflation targeting, International Organization 62, 323-358.

Mundlak, Y., 1978, On the pooling of time series and cross section data, Econometrica 46, 69-85.

Pétursson, T., 2004, Formulation of inflation targeting around the world, Monetary Bulletin 6, Central Bank of Iceland, 57-84.

Posen, A.S., 1995, Declarations are not enough: financial sector sources of central bank independence, in NBER Macroeconomics Annual 1995, 253-274.

Posen, A.S., 1993, Why central bank independence does not cause low inflation: there is no institutional fix for politics, in R. O'Brien (ed.), Finance and the international economy, vol. 7, Oxford University Press, Oxford.

Reinhart, C.S. and K.S. Rogoff, 2004, The modern history of exchange rate arrangements: A reinterpretation, The Quarterly Journal of Economics 119, 1-48.

Romer, D., 1993, Openness and inflation: theory and evidence, The Quarterly Journal of Economics 108, 869-903.

Rose, A.K., 2007, A stable international monetary system emerges: inflation targeting is Bretton Woods, reversed, Journal of International Money and Finance 26, 663-681.

Schmitt-Grohé, S., 2005, Comments on Christopher A. Sims's "Limits to inflation targeting", in Bernanke B.S and M. Woodford (eds.), The inflation targeting debate, University of Chicago Press, Chicago.

Truman, E.M., 2003, Inflation targeting in the world economy, Institute for International Economics, Washington.

Tsebelis, G., 2002, Veto players: how political institutions work, Princeton University Press Princeton.

Walsh, C.E., 2005, Economic structure and monetary policy design, in Cho, L-J., Cho, D. and Y. Hyung (eds.), Macroeconomic Implications of Postcrisis Structural Change, Korean Development Institute.

Woo, J., 2001, Economic, political and institutional determinants of public deficits, Journal of Public Economics 87, 387-426.

World Bank, 2008, World Development Indicators, CD-ROM, Washington, DC: World Bank.

Yang, B., 2008, Does democracy lower growth volatility? A dynamic panel analysis, Journal of Macroeconomics 30, 562-574.

Appendix A. Variables definitions and sources

Variables	Definition and source
CHECKS	Number of veto players in a political system, accounting for party affiliations, electoral rules, and electoral competitiveness. Source: Beck *et al.* (2001) and Keefer and Stasavage (2003) [april 2008 update]. Database available on the website of the World Bank at: http://www.wordlbank.org
CPI_1	One-year lagged inflation rate, measured by annual percentage change of consumer prices. Source: World Development Indicators (2008).
DEBT	Central government debt as a percentage of GDP. Source: Jaimovich and Panizza (2010). Data available at: http://www.iadb.org/research/pub_desc.cfm?pub_id=DBA-005
DMBA	Deposit money banks assets to GDP. Source: Beck and Demirgüç-Kunt (2009). Database available on the website of the World Bank at: http://www.wordlbank.org
EXCH	*De facto* "fine" classification of exchange rate regimes: polytomic variable taking values from 1 (hard pegs) to 14 (freely falling). Source: Reinhart and Rogoff (2004; 2009 update). Database available on the homepage of Carmen M. Reinhart at: http://terpconnect.umd.edu/~creinhar/Papers.html
FED	Variable taking the value zero if neither provincial executive nor provincial legislature is locally elected, the value 1 if the executive is appointed but the legislative elected, and the value 2 if executive and legislative are both locally elected. Source: Beck *et al.* (2001) and Keefer and Stasavage (2003) [april 2008 update].
FRAC	Probability that to deputies picked at random from the legislature will be of different parties. Source: Beck *et al.* (2001) and Keefer and Stasavage (2003) [april 2008 update].
GSTAB	Government stability: variable assessing the government's ability to carry out its declared program(s) and its ability to stay in office, and taking values from 0 (very low stability) to 12 (very high stability). This variable is the sum of three subcomponents (government unity, legislative strength, and popular support), each with a maximum score of four points and a minimum score of zero point. Source: International Country Risk Guide.
IT	Binary variable taking the value 1 if a country has in place an IT regime at the period t, and 0 otherwise. Source: Levya (2008)
LLGDP	Liquid liabilities as percentage of GDP. Liquid liabilities include currency, demand and interest-bearing liabilities of banks and other financial institutions. Source: Beck and Demirgüç-Kunt (2009).
LRGDP	Log of real GDP per capita in constant 2000 U.S. dollars. Source: World Development Indicators (2008).
NUM_IT	Number of industrialized and emerging countries that have adopted IT at the year t. Source: Author's calculations based on Levya (2008).
OPEN	Trade openness is the sum of exports and imports of goods and services as a share of GDP. Source: World Development Indicators (2008).
PCRED	Domestic credit provided by deposit money banks and other financial institutions as a percentage of GDP. Source: World Development Indicators (2008).
POLARIZ	Maximum partisan distance between the chief executive's party and the four principal parties of the legislature. Source: Beck *et al.* (2001) and Keefer and Stasavage (2003) [april 2008 update].
POLITY2	Index taking values from -10 (very autocratic) to +10 (very democratic) and constructed by subtracting the "democracy" score from the "autocracy" score. Source: Polity IV Project. Database available at: http://www.systemicpeace.org/polity/polity4.htm
PUBOND	Total amount of outstanding domestic debt securities issued by public domestic entities as a percentage of GDP. Source: Beck and Demirgüç-Kunt (2009).
STABS	Number of exits of veto players between year t and year $t+1$ divided by the total number of veto players in year t. Source: Beck *et al.* (2001) and Keefer and Stasavage (2003) [april 2008 update].
TOR_5	*De facto* central bank independence measured by the turnover rate of central bank governors based on 5-years averages. Source: Author's calculations based on central bank websites and Dreher *et al.* (2008; april 2009 update). Dreher's database available at: http://www.uni-goettingen.de/en/datasets/89555.html

Appendix B. Descriptive statistics

Variables	Obs.	Missing obs.	Mean	Std. Dev.	Min.	Max.
		Inflation targeting countries (1980-2006)				
TOR_5	476	10	0.27	0.24	0	1.2
PCRED	432	54	45.92	30.98	7.17	165.72
LLGDP	417	69	0.42	0.19	0.06	1.14
DMBA	414	72	0.27	0.27	0.04	1.73
PUBOND	241	245	0.23	0.15	0.01	0.81
GSTAB	378	108	7.15	1.96	1	11
POLITY2	460	26	4.68	5.81	-9	10
STABS	469	17	0.15	0.30	0	1
POLARIZ	425	61	0.52	0.82	0	2
FRAC	455	31	0.58	0.25	0	0.89
CHECKS	469	17	3.06	1.68	1	8
FED	396	90	0.96	0.84	0	2
DEBT	343	116	44.75	49.55	3.42	447.10
CPI	446	40	76.17	442.75	-0.41	7481.66
LRGDP	462	24	7.96	0.77	5.98	9.89
OPEN	449	37	61.91	31.33	14.39	176.03
EXCH	434	52	9.95	3.07	2	14
		Non-inflation targeting countries (1980-2006)				
TOR_5	314	10	0.25	0.25	0	1.2
PCRED	304	20	46.75	38.14	8.33	210.41
LLGDP	248	22	0.58	0.32	0.08	1.32
DMBA	248	22	0.48	0.32	0.10	1.64
PUBOND	111	213	0.20	0.14	0.01	0.77
GSTAB	256	68	7.61	2.31	1.83	12
POLITY2	312	12	0.47	6.44	-10	9
STABS	309	15	0.09	0.24	0	1
POLARIZ	271	53	0.22	0.56	0	2
FRAC	287	37	0.54	0.28	0	1
CHECKS	311	13	2.94	2.46	1	18
FED	270	54	0.99	0.75	0	2
DEBT	245	79	66.89	33.82	8	210.76
CPI	304	20	49.62	242.68	-1.41	3079.81
LRGDP	314	10	7.15	0.97	5.23	9.07
OPEN	314	10	63.06	43.99	11.54	228.87
EXCH	300	24	7.49	3.44	2	14

Appendix C. Country samples

<u>Both samples</u>: Argentina, China, Costa Rica, Dominican Republic, Egypt, Lebanon, Morocco, Tunisia, Uruguay, and Venezuela.

<u>Gonçalves and Salles (2008) sample</u>: Bulgaria, Cote-d'Ivoire, Ecuador, El Salvador, India, Malaysia, Nigeria, Pakistan, Panama, and Singapore.

<u>Batini and Laxton (2006) sample</u>: Algeria, Botswana, Cote-d'Ivoire, Croatia, Ecuador, El Salvador, Ghana, India, Jordan, Malaysia, Nigeria, Pakistan, Russia, Serbia, and Tanzania.

<u>Lin and Ye (2009) sample</u>: Belarus, Cape Verde, Georgia, Iran, Jamaica, Kazakhstan, Latvia, Lithuania, Mauritius, Paraguay, Slovenia, Syria, and Trinidad and Tobago.