IT Countries: A Breed Apart? the case of Exchange Rate Pass-Through

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JEL codes:
E31, E42, E52, C30

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1 Introduction

It is well documented that exchange rate variations are less than completely associated with changes in prices. Moreover, the literature also suggests that the impact of exchange rate shocks into prices has declined over time, as the inflation environment becomes more stable.[1] Should the exchange rate pass through (ERPT from now on) prove to be incomplete and decreasing, this could have far-reaching implications for external adjustments and, above all, for the conduct of monetary policy.

Given the relevance of this subject, the objective of this paper is to establish whether and how inflation targeting (IT) may have altered the way exchange rate changes impact prices. In doing so, we compare the achievements of targeting inflation to the choice of the exchange rate regime as an objective for monetary policy. While the effects of IT on the pass through have been widely analyzed, the literature is more silent on the consequences of the second objective. More importantly, contrary to most of the previous literature, we pay special attention to self selection bias and endogeneity of the monetary policy regime.

Indeed, it is argued that in the context of a stable and predictable monetary policy environment, nominal shocks –such as exchange rate shocks– play a vastly reduced role in driving fluctuations in prices (Taylor (2000)). Thus, improvements in monetary policy performance–reflected in stronger nominal anchors and low, stable inflation–result in an endogenous reduction in the exchange rate pass-through to consumer prices: when the inflation environment is more stable, firms resist passing exchange rate changes on to prices.[2] Similar arguments are developed in Gagnon and Ihrig (2004), Bailliu and Fujii (2004), Devereux, Engel, and Storgaard (2004), Ihrig, Marazzi, and Rothenberg (2006), Marazzi and Sheets (2007), Bouakez and Rebei (2008), Devereux and Yetman (2010) and Dong (2012) where the size of pass-through is a function of the stance of monetary policy.

Following this strand of the literature, many studies provide evidence that the adoption of IT is associated with an improvement in overall economic performance (Bernanke and Mishkin (1997); Svensson (1997)). For instance, Mishkin and Schmidt-Hebbel (2007) suggest that exchange rate pass-through seems to be attenuated by the adoption of IT. The basic underlying idea is that adopting inflation targeting

[1] See, for instance, Goldberg and Knetter (1997) and Campa and Goldberg (2005).

[2] In other words, if the increase in costs following a depreciation is perceived as transitory, agents can reduce temporarily their markups, save the menu costs of changing prices and simply wait until the shock reverts. On the contrary, if the shock is perceived as permanent or highly persistent, the price adjustment is inevitable. Since the economy will be subject to more persistent nominal shocks in high inflation regimes, the link between the level of inflation and the pass-through emerges

leads to credibility gains that are responsible for keeping low inflation expectations following an exchange rate appreciation. Consequently, opting for an inflation target is a means to reduce ERPT since under this regime, (i) inflation is expected to be diminished and stabilized, and (ii) central banks are expected to gain credibility as inflation-fighters. In addition, as shown by Reyes (2007), under inflation targeting regime, central banks respond to an exchange rate appreciation by increasing the interest rate to impede that exchange rate changes feed into inflation.

Most of the previous literature, however, misses two key elements when investigating ERPT and its link with inflation targeting: self selection bias and endogeneity of the monetary policy regime. In the first case, selection bias occurs when IT is not randomly allocated across countries, but is instead correlated with other variables. A difference in ERPT between countries faced with IT (the so-called treated group) and the other countries (the so-called control group) could then be attributable to systematic differences in some variables between the treated and control groups rather than the effect of the treatment itself (IT adoption). In the second case, the adoption of inflation targeting is clearly an endogenous choice (see Mishkin and Schmidt-Hebbel (2001)). For instance, countries with histories of high inflation or expecting future high inflation are more likely to have felt compelled to adopt inflation targets. The finding that lower ERPT is associated with inflation targeting thus may not imply that inflation targeting causes ERPT.

Being aware of these limits, our first contribution is to rely on a methodology that allows us to determine whether a treatment leads to different outcomes than the absence of treatment, by matching treated observations with control observations that share similar characteristics other than the presence of the treatment. That is, we construct a counterfactual for the treatment, based on a set of observable characteristics.

Our second contribution is in terms of the monetary objective analyzed. Indeed, we compare the benefits of the IT in terms of pass through reduction to an additional monetary goal not yet sufficiently explore in the literature: the choice of the exchange rate regime. In this case, it is suggested that where a floating exchange rate (ER) is in place (with inflation expectations anchored via inflation targeting), there may be a disconnect between the exchange rate and prices, i.e. a reduction of the ERPT for countries with flexible ER. For instance, Coricelli, Jazbec, and Masten (2006) note that where some form of fixed exchange rate regime is in place, any pre-announced currency devaluation provides a nominal anchor for expectations. A stronger link between the exchange rate and prices is evident in this scenario as exchange rate changes may signal price changes.

Since the ERPT is not an observable variable, our empirical assessment to analyse the link between pass through and policy goals then relies in a two-stage procedure. In the first stage, we estimate time-varying coefficients of exchange rate pass through for each economy by means of state space models. In the second step, we explore whether these estimates are related to our proxies of monetary policy objective using a propensity score matching (PSM) methodology. We estimate different models and use several alternative definitions in order to ensure the robustness of our findings.

Our results can be summarized as follow. First, IT clearly contributes to reducing the ERPT. Second, the duration of this goal matters since older regimes are more likely to deliver higher reductions of the ERPT than newer regimes. Third, exchange rate regimes have not noticeable advantages to reduce the extent to which exchange rate fluctuations contribute to inflation instability.

The rest of the paper is organized as follows. Section 2 describes in detail our methodology. Section 3 presents the data. Section 4 displays our estimation results, and Section 5 concludes the paper.

2 Methodology

As stated before, the finding that lower ERPT is associated with inflation targeting, or any other kind of target, may not imply that the target causes this performance. For instance, it could be argued that if IT improves the credibility of monetary policy and the anchoring of inflation expectations, then there would be less of a pass-through effect from exchange rate shocks. As a result of increased credibility and reduced pass-through, inflation targeting may also reinforce monetary policy independence (Mishkin and Schmidt-Hebbel (2007)).

We therefore want to assess whether inflation targeters differ from non-targeters in the response of inflation to shocks in the exchange rate. To this end, we first have to estimate the ERPT. Instead of using the traditional rolling ERPT estimates, we rely in state space models that allow us to estimate the coefficients for each period of the sample employed in this paper. We then test for differences between targeters and non targeters by adopting a PSM methodology.

2.1 Estimating time-varying ERPT by state space models

The degree of exchange rate pass-through are not directly observable and therefore need to be estimated before its hypothetical link with a monetary target can be tested. Following Kim (1990) and Sekine (2006), we estimate a varying-parameter model of the pass-through based on the following generic specification proposed by Goldberg and Knetter (1997):

$$\Delta p_t = \alpha + \gamma \sum_{j=1}^{n} \gamma_j \Delta p_{t-j} + \theta_t \Delta e_t + \rho \Delta y_t + \lambda \Delta p_t^* + G\epsilon_t \tag{1}$$

where p_t denotes consumer prices in period t, e_t is the nominal effective exchange rate, y_t is the demand shifter, p_t^* corresponds to a supply shock variable and $\epsilon_t \sim N(0, G_t)$ is an independent and identically distributed error term.[3] All the variables are expressed in logarithms.[4]

Note that, in Eq.(1), the ERPT coefficients, θ, is assumed to be time-varying. More specifically, we expand the previous equation, known as the the measurement equation, with the following ERPT shift equation:

$$\theta_t = \theta_{t-1} + C\upsilon_t \tag{2}$$

where the ERPT parameter θ depends on an autoregressive term and $\upsilon_t \sim N(0, Q_t)$. The system (1)-(2) constitute a state-space model. These type of models can be estimated using the Kalman filter recursive algorithm, which is commonly employed in time-varying coefficient models. The Kalman filter is a method for recursively obtaining linear, least-squares forecasts of unknown coefficients conditional on past information. These forecasts are used then to construct the log likelihood. More precisely, for each time t, the Kalman filter produces the conditional expected state vector $\theta_{t|t-1}$ and the conditional covariance matrix $\Omega_{t|t-1}$; both are conditional on information up to and including time t. Using the model and previous period results, for each t we begin with:

[3] We include 4 lags of the inflation rate to better capture the observed inertial behavior of inflation (inflation persistence) and to avoid underestimating ERPT.

[4] Note that the ERPT equation is specified in first differences because the underlying series are generally found to be integrated of order one and non-cointegrated (see, e.g., Campa and Goldberg (2005)).

$$\begin{aligned}
\theta_{t|t-1} &= \theta_{t-1|t-1} \\
\Omega_{t|t-1} &= \Omega_{t-1|t-1} + CQC' \\
\Delta p_{t|t-1} &= \alpha + \gamma \sum_{j=1}^{n} \Delta p_{t-j} + \theta_{t|t-1}\Delta e_t + \lambda \Delta p_t^* + \rho \Delta y_t + G\epsilon_t
\end{aligned} \tag{3}$$

The residuals and the mean squared error (MSE) matrix of the forecast error are:

$$\begin{aligned}
\hat{\nu}_{t|t} &= \Delta p_t - \Delta p_{t|t-1} \\
\Sigma_{t|t} &= y_t^* \Omega_{t-1|t-1}(\Delta e_t)' + GQG'
\end{aligned} \tag{4}$$

In the last step, we update the conditional expected state vector and the conditional covariance with the information in time t:

$$\begin{aligned}
\theta_{t|t-1} &= \theta_{t-1|t-1} + \Omega_{t|t-1}(\Delta e)\Sigma_{t|t}^{-1}\hat{\nu}_{t|t} \\
\Omega_{t|t} &= \Omega_{t|t-1} - \Omega_{t|t}(\Delta e)\Sigma_{t|t}^{-1}(\Delta e)'\Omega_{t|t-1}
\end{aligned} \tag{5}$$

Equations (3) to (5) are the Kalman filter. The equations denoted by (3) are the one-step predictions. These predictions do not use contemporaneous values of Δp_t; only its past values. Equations (4) and (5) form the update step of the Kalman filter; they incorporate the contemporaneous dependent variable information into the predicted states. In addition, The Kalman filter requires initial values for the states and a covariance matrix for the initial states to start off the recursive process.[5] The previous system of equations can then be estimated by maximum likelihood.

2.2 Assessing the effects of a target with propensity score matching

Our main objective in this paper is to answer if countries that have adopted IT present a lower level of ERPT. Efforts to answer this question properly must control for endogeneity and self selection bias since IT countries may also have lower inflation and pass through rates. Then, a challenge in evaluating the benefits of IT or an exchange rate regime is to disentangle the direction of causality.

[5] OLS estimates can be used as initial values.

There are a number of ways to account for endogeneity or self-selection bias. The first and more obvious approach is to use an instrument for being a targeter.[6] This standard approach to rely on an instrumental variable that affects the target but does not directly affect inflation is criticized for several reasons. For instance, controlling for the differences across countries through an effective instrument is quite difficult, especially in presence of limited amount of data. A second, less standard approach, would be to employ the matching and propensity score methodology that was developed precisely for the bias associated with this type of estimation problem. In this paper, we follow this approach and apply the matching methodology to account for the estimation bias arising from the selection on observables problem. As far as we know, this way of proceeding is novel for studying the ERPT and its link with monetary policy.

The idea behind the PSM approach is to determine whether a treatment (in our case the policy goals) leads to different outcomes than the absence of treatment, by matching treated observations with control observations that share similar characteristics other than the presence of the treatment. Following the matching of observations, we assess the "treatment effect" by measuring the difference in the ERPT between the two groups. That is, we see IT adoption as a "natural experiment," so we seek to reestablish the conditions of a randomized experiment where the IT adoption mimics a treatment.

More in detail, let D be a binary indicator that equals one if a country has adopted IT (alternatively, fully flexible) and zero otherwise. Also, let Y_i^1 denote the ERPT for country i if the country has adopted IT (i.e. if the country is in the treated group) and Y_i^0 if not, all other characteristics of the country being equal. The treatment effect for country i can be written as $Y_i^1 - Y_i^0$, where one outcome is observed and the other one is the counterfactual. We are interested in estimating the average treatment (ATT) effect on the treated countries, that is:

$$ATT = E[Y_i^1|D = 1] - E[Y_i^0|D = 1] \tag{6}$$

[6]Some instruments for IT used in the literature are: i) being an English speaking country and the interaction between this and having high inflation. This identification approach assumes that sharing a common language means that the central bank and government were more likely to be influenced by the same theories about how to effectively fight inflation, ii) a measure of central bank independence since it is argued that central banks that had less historical independence have greater need to become inflation targeters. This implies that they would be vigilant in fighting inflation (Boschen and Weise (2003)) and, iii) benefit entitlements during the 1980s with the idea that higher unemployment benefits may mean the central bank is less concerned about the costs of unemployment and hence focuses more on reducing inflation (MacCulloch, Tella, and Oswald (2001)).

Introducing the control group, we can write the average treatment as:

$$ATT = E[Y_i^1|D=1] - E[Y_i^0|D=0] - E[Y_i^0|D=1] + E[Y_i^0|D=0] \quad (7)$$

where $E[Y_i^1|D=1]$ and $E[Y_i^0|D=0]$ are observed and $E[Y_i^0|D=0] - E[Y_i^0|D=1]$ is the selection bias. Hence, Eq.(7) can only be identified if this selection bias disappears, i.e. if $E[Y_i^0|D=1] = E[Y_i^0|D=0]$.

The PSM methodology deals with this selection problem by pairing each treated observation with control observations that are otherwise similar based on a set of observable characteristics, **X**. This requires that the treatment satisfies some form of exogeneity, namely the so-called conditional independence assumption. This assumption states that, conditional on a vector of observable characteristics, the variable of interest (the ERPT) is independent of the treatment status. Conditional on this vector **X**, the expected ERPT in the absence of IT would then be the same for paired countries, that is $E[Y_i^0|D=1,\mathbf{X}] = E[Y_i^0|D=0,\mathbf{X}]$, and the bias would disappear. Under this assumption then ATT effect is written as:

$$ATT = E[Y_i^1|D=1,\mathbf{X}] - E[Y_i^0|D=0,\mathbf{X}] \quad (8)$$

In Eq. (8) $E[Y_i^1|D=1,\mathbf{X}]$ controls for the relevant set of characteristics, **X**. This set should include variables that are co-determinants of both IT (the treatment) and ERPT (the outcome), and conditioning on all relevant variables may be a challenge. Rosenbaum and Rubin (1983) and Imbens (2004) show that if the hypothesis of conditional independence hold then all biases due to observable components can be removed by conditioning on the propensity score. Therefore, ATT becomes:

$$ATT = E[Y_i^1|D=1,p(\mathbf{X})] - E(Y_i^0|D=0,p(\mathbf{X})] \quad (9)$$

where $E[Y_i^1|D=1,p(\mathbf{X})]$ denotes the fact that we control for the probability of observing the treatment conditional on the set **X** of variables. $p(\mathbf{X})$, the propensity score, should reflect a compromise between the potential influence of a variable on the outcome and its ability to improve the matching.

To obtain ATT, we proceed in two steps. We first estimate the propensity score by a benchmark probit equation explaining the likelihood of a country receiving the treatment. To this end, we consider a number of potential structural, political, and economic determinants of IT (or any other treatment).[7] We then use a matching algorithm to pair the observations based on observable characteristics. We employ

[7]As a robustness exercises we also estimate logit models for the benchmark equation.

four matching algorithms: nearest neighbor, kernel, local linear, and radius matching. These different approaches all match observations with similar characteristics, excepting that one group of countries adopts IT (the "treatment group") and the other does not (the "control group").[8]

Applying these matching methods requires that two hypotheses must be satisfied. The first is the conditional independence assumption stating that, conditional to the vector of observable variables $\mathbf{X}$, the outcome variable is independent of the IT adoption. The second is the common support condition, which ensures that there is sufficient overlap in the characteristics of the treated and untreated groups to find adequate matches.

3 Data and descriptive statistics

We consider a sample of 48 advanced and emerging economies that have and have not adopted IT between 1982Q1 and 2016Q4: Argentina, Australia*, Austria, Belgium, Brazil*, Canada*, Chile*, Colombia*, Costa Rica, Denmark , Finland*, France, Germany, Greece, Hong Kong, China, Hungary*, India, Indonesia*, Ireland, Israel*, Italy, Japan, Korea, *, Latvia, Malaysia, Mexico*, Netherlands, New Zealand*, Norway*, Peru*, Philippines*, Poland*, Portugal, Romania *, Russia, Singapore, Slovak Republic*, Slovenia, South Africa *, Spain*, Sweden *, Switzerland*, Thailand*, Turkey*, The United Kingdom* and The United States.[9]

The variables entering the estimation of the exchange rate pass through are: (i) the consumer price index (P), (ii) the nominal effective exchange rate defined as domestic currency per unit of foreign currency (E, source BIS), (iii) the GDP (Y, source IFS), and (iv) the OECD producer price index as a proxy for supply factors

[8] The nearest-neighbor pairs each observation in the treated group with the closest observation (in term of propensity score) from the control group. Following Lin and Ye (2007) and Bussière, Lopez, and Tille (2015) we consider the nearest (N = 1), the two nearest (N = 2), and the five-nearest neighbors (N = 5). The radius method (see Dehejia and Wahba (2002)) matches each treated with untreated located at some distance. Following Balima, Combes, and Minea (2017) we use a small (r = 0.005), a medium (r = 0.01), and a wide (r = 0.05) radius. The last two matching algorithms, the kernel and local-linear method, are non-parametric matching estimators that compare the outcome of each treated observation to a weighted average of the outcomes of all control observations, with the highest weight being placed on the control observations with the closest propensity scores to the treated observation (see Heckman, Ichimura, and Todd (1998)). These algorithms have a lower variance as they use more information, at the cost of being more exposed to bad matches.

[9] Countries with an IT framework are denoted with a star (*). Dates of adoption are presented in table (6) in the Appendix.The choice of the countries is also determined by the availability of the data. Note that the sample size might occasionally change.

(P^*, source OECD).[10] All the series are seasonally adjusted. We work with the year-to-year differences of the variables expressed in logarithm terms.

For the second step, namely, the propensity score matching estimation, we work with annual data in order to consider a broad set of variables that define an economy. We therefore annualised the ERPT found in the first step by taking the annual mean value of the four quarters. Regarding the variables related to inflation targeting, we use a dummy variable IT that takes the value 1 for countries that adopted an inflation target and 0 otherwise.[11] For the sake of robustness, we follow Rose (2007), Minea and Tapsoba (2014) and Balima, Combes, and Minea (2017) and distinguished between the default and conservative starting dates of IT. The difference between the two dates captures the fact that some central banks first adopted "soft or informal" IT (see Vega and Winkelried (2005)), in which the central bank's reaction, following a deviation of inflation from its targeted level, is slower compared to its reaction under an explicit "full-fledged or formal" IT. Consequently, soft IT are those dates declared by central banks themselves, while full-fledged IT starting dates are those considered by academia as the genuine dates from which the central bank began meeting the required criteria to be classified as an ITer (Minea and Tapsoba (2014)). In addition, we also considered the definition provided by Hammond (2012) and Ilzetzki, Reinhart, and Rogoff (2017). Hammond (2012) considers IT to be implemented if a country fulfills five explicit criteria: 1) Price stability is explicitly recognised as the main goal of monetary policy; 2) There is a public announcement of a quantitative target for inflation; 3) Monetary policy is based on a wide set of information, including an inflation forecast; 4) Transparency; and 5) Accountability mechanisms.

With respect to exchange rate targeting, the exchange rate regime dummy is based on the *de facto* or *de jure* classification and takes the value 1 if a country has a flexible exchange rate regime, and 0 otherwise. We employ three alternative *de facto* classifications developed by Reinhart and Rogoff (2004) and updated, Levy-Yeyati and Sturzenegger (2005) and Klein and Shambaugh (2006). Treatment in this case is having a flexible −*de facto* or *de jure* - exchange rate regime defined following the Reinhart and Rogoff criteria of "coarse floating", namely freely floating. However, we also allow for a "fine classification" of flexible exchange rate, in which case we added to free floating a managed floating regime.[12] We use the *de jure* classification

[10] An increase in the nominal exchange rate implies a depreciation. Therefore, a positive relationship is expected between exchange rate changes and inflation, since a depreciation of the currency should be followed by an increase in inflation.

[11] In other words, the dummy variable takes on the value one starting in the period in which the country adopted this monetary target (and for all subsequent years), and zero otherwise.

[12] The observations categorised by Reinhart and Rogoff as "freely falling" are omitted throughout. The results being very similar we reproduce on the results for "fine classification" in the tables below.

by the IMF. In addition, we use two alternative coding, either the one proposed by Reinhart (see, for example, Reinhart and Rogoff (2004)) and the data used by Rose (2014). The two *de jure* classification may slightly differ from time to time. Table 7 present the list of countries belonging to each of the previously mentioned categories.

The rest of the variables correspond to the controls that we use in the logit or probit estimations: inflation volatility, GDP volatility, financial development, political stability, the number of countries having adopted IT, the share of world GDP and trade openness are the set of variables entering the benchmark probit model for the propensity score for inflation targeting. We also include economic development, energy dependence, remittances, income per capita, credit, broad money to GDP, debt to GDP, fiscal deficit, the number of years of floating experience, transparency and independence of the central bank for alternative models. Regarding the PSM for the exchange rate regime, we include trade openness, external debt, political stability, GDP growth, term-of-trade volatility, Neighborhood, and broad money to GDP. Appendix 6 reports the exact definition and source of all the variables.

4 Results

Figures 1 and 2 show the estimated ERPT varying coefficients. As expected, ERPT is incomplete in all the cases. The figures also shows that it declines over time in various countries. However, the decreasing ERPT found in the literature is not a generalized feature for our set of countries. Moreover, note that the estimated ERPT coefficients increases for a good part of the countries around 2009-2010.

Once the ERPT is calculated, it remains to asses its link with the monetary policy goals. Let us first concentrate in inflation target. As a first step to produce the propensity score specifications for inflation target, we estimate the probability of observing IT for all the countries of our sample. We therefore explore economic, fiscal, external, financial, and institutional characteristics highlighted by the literature as preconditions for IT adoption.[13] Table 1 presents the logit estimations (i.e. the probability) considering different control variables.[14]

As seen, the variables help in capturing the specificities of the treatment since all estimated parameters, except for GDP volatility, are significant. Indeed, contrary

[13] It is worth noting that when estimating the propensity score, our goal is not to only to find the best statistical model to explain the probability of IT adoption but also to achieve the best matching. Indeed, to respect the conditional independence assumption, the propensity score estimates should include all the possible variables that may have a systematic impact on the ERPT as well as in the policy goal.

[14] All variables used in the logit regression are lagged in order to ensure that they are not affected by the treatment.

Figure 1: **Exchange rate pass through**

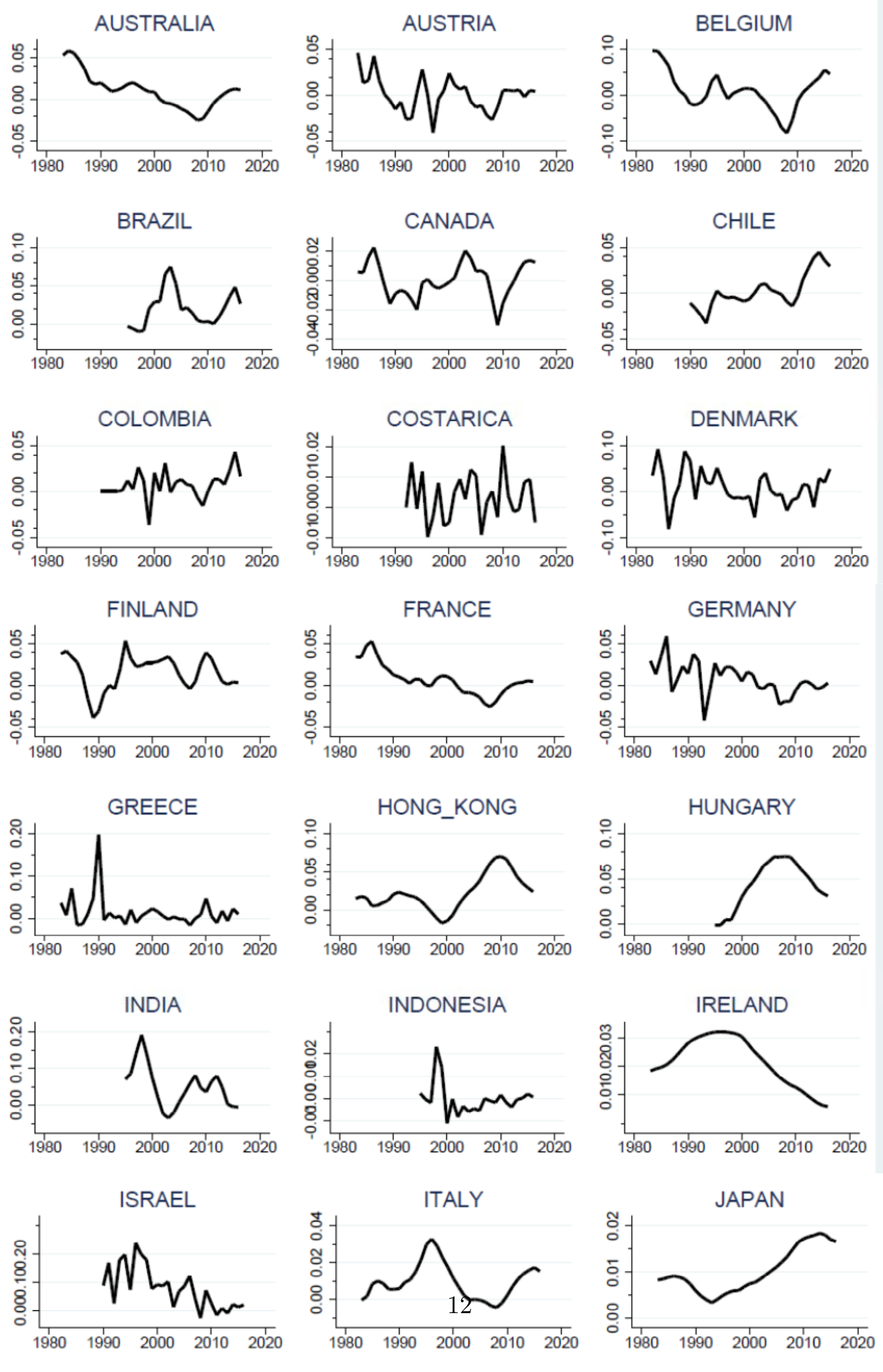

Figure 2: **Exchange rate pass through (cont.)**

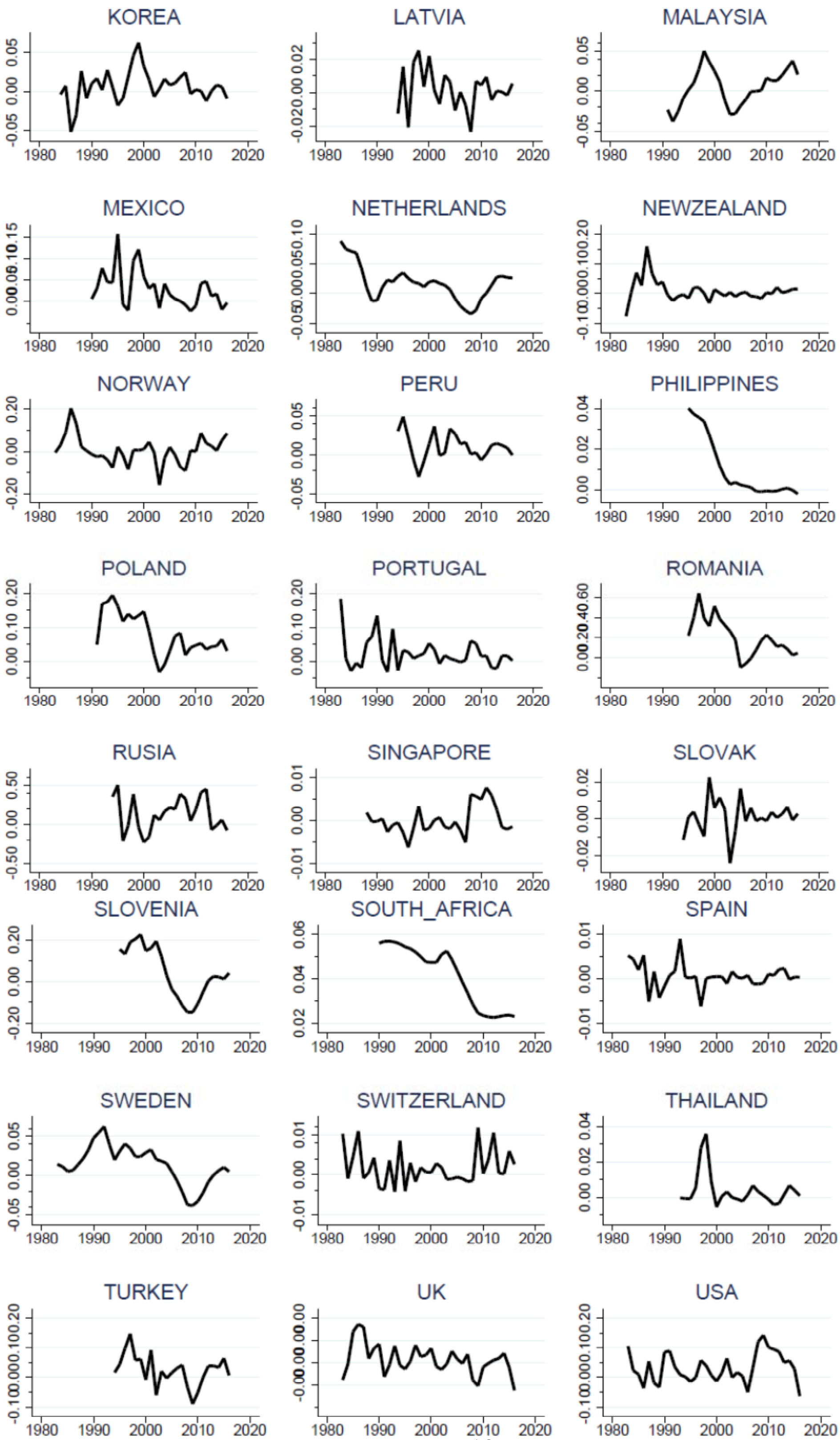

Table 1: Propensity score for inflation targeting. Independent variable: IT dummy

Dependent var.	Baseline Model FF IT (1)	Baseline Model Soft IT (2)	Baseline Model IRR IT (3)	Adding Structure FF IT (4)	Adding Financial FF IT (5)	Adding Fiscal FF IT (6)
Inflation vol.	-0.21**	-0.18**	-0.18**	-0.24**	-0.32***	-0.14
	(0.08)	(0.07)	(0.07)	(0.10)	(0.11)	(0.10)
GDP vol.	-0.05	0.08	-0.00	-0.08	-0.06	0.08
	(0.11)	(0.11)	(0.11)	(0.14)	(0.12)	(0.13)
Market Dev.	0.00***	0.00***	0.00**	0.01***	0.01***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Political stability	0.15***	0.14***	0.07*	0.29***	0.16***	0.23***
	(0.04)	(0.04)	(0.04)	(0.06)	(0.04)	(0.05)
IT number	0.10***	0.09***	0.09***	0.11***	0.12***	0.11***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
GDP Share	-3.67***	-3.77***	-3.46***	-2.80***	-2.18***	-2.49***
	(0.48)	(0.47)	(0.46)	(0.52)	(0.36)	(0.50)
Trade openness	-1.51***	-1.54***	-1.75***	-1.25***	-0.59***	-1.39***
	(0.19)	(0.18)	(0.19)	(0.22)	(0.21)	(0.20)
Econ. Development				-0.07**		
				(0.04)		
Energy dependence				-0.05***		
				(0.02)		
Remittances				0.17**		
				(0.07)		
Income				-0.00***		
				(0.00)		
Credit					0.01***	
					(0.00)	
Broad money					-0.04***	
					(0.00)	
Debt to GDP						-0.03***
						(0.00)
Fiscal deficit						0.03
						(0.02)
Constant	3.19***	3.51***	5.08***	2.65**	0.29	2.93***
	(0.93)	(0.90)	(0.91)	(1.19)	(0.99)	(1.03)
Pseudo R2	0.25			0.24	0.32	0.29
No. of Obs.	1011.00			807.00	975.00	906.00

Notes: *,**,*** denotes significance at the 1 5 and 10%, respectively. "FF" denotes full fledged inflation targeting. Soft and full fledged are defined as in Balima, Combes, and Minea (2017). "IRR" denotes inflation targeting as defined in Ilzetzki, Reinhart, and Rogoff (2017).

to our intuition, the results indicate that high inflation volatility decreases the likelihood to adopt inflation targeting.[15] This result is in line with studies by Lucotte (2012), Minea and Tapsoba (2014), Ebeke and Fouejieu (2015) and Balima, Combes, and Minea (2017) among others, who found that high or volatile inflation is negatively associated with the probability of adopting IT. GDP share and trade openness also negatively affect IT adoption. In the first case, small countries are more likely to fix (because small economies have a higher propensity to trade internationally and are less likely to trade using the nation unit of account, see Levy Yeyati, Sturzenegger, and Reggio (2010) and Rose (2014)) while the G3 currencies are not ITers (the US dollar, the Euro and the Yen). Therefore only intermediate countries are expected to be ITers. The usual explanation behind the negative sign in the case of trade openness is that many economies are dependent on foreign trade and exposed to external real shocks. As such, countries tend to limit exchange rate movements. Consequently, open economies often prefer to have exchange rate pegs rather than inflation targeting with flexible exchange rates (see, for instance Fatas, Mihov, and Rose (2007)). On the contrary, political stability, captured by the democracy score, market or financial development and the number of countries with IT increases the probability of targeting inflation. Finally, the results also indicate that high output volatility is not a requirement to adopt inflation targeting.[16] To check the robustness of our results, we present in the same table, columns (2) and (3), the propensity score for the "Soft" , "Full fledge" and "IRR" inflation targeting variables.

Regarding the probability of following a flexible exchange rate regime, table (2) shows that all the variables, except for GDP growth, capture the likelihood of adopting this type of regime. Surprisingly, perhaps, there are some differences in the estimates obtained when the alternative definitions of regimes are used. For instance, political stability plays an important role in the selection of the exchange-rate regime. However, different results are preset with the volatility of the terms of trade and the money supply where a positive and negative signs, respectively, are only present with the Reinhart and Rogoff classification (column (1) in the table). Otherwise, the results suggest that trade openness, external debt and broad money reduce all the probability of following a fully flexible exchange rate regime. These results can be explained as follows. First, greater trade openness enhances

[15]It has been argued that economies with high prior inflation are more likely to adopt IT (Mishkin and Schmidt-Hebbel (2001) and Goncalves and Salles (2008)). We should expect then high and unstable inflation to be a prerequisite for IT (i.e. a positive sign of inflation volatility in the probit model). However, Mishkin and Schmidt-Hebbel (2001) and Mishkin (2000) also highlight that industrial countries and some emerging country inflation targeters started IT at initial inflation close to stationary low levels.

[16]Note that we add a set of variables that may affect IT adoption as long as we do not reduce to much the number of treated observations (see columns (4), (5) and (6) in table (1).

the trade gains derived from stable bilateral exchange rates, reducing the likelihood of adopting a flexible arrangement (Levy Yeyati, Sturzenegger, and Reggio (2010)). Second, a large strand of papers argues that exchange rate flexibility is associated with greater currency mismatches, therefore the larger the external debt, the less likely a flexible arrangement (see Mishkin (1996), Obstfeld (1998), Eichengreen, Hausmann, and Panizza (2003) and Goldstein and Turner (2004) among others). Third, broad money over GDP refers to the financial development, whose effects on exchange rate arrangement choice remains unclear. On the one hand, as argued by Meissner and Oomes (2009), financially developed countries may be more successful at adopting and maintaining pegs. On the other hand, as emphasized by Rodriguez (2016), countries with low financial development may lack instruments to conduct monetary policy, and thus tend to increase the probability of adopting pegs. Also, more developed financial system could be synonymous with greater exposure to international capital flows. This could create an incentive to choose a peg in order to stabilize bilateral exchange rates or this could reduce the likelihood of choosing a peg for countries wishing to maintain autonomous monetary policy (Levy Yeyati, Sturzenegger, and Reggio (2010)). Finally, note also that Neighborhood is significantly associated to the type of regime. This variable captures both the geographical factors that may impact the choice of a monetary regime (such as being an oil exporter) and part of the income level, two features that may impact simultaneously the policy goal and the ERPT.[17]

We next proceed to verify that the independence condition holds, i.e., that the value of the various control variables does not significantly differ between the treatment and control groups once the matching is computed. Results, using different matching algorithms, indicate that no significant difference remains in the data after any of the matching procedures for the benchmark and the majority of alternative models.[18]

4.1 The effects of monetary policy objectives

Having proved that all the prerequisite required for the use of our method hold, we estimate the impact of a monetary regime on the ERPT. In order to do so, we perform the matches and estimate the average treatment effects –IT and flexible exchange regime– on the treated countries.

Let us first focus on the estimated average effect of IT. In table 3, we present

[17] Including the variable Neighborhood is important for the PSM because it increases the chances that, for instance, an Asian IT country is compared to a non-IT Asian country (and not a non-IT European country). In other words, it allows to have a good “balancing”.

[18] All the results are available upon request form the authors.

Table 2: Propensity score for exchange rate regime.

Dependent var.	RR float (1)	LYS float (2)	KS float (3)	IMF in Rose (4)	IMF in RR (5)
Trade openness	-4.41***	-1.65***	-1.67***	-1.87***	-1.27***
	(0.46)	(0.20)	(0.16)	(0.26)	(0.18)
External debt	-0.03***	-0.00	-0.01**	-0.00	-0.01***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Political stability	0.27*	-0.03	-0.15***	-0.12**	-0.02
	(0.15)	(0.04)	(0.03)	(0.05)	(0.03)
ToT volatility	-7.50*	3.94**	-1.00	2.54	-0.39
	(4.22)	(1.88)	(1.41)	(2.11)	(1.61)
Broad money	0.02***	-0.01**	-0.00*	-0.03***	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
GDP growth	0.13*	-0.01	0.01	-0.04	-0.07*
	(0.08)	(0.05)	(0.04)	(0.05)	(0.04)
Neighborhood	4.23***	7.12***	2.53***	46.70***	19.40***
	(1.02)	(1.25)	(0.71)	(6.07)	(2.46)
Constant	11.62***	6.07***	8.08***	10.32***	4.59***
	(2.07)	(0.95)	(0.84)	(1.45)	(0.89)
Pseudo R2	0.48	0.20	0.15	0.37	0.24
No. of Obs.	990.00	753.00	1035.00	568.00	977.00

Notes: (1)Coef./std.errors. (2) *,**,*** denotes significance at the 1, 5 and 10%. (3) Based on Reinhart and Rogoff (2004) (RR), Levy-Yeyati and Sturzenegger (2005) (LYS), Klein and Shambaugh (2008) (KS) and Rose (2014) (Rose) with updates.

the analysis for: i) all the treated countries (all ITers) and, ii) treated countries according to the inflation level or the duration of the inflation target policy.[19] As seen in the table, the first outcome to be highlighted is that IT has significantly decreases the ERPT in ITers compared to the control group (i.e. non ITers). Indeed, depending on the matching algorithm and the control variables considered, the reduction is estimated to lie between 1.3 and 1.8 percent Second, these results are robust to different IT definitions (soft, full fledged and IRR), logit specification (baseline, adding structure, finance or fiscal) and PSM estimators (nearest neighbor, Kernel, local liner or radius). Third, looking at potential differences in the effect of IT adoption depending on inflation characteristics, the results show that the reduction on the ERPT is slightly more important for countries with higher inflation rates. Four, regime durability seems to matter. Indeed, older IT regimes–for instance, IT for at least 5 years– are more likely to reduce the ERPT than newer regimes –IT at most for 3 years– the ATT in the last case not being significant.

[19]Each column of the table corresponds to one of our matching algorithms.

Table 3: **Impact of inflation targeting on ERPT. Average treatment (ATT) effect on the treated countries. Treatment = IT.**

	Nearest neighbor(1)	Nearest neighbor(2)	Nearest neighbor(5)	Kernel	Local-linear	Radius (.05)	Radius (.01)	Radius (.005)
(a) By regime definition:								
ATT IT Full Fledged	-0.0182***	-0.0200***	-0.0159***	-0.0124***	-0.0157***	-0.0122***	-0.0166***	-0.0175***
	(-2.77)	(-3.47)	(-3.14)	(-2.97)	(-3.80)	(-2.99)	(-3.55)	(-3.26)
ATT IT Soft	-0.0104**	-0.00998**	-0.0101**	-0.0101**	-0.0118***	-0.00990**	-0.00852**	-0.00916**
	(-2.01)	(-2.09)	(-2.31)	(-2.51)	(-3.10)	(-2.47)	(-2.23)	(-2.00)
ATT IT IRR	-0.00867*	-0.0102**	-0.00854*	-0.0101**	-0.0121***	-0.0103**	-0.00813*	-0.00622
	(-1.55)	(-1.98)	(-1.79)	(-2.42)	(-2.99)	(-2.38)	(-1.87)	(-1.39)
(b) Alternative PSM :								
ATT adding structure	-0.0209***	-0.0150**	-0.0185***	-0.0168***	-0.0267***	-0.0168***	-0.0169***	-0.0164***
	(-3.24)	(-2.50)	(-3.41)	(-3.76)	(-4.97)	(-3.73)	(-3.24)	(-2.98)
ATT adding finance	-0.0121*	-0.0128**	-0.0173***	-0.0183***	-0.0228***	-0.0184***	-0.0176***	-0.0121**
	(-1.78)	(-1.97)	(-2.90)	(-3.64)	(-3.74)	(-3.87)	(-2.79)	(-2.07)
ATT adding fiscal	-0.0175**	-0.0203***	-0.0239***	-0.0230***	-0.0385***	-0.0229***	-0.0213***	-0.0210***
	(-2.37)	(-2.76)	(-3.39)	(-3.95)	(-6.80)	(-3.60)	(-3.54)	(-2.99)
(c) By inflation characteristics:								
ATT with inflation less than 3 %	-0.0057	-0.0067*	-0.0057*	-0.0076***	-0.0077***	-0.0078***	-0.00684***	-0.00720**
	(-1.32)	(-1.77)	(-1.68)	(-3.01)	(-3.15)	(-3.11)	(-2.65)	(-2.46)
ATT with inflation less than 5%	-0.0062	-0.0079*	-0.0109***	-0.0103***	-0.0099***	-0.0103***	-0.0109***	-0.0109***
	(-1.52)	(-1.94)	(-3.28)	(-3.54)	(-3.79)	(-3.53)	(-3.38)	(-3.45)
(d) By duration of the regime :								
ATT 3 years before IT	0.0092**	0.0080**	0.0057	0.0062*	0.0091***	0.0063*	0.0060	0.00428
	(2.29)	(2.00)	(1.46)	(1.89)	(3.26)	(1.85)	(1.62)	(1.03)
ATT with IT at most for 3 years	-0.0077	-0.0039	-0.0063	-0.0031	-0.0041	-0.0027	-0.0042	-0.00392
	(-0.70)	(-0.38)	(-0.75)	(-0.51)	(-0.64)	(-0.40)	(-0.63)	(-0.59)
ATT with IT for at least 3 years	-0.0117*	-0.0096	-0.0110**	-0.0130***	-0.0188***	-0.0129***	-0.0110**	-0.00825*
	(-1.87)	(-1.55)	(-2.04)	(-2.71)	(-3.63)	(-2.69)	(-2.29)	(-1.67)
ATT with IT for at least 5 years	-0.0201**	-0.0147*	-0.0149**	-0.0182***	-0.0230***	-0.0180***	-0.00985*	-0.00562
	(-2.53)	(-1.86)	(-2.19)	(-2.78)	(-4.15)	(-2.74)	(-1.93)	(-1.13)

Notes: (1) Observed coefficient is treatment effect (the difference between the treated and controls). When ERPT is higher for the controls than the treated, observed coefficient shows a negative value, (2) Standard errors are bootstrapped (using 500 iterations), (3) *,**,*** denotes significance at the 1, 5 and 10%. A low p-value indicates a significant gap between treated and controls.

Turning to the potential effects of following a flexible exchange rate regime in the ERPT, the results in table 4 indicate that there are no noticeable differences across countries with de facto flexible exchange rate regimes compared to those with less flexible regimes. However, countries with a de jure flexible exchange rate regime exhibiting lower pass-through degrees than otherwise (see line IMF in Rose in the table). As with IT, we investigate if the duration of the regime matters in the ERPT. Results, presented in the second panel of the table, show that older regimes are no more successful than younger ones in achieving low ERPT, the coefficients in most of the cases not being significant.

Table 4: **Impact of Exchange Rate Regime on ERPT. Average treatment (ATT) effect on the treated countries. Treatment = flexible exchange rate regime.**

	Nearest neighbor(1)	Nearest neighbor(2)	Nearest neighbor(5)	Kernel	Local-linear	Radius (.05)	Radius (.01)	Radius (.005)
(a) By regime definitions:								
ATT RR	-0.00322	-0.00826	-0.0100	-0.0136*	-0.0226	-0.0135	0.00431	0.00922
	(-0.31)	(-0.86)	(-1.06)	(-1.66)	(-0.97)	(-1.54)	(0.69)	(1.61)
ATT LYS	0.00737	0.00267	0.000778	0.00355	0.00582	0.00336	0.00807	0.00687
	(1.18)	(0.43)	(0.13)	(0.64)	(1.07)	(0.60)	(1.37)	(1.00)
ATT KS	0.00645	0.00968*	0.00772	0.00576	0.00444	0.00567	0.00782	0.00890*
	(1.06)	(1.67)	(1.41)	(1.08)	(0.87)	(1.07)	(1.46)	(1.69)
ATT IMF in Rose data	-0.0524***	-0.0550**	-0.0715***	-0.0641***	-0.0691***	-0.0640***	-0.0384***	-0.0324***
	(-2.59)	(-2.29)	(-2.67)	(-3.43)	(-2.93)	(-3.45)	(-3.06)	(-2.65)
ATT IMF in RR data	-0.00266	-0.00392	-0.00680	-0.00460	-0.000419	-0.00460	-0.00431	-0.00629
	(-0.48)	(-0.72)	(-1.33)	(-1.16)	(-0.10)	(-1.25)	(-1.01)	(-1.26)
(b) By duration of the regime:								
ATT RR 3 years before being flexible	-0.00258	-0.00235	-0.00205	-0.00161	0.000108	-0.00164	-0.00377	-0.00372
	(-0.44)	(-0.39)	(-0.43)	(-0.34)	(0.02)	(-0.32)	(-0.82)	(-0.85)
ATT RR at most for 3 years being flexible	0.0278	0.0165	0.00872	0.0197	0.0148	0.0204	0.0112	0.00884
	(1.26)	(0.81)	(0.53)	(1.45)	(1.17)	(1.56)	(0.83)	(0.64)
ATT with flexible ER regime for at least 3 years	-0.0086	-0.0059	-0.0075	-0.0105	-0.0572**	-0.0116	-0.0056	-0.0001
	(-0.70)	(-0.55)	(-0.79)	(-1.16)	(-2.39)	(-1.31)	(-0.54)	(-0.01)
ATT with flexible ER regime for at least 5 years	0.0042	-0.0013	0.0051	-0.0003	-0.0457*	-0.0005	0.0107**	0.0055
	(0.42)	(-0.13)	(0.65)	(-0.03)	(-1.91)	(-0.08)	(1.98)	(0.66)

Notes: (1) Observed coefficient is treatment effect (the difference between the treated and controls). When ERPT is higher for the controls than the treated, observed coefficient shows a negative value, (2) Standard errors are bootstrapped (using 500 iterations), (3) *,**,*** denotes significance at the 1, 5 and 10%. A low p-value indicates a significant gap between treated and controls. (3) De facto classification: RR, Reinhart and Rogoff (2004, updated), LYS, Levy Yeyati and Sturzenegger (2005), and KS, Klein and Shambaugh (2008). De jure classification: IMF. Treatment is "having flexible exchange rate" (managed floating or freely floating) . (4) PSM estimates includes Trade openness, External debt, Political stability, GDP growth, ToT volatility, Neighborhood and Broad money.

As an additional robustness exercise, we estimate the PSM with fixed exchange rate regime as the treatment effect. The argument in this case is that, as an alternative to inflation targeting with flexible exchange rates, a country may choose to peg its exchange rate to the currency of a country with a record of low and stable inflation. Then, a fixed exchange rate may be seen as an intermediate target for monetary policy. Effectively, a fixed exchange rate regime means that the instruments of monetary policy - the short term interest rate and foreign exchange market interventions - become fully and exclusively dedicated to achieving the intermediate target of a fixed exchange rate. However, this intermediate target is adopted with the purpose of realizing the ultimate policy goal of price stability. Quite consistent with our previous findings, results in table 5 show that, except in the case of the Klein and Shambaugh classification, there are no noticeable effects in terms of ERPT between treated and control countries.

The previous results seem to indicate two important things. First, even though IT was generally intended to go hand in hand with a freely floating exchange rate, exchange rate target is not equivalent to inflation target, at least when referring to the effects on the ERPT of the two rules. A lower ERPT cannot be attributed to choosing and achieving an exchange rate regime as a policy objective. Second, what a country say they do seems more important than what they actually do, at least in terms of the extent to which exchange rate fluctuations contribute to inflation instability.

Table 5: **Impact of Exchange Rate Regime on ERPT. Average treatment (ATT) effect on the treated countries. Treatment = fixed exchange rate regime.**

	Nearest neighbor(1)	Nearest neighbor(2)	Nearest neighbor(5)	Kernel	Local-linear	Radius (.05)	Radius (.01)	Radius (.005)
ATT RR	-0.0027	-0.0048	-0.0054	-0.0056	-0.0069*	-0.0056	-0.0063	-0.0043
	(-0.59)	(-0.99)	(-1.20)	(-1.37)	(-1.77)	(-1.32)	(-1.39)	(-1.01)
ATT LYS	-0.0102*	-0.0060	-0.0053	-0.0056	-0.0039	-0.0056	-0.0060	-0.0062
	(-1.74)	(-1.14)	(-1.19)	(-1.58)	(-1.35)	(-1.54)	(-1.48)	(-1.51)
ATT KS	-0.0123***	-0.0087**	-0.0090***	-0.0078***	-0.0075***	-0.0078***	-0.0075***	-0.0074**
	(-2.69)	(-2.13)	(-2.71)	(-2.72)	(-2.83)	(-2.85)	(-2.62)	(-2.33)
ATT IMF in Rose data	-0.0065	-0.0054	-0.0073*	-0.0060	-0.0059	-0.0058	-0.0058	-0.0032
	(-1.52)	(-1.24)	(-1.70)	(-1.52)	(-1.43)	(-1.47)	(-1.14)	(-0.61)
ATT IMF in RR data	-0.00726	-0.00933	0.000310	-0.00488	-0.00432	-0.00492*	-0.0059	-0.00747*
	(-1.52)	(-2.38)	(-1,40)	(-1.60)	(-1.62)	(-1.85)	(-1.47)	(-1.95)

Notes: (1) Observed coefficient is treatment effect (the difference between the treated and controls). When ERPT is higher for the controls than the treated, observed coefficient shows a negative value, (2) Standard errors are bootstrapped (using 500 iterations), (3) *,**,*** denotes significance at the 1, 5 and 10%. A low p-value indicates a significant gap between treated and controls. (3) De facto classification: RR, Reinhart and Rogoff (2004, updated), LYS, Levy Yeyati and Sturzenegger (2005), and KS, Klein and Shambaugh (2008). De jure classification: IMF. Treatment is "having fixed exchange rate" (no separate legal tender, currency board, peg or crawling peg). (4) PSM estimates includes Trade openness, Debt to GDP, Polity2, Real GDP Growth, Volext, Region average classification, M3 to GDP.

5 Conclusions

In this paper, we explore the role of monetary policy performance in determining the exchange rate pass-through. The hypothesis we test is whether, by delivering price stability and better coordinating inflation expectations, monetary policy can lead to a reduction in overall exchange rate pass-through to consumer prices. To this end, we test two policies and compare which is most effective in containing the ERPT: inflation targeting and exchange rate regime. While the literature is abundant regarding the benefits of IT, the last objective has not received sufficient attention in the debate. Moreover, the previous literature is also silent about endogeneity and self-selection bias of the monetary policy goal.

By paying special attention to these elements, our results can be summarized as follows. First, IT can reduce the extent to which exchange rate fluctuations contribute to inflation instability. Second, the reduction in the ERPT is more important for "older" regimes. This result suggests that the effect of IT could be associated with a learning effect which may come from the time required by a central bank to gain credibility by (i) agents understanding its communication and (b) agents perceiving its reaction function. Third, the exchange rate regime is not associated with a reduction in the ERPT, at least when considering a de facto definition. This important result implies that inflation targeting is different from the exchange rate regime, i.e., targeting countries are often not actually floating. Indeed, because of a "fear of floating" (Calvo and Reinhart (2002)) and, in particular, a "fear of appreciation" (Levy-Yeyati, Sturzenegger, and Gluzmann (2013)) many countries have hybrid regimes consisting of intervening in the foreign exchange market via the foreign exchange reserves (see Nordstrom, Roger, Stone, Shimizu, Kisinbay, and Restrepo (2009) for instance). Last but not least, a robustness analysis shows that these results still hold when considering different definitions and methodologies and, more importantly, are obtained after controlling for possible endogeneity bias.

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6 Annex

Variables and definition:

Inflation (Δp): Quarterly seasonally adjusted year-to-year difference of the log consumer price index.
Source: IMF- International Financial Statistics

Exchange rate variation (Δe): Quarterly year-to-year difference of the log nominal effective exchange rate. Domestic currency per unit of foreign currency: an increase implies a nominal depreciation.
Source: BIS- Bank of International Settlements

GDP growth (Δy): Quarterly seasonally adjusted year-to-year difference of the log GDP in real terms.
Source: IMF- International Financial Statistics

Supply shocks (Δp^*): Quarterly seasonally adjusted year-to-year difference of the average OECD producer price index.
Source: IMF- International Financial Statistics

Inflation targeting : fully fledged: Dummy variable that takes on the value one if in a given year the country operates under IT, and zero otherwise. The default IT variable corresponds to the full-fledge definition: countries that make an explicit commitment to meet a specified inflation rate or range within a specified time frame, regularly announce their targets to the public, and have institutional arrangements to ensure that the central bank is accountable for meeting the target.
Source: Rose (2007), Roger (2009), Minea and Tapsoba (2014) and Balima, Combes, and Minea (2017)

Inflation targeting : soft: Dummy variable that takes on the value one starting in the period in which the country officially announced the adoption of IT (and for all subsequent years), and zero otherwise. Under soft IT, the inflation target may coexists with other nominal anchors.
Source: Minea and Tapsoba (2014), Rose (2007) and Roger (2009)

Inflation targeting : IRR: Dummy variable taking the value 1 if in a given year a country monetary policy framework verifies Hammond'2012 criteria for IT, zero otherwise. These criteria are 1) Price stability is explicitly recognised as the main goal of monetary policy; 2) There is a public announcement of a quantitative target for inflation; 3) Monetary policy is based on a wide set of information, including an inflation forecast; 4) Transparency; and 5) Accountability mechanisms. *Source: Hammond (2012) and Ilzetzki, Reinhart, and Rogoff (2017)*

IMF de jure exchange rate regime: Dummy variable that takes the value 1 if a country has a de jure flexible exchange rate regime, and 0 otherwise, based on Rose (2014) and **?** (freely floating+managed floating in the "fine" case). *Source: IMF's Classification of Exchange Rate Arrangements and Monetary Frameworks*

RR de facto exchange rate regime: Binary variable taking the value 1 if in a given year a country has *de facto* a flexible (freely floating in the "coarse" case and freely floating+managed floating in the "fine" case) exchange rate regime, and 0 otherwise. *Source: Reinhart and Rogoff (2004) and updated in Ilzetzki, Reinhart, and Rogoff (2017)*

LYS de facto exchange rate regime: Dummy variable that takes the value 1 if a country has a de facto flexible (freely floating in the "coarse" case and freely floating+managed floating in the "fine" case) exchange rate regime, and 0 otherwise. *Source: Levy-Yeyati and Sturzenegger (2005)*

KS de facto exchange rate regime: Dummy variable that takes the value 1 if a country has a de facto flexible (freely floating in the "coarse" case and freely floating+managed floating in the "fine" case) exchange rate regime, and 0 otherwise. *Source: Klein and Shambaugh (2006)*
Inflation volatility: Standard deviation of the annualized montly inflation rates of years t and $t-1$.
Source: Author's calculations based on the consumer price index provided by the Bank of International Settlements

GDP volatility: Standard deviation of the real GDP growth over 5 years.
Source: Author's calculations based on IMF WEO Real GDP growth.

Market development: Financial development measure by market capitalization of listed domestic companies (% of GDP)
Source: World Bank.

Political stability: 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 (Polity2)

IT number: Number of countries that have adopted IT at the period t
Source: Author's calculations

GDP Share: The share of world GDP (domestic current US$ GDP over world current US$ GDP, %,)
Source: Author's calculations & World Bank (ny.gdp.mktp.cd)

Trade openness: Log of the sum of exports and imports of goods and services measured as a share of the GDP.
Source: World Bank (ne.trd.gnfs.zs)

Economic Development: measured by primary sector share of GDP
Source: World Bank (nv.agr.totl.zs)

Energy dependence: Fuel imports (% of merchandise imports)
Source: World Bank (tm.val.fuel.zs.un)

Remittances: "Personal remittances, received (% of GDP)"
Source: World Bank (bx.trf.pwkr.dt.gd.zs)

Income: GDP per capita, PPP (constant 2011 international USD)
Source: World Bank (ny.gdp.pcap.pp.kd)

Credit: Domestic credit to private sector (% of GDP)
Source: World Bank (fs.ast.prvt.gd.zs)

Broad money: money-to-GDP ratio (Broad money % of GDP)
Source: World Bank (FM.LBL.BMNY.GD.ZS) , IMF IFS (35L..ZK) and fred.stlouisfed.org

Debt to GDP: General government gross debt (% of GDP)
Source: World Bank WEO and IMF (GGXWDG.NGDP)

Fiscal deficit: General government net lending/borrowing (gdp%)
Source: World Bank WEO and IMF (GGXCNL.NGDP)

External debt: External debt stocks (% of GNI)
Source: World Bank (dt.dod.dect.gn.zs)

Terms of trade volatility: Standard deviation of the logarithm of terms of trade over the previous five years adjusted by openness
Source: Author's calculation based on "volext" in Levy Yeyati, Sturzenegger, and Reggio (2010), usinf World Bank NY.EXP.CAPM.KN

Neighborhood: Yearly average of the exchange rate regime dummy by geographical area, difined as CEPII"region" ,
Source: Author's calculations based on CEPII Institutional Profiles Database "region" variable.

GDP volatility: Standard deviation of the real GDP growth over 5 years.
Source: IMF WEO Real GDP growth Annual percent change NGDP.RPCH

Table 6: **IT data-set composition**

Country	**IT "Soft"**	**IT "Fully fledge"**	**IT IRR**
Armenia	abs	abs	2006
New Zealand	1990	1990	1990
Canada	1991	1992	1991
Chile	1991	2000	2000
Israel	1992	1997	1997
Australia	1993	1995	1993
Finland*	1993	1994	-
Sweden	1993	1995	1996
United Kingdom	1993	1993	1993
Spain*	1995	1995	-
Czech Republic	1998	1998	1998
Korea, Rep.	1998	1998	1998
Brazil	1999	1999	1999
Mexico	1999	2001	2002
Poland	1999	1999	1999
Colombia	2000	2000	2000
South Africa	2000	2000	2000
Switzerland	2000	2000	-
Thailand	2000	2000	2000
Hungary	2001	2002	2001
Iceland	2001	2001	2003
Norway	2001	2001	2001
Peru	2002	2002	2002
Philippines	2002	2002	2002
Guatemala	2005	2005	2006
Slovak Republic	2005	2005	-
Indonesia	2006	2005	2006
Romania	2006	2005	2006
Turkey	2006	2006	2006
Ghana	2007	2008	2007
Serbia	2007	2007	2009

Notes: years with dummy equals 1 and ERPT data, based on Minea and Tapsoba (2014) and Balima, Combes, and Minea (2017) for fully fledged and soft and based on Hammond (2012) and Ilzetzki, Reinhart, and Rogoff (2017) for IRR. The starting date is the current year of adoption if it took place from Januray to June, the following year if it took place form July to December. The ending date is 2016 for all countries but Spain and Finland which have adopted Euro in 1999.

Table 7: **Regimes data-set composition**

Country	Floating Exchange rate					Inflation		
	De Facto			De Jure		Targeting		
	RR	LYS	KS	Rose	RR	FF	Soft	IRR
Argentina	0	2	6	7	4	0	0	0
Australia	28	21	28	12	27	22	24	24
Austria	0	0	0	0	0	0	0	0
Belgium	0	1	0	0	0	0	0	0
Brazil	11	3	17	12	12	18	18	18
Canada	0	18	7	12	28	25	26	26
Chile	0	14	20	12	11	17	26	17
Colombia	1	13	21	12	9	17	17	17
Costa Rica	0	1	3	0	3	0	0	0
Denmark	0	0	0	0	0	0	0	0
Finland	0	0	4	0	4	6	7	7
France	0	0	0	0	0	0	0	0
Germany	16	16	16	0	0	0	0	0
Greece	2	3	11	0	0	0	0	0
Hong Kong	0	0	1	0	0	0	0	0
Hungary	0	5	10	5	3	15	16	16
India	0	5	6	12	5	0	0	0
Indonesia	7	4	14	12	4	12	11	11
Ireland	0	0	3	0	0	0	0	0
Israel	0	11	13	9	0	20	25	20
Italy	0	5	4	0	4	0	0	0
Japan	28	22	32	12	21	0	0	0
Korea, Rep.	12	0	13	12	7	19	19	19
Latvia	0	0	1	0	1	0	0	0
Malaysia	1	2	6	4	2	0	0	0
Mexico	15	9	9	12	10	16	18	15
Netherlands	0	0	0	0	0	0	0	0
New Zealand	26	3	13	12	20	27	27	27
Norway	28	0	7	12	6	16	16	16
Peru	0	6	6	12	8	15	15	15
Philippines	2	8	7	12	8	15	15	15
Poland	11	14	17	12	12	18	18	18
Portugal	0	1	5	0	0	0	0	0
Romania	9	6	14	9	2	12	11	11
Russian	0	3	13	7	2	0	0	0
Singapore	0	2	5	8	7	0	0	0
Slovakia	0	1	4	4	0	12	12	0
Slovenia	0	0	0	1	0	0	0	0
South Africa	16	11	23	12	21	17	17	17
Spain	0	8	3	0	5	5	5	5
Sweden	8	6	9	12	2	22	24	21
Switzerland	0	2	3	11	28	17	17	0
Thailand	2	6	10	12	7	17	17	17
Turkey	5	8	21	12	4	11	11	11
United Kingdom	18	17	13	12	21	24	24	24
United States	28	22	32	12	28	0	0	0

Notes: Number of years with dummy equals 1 and ERPT data available, based on Reinhart and Rogoff (2004) (RR), Levy-Yeyati and Sturzenegger (2005) (LYS), Klein and Shambaugh (2008) (KS), Rose (2014) (Rose), Balima, Combes, and Minea (2017) (soft and FF for fully fledged) and