Output Growth and Inflation Targeting: empirical effects across the world

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Abstract

This study investigates the economic performance under Inflation Targeting (IT) and compares to non-targeting regimes taking into account cross-dependence among the countries. It is especially important since the global financial crisis challenges the capacity of this monetary regime to create a macroeconomic environment that permits a recovery in economic activity. To this end, three samples are used: advanced countries, developing countries and whole sample. An important result of the several estimations in this study is that there is a positive constant effect on the output after the adoption of IT, especially to developing countries. Therefore, the findings denote that the adoption of IT implies gains in economic growth or that it does not imply a sluggish economic growth.

Key words: *inflation targeting, output growth, cross-dependence, developing and advanced countries.*

Resumo

Este estudo investiga o desempenho econômico dos países sob o Regime de Metas de Inflação (RMI) e compara o resultado com países que utilizam regimes diferentes, considerando, todavia, a interdependência entre eles. Esse ponto é especialmente importante, dado que a crise financeira internacional recente desafia a capacidade do RMI de criar um ambiente macroeconômico que permita a recuperação da atividade econômica. Para o intento, três amostras são usadas: países avançados, países em desenvolvimento e a amostra global. Um relevante resultado das várias estimações empregadas é que existe um efeito constante e positivo sobre o produto após a adoção do RMI, especialmente para as economias em desenvolvimento. Destarte, as conclusões denotam que a adoção do RMI proporciona ganhos em termos de crescimento econômico, ou ao menos não o prejudica.

Palavras-chaves: *metas de inflação, crescimento econômico, dependência cruzada, países em desenvolvimento e avançados.*

Área 4 (ANPEC): Macroeconomia, Economia Monetária e Finanças.

Classificação JEL: *E42, E52, O42.*

1. Introduction

Over the past few decades, Inflation Targeting (IT) has been adopted by several countries with the main objective of maintaining a low and stable inflation. However, the recent subprime crisis challenges the capacity of this monetary regime to create a macroeconomic environment that permits a recovery in economic activity. This point is crucial because the empirical literature on IT and economic growth is still in evolution and the results are not convergent.[1]

Most of the empirical literature on IT and economic growth neglects the effect of common shocks across countries. This study presents a contribution through a combination of econometric models seeking flexibility to capture the collateral effects of IT on economic growth and incorporating the relationship among the countries in the models with panel data. With this focus in mind, a set of 128 countries (of which 31 adopted IT during the period under consideration) is considered in the analysis for the period 1970 to 2007.

The paper is organized as follows: Section 2 presents the underpinnings for the econometric model. Section 3 describes the database, presents the estimation of the models, and reports the results. Section 4 concludes the paper.

2. Theoretical underpinning

In a general way, most studies which measure IT as a treatment, independently of the methods (difference-in-difference, propensity score, panel data models), incorporate a dummy variable which assumes value "1" for the period after the adoption of IT and "0" for the previous period (step dummy). In this sense, a general specification of the effect of IT on output (*Y*), in a dynamic perspective (output growth), for a panel data model is:

$$Y_{i,t} = \alpha_i + \phi Y_{i,t-1} + \beta' X_{i,t} + \delta IT_{i,t} + \varepsilon_{i,t} \tag{1}$$

where i=1…N is the cross-section unit; t=1…T is the time index; α_i specific vector of time-fixed characteristics of the country i; $X_{i,t}$ is the set of time-varying variables; $IT_{i,t}$ is the binary variable regarding *IT*.

In other words, the standard specification assumes that the effect of the adoption of IT on the economy is immediate, without delay in response or anticipation, and that this effect is constant and permanent. Due to the fact that these assumptions may not be plausible, we change the traditional model making the substitution of the step dummy by a pulse dummy[2]. Then,

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[1] Empirical evidence favorable to the IT on economic growth can be found in: Truman (2003), Pétursson (2004a), Ball and Sheridan (2005), Apergis *et al.* (2005), Mollick, Cabral, and Carneiro (2011). Unfavorable effects or no evidence whatsoever that IT improves the behavior of output is observed in: Fraga, Goldfajnm, and Minella (2004), and Fang, Lee, and Miller (2009), Brito and Bystedt (2010), Ball (2011).

[2] A variation of this methodology is suggested by Laporte and Windmeijer (2005).

$$Y_{i,t} = \alpha_i + \phi Y_{i,t-1} + \beta' X_{i,t} + \delta_{-j} PIT_{i,-j} + ... + \delta_{-1} PIT_{i,-1} + \delta_0 PIT_{i,0} + \delta_1 PIT_{i,1} + ... + \delta_j PIT_{i,j} + \varepsilon_{i,t}$$

$$Y_{i,t} = \alpha_i + \phi Y_{i,t-1} + \beta' X_{i,t} + \sum_{j=-l}^{r} \delta_j PIT_{i,j} + \varepsilon_{i,t} \tag{2}$$

where j=0 is the date of adoption of IT, and PIT_j is the effect of the treatment in each period of time: at the moment of the adoption of IT, before (possible anticipation of effects due to the expectation of changes) and after. Hence, the dummy variable assumes value "1" at the moment of adoption (and for j periods before and after), and "0" for the other.

Equation (2) allows one to measure the effect on output with the control of explanatory variables considering the individual characteristics of the countries and the time effect. Therefore, the effect of the treatment in each period related with the adoption of IT is obtained in comparison with the average behavior. It is important to observe that this framework allows one to observe several characteristics that are not observed in models that use the traditional step dummy. Firstly, for the period before the adoption of IT, the statistical significance of δ_{-j} can suggest that the public anticipated the effects or a possible endogenous effect where the output affects the decision for adoption of IT.[3] Secondly, the observation of the coefficients (δ_0 and $\delta_{0\pm j}$) permits seeing if the effects are not immediate or if there is some delay in the process. Thirdly, the magnitude and the significance of the coefficients regarding the treatment in each point of time allows one to see if the effect is decreasing, increasing, constant, or random.

In line with models like Mankiw, Romer, and Weil (1992) and Islam (1995), we estimate the dynamic of economic growth in the following way:[4]

$$\ln y_{i,t} = \alpha_i + \phi \ln y_{i,t-1} + \beta \ln kinv_{i,t} + \sum_{j=-l}^{r} \delta_j PIT_{i,j} + \varepsilon_{i,t} \tag{3}$$

where $\ln y_{i,t}$ is real GDP (in logs), $\ln kinv_{i,t}$ as well as the investment/GDP ratio (in logs), and $PIT_{i,j}$ assumes value "1" at the year of the adoption of IT (and for j periods before and after) and "0" for the other years, and

$$\ln y_{i,t} = \alpha_i + \phi \ln y_{i,t-1} + \beta \ln kinv_{i,t} + \varphi popg_{i,t} + \sum_{j=-l}^{r} \delta_j PIT_{i,j} + \varepsilon_{i,t} \tag{4}$$

where $popg_{i,t}$ is the population growth rate.

[3] The inclusion of the output lagged one period considers a possible bias due to the correlation between the dummy and the past output. In other words, countries with greater economic growth are more likely to adopt IT (see, Lin and Ye (2007), and de Mendonça and de Guimarães e Souza, 2012).

[4] According to Hauk and Wacziarg (2009, 104) "since the mid-1990s, the use of dynamic panel data estimators in growth empirics has become prevalent".

With the intention of incorporating the equilibrium relation and the short-term dynamic, a basic version of a panel error correction model is considered.[5] As a consequence, equations (3) and (4) are rewritten, respectively, as:

$$\Delta \ln y_{i,t} = \alpha_i + \lambda(\ln y_{i,t-1} - \tau \ln kinv_{i,t-1}) + \sum_{j=-l}^{r} \delta_j PIT_{i,j} + \varpi \Delta \ln y_{i,t-1} + \beta \Delta \ln kinv_{i,t} + \varepsilon_{i,t} \tag{5}$$

and

$$\begin{aligned} \Delta \ln y_{i,t} &= \alpha_i + \lambda(\ln y_{i,t-1} - \tau \ln kinv_{i,t-1} - \iota popg_{i,t-1}) + \sum_{j=-l}^{r} \delta_j PIT_{i,j} + \\ &\varpi \Delta \ln y_{i,t-1} + \beta \Delta \ln kinv_{i,t} + \varsigma \Delta popg_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{6}$$

In brief, with these specifications, we give robustness to the results through the test of the effect of IT over time taking into account the short-term and long-term effects on the control variables.

3. Data and empirical evidence

This study considers information from 128 countries, which represent 99% of the world GDP and 97% of the world population measured by Penn World Table (PWT), in an unbalanced panel data.[6] As observed in Corbo, Landerretche and Schmidt-Hebbel (2002), Roger and Stone (2005), Mollick, Cabral and Carneiro (2011) and, de Mendonça and de Guimarães e Souza (2012), we consider two different dates of IT adoption for the monitored countries. The first set of dates (soft IT) refers to the period when the country announces a numerical target. The second set of dates (full-fledged IT) refers to complete adoption of IT (Table A.1).

The period under analysis spans from 1970 to 2007 (38 years)[7] and thus there is a *T* sufficiently large which, in turn, permits the estimation of dynamic models based on fixed effects (*Dynamic Fixed-Effects* - DFE).[8]

With the objective of observing the effect of IT on output, we consider two different *j* (5 and 10). These two different time horizons are relevant because they allow one to detect whether the results are robust in different periods. Besides considering all countries in the analysis, we make the estimations dividing the sample between advanced and developing countries (based on IMF classification). The main idea is to observe if the

[5] Based on error correction in panel data (Westerlund, 2007).

[6] Data gathered from PWT 7.0 is real GDP per capita, investment/GDP ratio, and population growth rate.

[7] The international crisis period (2008-2009) was omitted in order to not bias the results.

[8] Corrections for bias due to endogeneity between the error term and lagged dependent variable as proposed in Kiviet (1995) and Bun and Carree (2005) are unnecessary because of the dimension of *T*. Then, DFE is the best choice overall, for long and unbalanced panels, while dynamic GMM estimators and their well-known problem of too many instruments is just a second-best solution (Judson and Owen, 1999; Roodman, 2009). Even Difference and System GMM estimators were developed for large *N* and short *T*. Some problems: they require stationary variables or at least stationarity in the initial condition ($t=0$ in system GMM), overfitting with long *T* panels; and assume parameter homogeneity for instrumentation (see Pesaran and Smith, 1995).

impact, due to the adoption of IT, is different for countries with different levels of development.

It is important to highlight that although the sample size is adequate for estimating fixed effect models, a period larger than 20-30 years amplifies the cross-sectional dependence among the countries. Concerning the cross-dependence among the countries, the Cross-Dependence (CD) test suggested by Pesaran (2004) is applied (Table A.2)[9]. In a general way, independent of the series being in level or in difference and also the sample which is considered (all countries, advanced countries, and developing countries), the CD test rejects the assumption that there is cross-section independence among the countries. As a manner of treating this problem, the variance and covariance matrix is adjusted as proposed by Driscoll and Kraay (1998). This adjustment (no restrictions on the number of countries due to the use of a non-parametric estimation) implies standard errors that are robust in the presence of heterogeneity, residual autocorrelation, and cross-dependence among the countries[10].

The Table 1 summarizes the results for the full sample and the case of soft IT. In all specifications, the control variables are statistically significant and the coefficients have the signs predicted by the literature. In the dynamic models the coefficient of $\ln y_{i,t-1}$ is positive and significant which, in turn, indicates a gradual economic growth. In addition, the coefficient of the error correction is negative and significant indicating an adjustment to short-term variations. As expected, in both models (j=5 and j=10) we find positive values for the relationship between investment and output, and negative for the relationship between population growth rate and output.

About the parameters of interest, the individual coefficients are positive and significant after the adoption of IT (j>0). Another highlight is the homogeneity among the estimated coefficients in the period after adoption of IT. Even when we amplify the measurement of the effect by the inclusion of additional dummies, the coefficients are around the average of 0.02. This observation matters because it suggests the presence of constant effects due to IT on output. Furthermore, we test the joint significance of the coefficients of $PIT_{i,j}$ for the two possibilities: before adoption of IT ("pre-adoption") and after the adoption of IT including the year of adoption ("post-adoption"). The results strengthen the presence of the effect only after the adoption of IT. It is important to observe that the non-significance in the period before the adoption of IT minimizes the possible problem of endogeneity (adoption of IT due to economic growth) [11].

[9] For a survey about cross-sectional dependence in panels, see Moscone and Tosetti (2009).
[10] The lag length is the integer part of $4(T/100)^{2/9}$.
[11] Traditional diagnostic measures of each model are also presented. The tests indicate the presence of heterogeneity and residual autocorrelation; however, they are treated together with cross-dependence effect by Driscoll and Kraay's (1998) correction.

Table 1 - *Estimations – full sample and soft IT*

Variable	*Soft IT*							
	j = 5				*j = 10*			
	Dynamic Model		*Error Correction Model*		*Dynamic Model*		*Error Correction Model*	
	Invest	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*
$\ln y_{i,t-1}$	0,9733 ***	0,9727 ***	-0,0290 **	-0,0305 ***	0,9720 ***	0,9716 ***	-0,0303 **	-0,0316 ***
$\ln kinv_{i,t}$	0,0256 ***	0,0259 ***			0,0253 ***	0,0256 ***		
$popg_{i,t}$		-0,0026 **				-0,0025 **		
$\ln kinv_{i,t-1}$			0,0175 ***	0,0191 ***			0,0173 ***	0,0188 ***
$\ln popg_{i,t-1}$				-0,0057 ***				-0,0056 ***
$soft\ PIT_{i,-10}$					0,0012	0,0006	0,0014	0,0001
$soft\ PIT_{i,-9}$					-0,0145	-0,0150	-0,0141	-0,0153 *
$soft\ PIT_{i,-8}$					-0,0033	-0,0039	-0,0023	-0,0034
$soft\ PIT_{i,-7}$					-0,0069	-0,0075	-0,0019	-0,0031
$soft\ PIT_{i,-6}$					-0,0039	-0,0046	-0,0039	-0,0052
$soft\ PIT_{i,-5}$	0,0094	0,0088	0,0088	0,0077	0,0103	0,0094	0,0100	0,0084
$soft\ PIT_{i,-4}$	0,0042	0,0036	0,0023	0,0010	0,0051	0,0043	0,0036	0,0017
$soft\ PIT_{i,-3}$	0,0099	0,0093	0,0096	0,0082	0,0109	0,0100	0,0109	0,0090
$soft\ PIT_{i,-2}$	0,0026	0,0021	0,0022	0,0009	0,0036	0,0028	0,0035	0,0017
$soft\ PIT_{i,-1}$	-0,0041	-0,0045	-0,0038	-0,0048	-0,0030	-0,0037	-0,0024	-0,0040
$soft\ PIT_{i,0}$	0,0007	0,0001	0,0017	0,0005	0,0018	0,0009	0,0031	0,0013
$soft\ PIT_{i,1}$	0,0175 ***	0,0170 ***	0,0173 ***	0,0160 ***	0,0186 ***	0,0178 ***	0,0186 ***	0,0169 ***
$soft\ PIT_{i,2}$	0,0203 ***	0,0197 ***	0,0185 ***	0,0173 ***	0,0215 ***	0,0206 ***	0,0200 ***	0,0182 ***
$soft\ PIT_{i,3}$	0,0197 ***	0,0190 ***	0,0181 ***	0,0167 ***	0,0212 ***	0,0202 ***	0,0198 ***	0,0179 ***
$soft\ PIT_{i,4}$	0,0235 ***	0,0227 ***	0,0215 ***	0,0200 ***	0,0251 ***	0,0240 ***	0,0234 ***	0,0213 ***
$soft\ PIT_{i,5}$	0,0230 ***	0,0222 ***	0,0214 ***	0,0197 ***	0,0247 ***	0,0236 ***	0,0234 ***	0,0211 ***
$soft\ PIT_{i,6}$					0,0196 ***	0,0183 **	0,0195 ***	0,0168 **
$soft\ PIT_{i,7}$					0,0194 **	0,0180 **	0,0192 ***	0,0160 **
$soft\ PIT_{i,8}$					0,0214 ***	0,0201 **	0,0218 ***	0,0190 ***
$soft\ PIT_{i,9}$					0,0195 **	0,0181 **	0,0188 **	0,0160 **
$soft\ PIT_{i,10}$					0,0200 *	0,0185 *	0,0209 **	0,0178 *
$\Delta\ln y_{i,t-1}$			0,0950 **	0,0981 **			0,0950 **	0,0980 **
$\Delta\ln kinv_{i,t}$			0,0434 ***	0,0427 ***			0,0432 ***	0,0425 ***
$\Delta\ popg_{i,t}$				-0,0029 ***				-0,0029 ***
Pre-Adoption	0,0219	0,0191	0,0192	0,0130	-0,0006	-0,0076	0,0048	-0,0102
Post-Adoption	0,1041 ***	0,1006 ***	0,0969 ***	0,0898 ***	0,2109 ***	0,1992 ***	0,2056 ***	0,1809 ***
Wald Het.	62273,58 ***	62077,5 ***	73662,9 ***	72899,2 ***	60467,7 ***	60341,18 ***	77052,8 ***	76017,3 ***
Woold.Autocorr.	44,41 ***	44,13 ***	65,90 ***	65,66 ***	44,55 ***	44,26 ***	65,91 ***	65,67 ***
F test	3694,39 ***	3769,57 ***	25,56 ***	29,19 ***	10675,5 ***	10765,43 ***	58,52 ***	92,58 ***
Within R^2	0,95	0,95	0,04	0,05	0,95	0,95	0,04	0,05
N	4338	4338	4296	4296	4338	4338	4296	4296
Countries	128	128	128	128	128	128	128	128

Notes: * Indicate the significance level of 10%, ** the significance level of 5% and *** the significance level of 1%. To the coefficients of the equation, the significance level are based on the Driscoll and Kraay's standard errors - Driscoll and Kraay (1998).

Table 2 - *Estimations – full sample and full-fledged IT*

Variable	*Full IT*							
	j = 5				*j = 10*			
	Dynamic Model		*Error Correction Model*		*Dynamic Model*		*Error Correction Model*	
	Invest	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*
$\ln y_{i,t-1}$	0,9727 ***	0,9723 ***	-0,0296 **	-0,0309 ***	0,9709 ***	0,9705 ***	-0,0315 ***	-0,0325 ***
$\ln kinv_{i,t}$	0,0256 ***	0,0260 ***			0,0256 ***	0,0259 ***		
$popg_{i,t}$		-0,0025 **				-0,0025 **		
$\ln kinv_{i,t-1}$			0,0175 ***	0,0191 ***			0,0176 ***	0,0191 ***
$\ln popg_{i,t-1}$				-0,0057 ***				-0,0056 ***
$full\ PIT_{i,-10}$					0,0008	0,0001	-0,0004	-0,0020
$full\ PIT_{i,-9}$					-0,0023	-0,0030	-0,0022	-0,0037
$full\ PIT_{i,-8}$					-0,0038	-0,0044	-0,0035	-0,0050
$full\ PIT_{i,-7}$					0,0064	0,0059	0,0127 **	0,0115 *
$full\ PIT_{i,-6}$					0,0096	0,0090	0,0083	0,0071
$full\ PIT_{i,-5}$	0,0094	0,0090	0,0085	0,0076	0,0123	0,0116	0,0114	0,0100
$full\ PIT_{i,-4}$	0,0012	0,0006	0,0005	-0,0006	0,0041	0,0033	0,0036	0,0019
$full\ PIT_{i,-3}$	0,0069	0,0062	0,0074	0,0061	0,0098	0,0089	0,0105	0,0086
$full\ PIT_{i,-2}$	0,0077	0,0069	0,0080	0,0063	0,0107	0,0097	0,0111	0,0089
$full\ PIT_{i,-1}$	0,0058	0,0050	0,0056	0,0039	0,0088	0,0078	0,0087	0,0065
$full\ PIT_{i,0}$	0,0125 ***	0,0115 **	0,0125 ***	0,0107 **	0,0156 ***	0,0144 **	0,0157 ***	0,0133 **
$full\ PIT_{i,1}$	0,0099 **	0,0090 *	0,0099 **	0,0077 *	0,0131 **	0,0119 **	0,0132 ***	0,0105 **
$full\ PIT_{i,2}$	0,0136 **	0,0126 **	0,0133 **	0,0113 **	0,0171 ***	0,0159 **	0,0169 ***	0,0143 **
$full\ PIT_{i,3}$	0,0229 ***	0,0219 ***	0,0220 ***	0,0199 ***	0,0265 ***	0,0252 ***	0,0257 ***	0,0230 ***
$full\ PIT_{i,4}$	0,0279 ***	0,0268 ***	0,0261 ***	0,0238 ***	0,0318 ***	0,0304 ***	0,0300 ***	0,0272 ***
$full\ PIT_{i,5}$	0,0287 ***	0,0275 ***	0,0265 ***	0,0241 ***	0,0326 ***	0,0312 ***	0,0306 ***	0,0275 ***
$full\ PIT_{i,6}$					0,0224 ***	0,0210 ***	0,0223 ***	0,0193 ***
$full\ PIT_{i,7}$					0,0314 ***	0,0300 ***	0,0306 ***	0,0276 ***
$full\ PIT_{i,8}$					0,0315 ***	0,0303 ***	0,0291 ***	0,0266 ***
$full\ PIT_{i,9}$					0,0306 ***	0,0294 ***	0,0282 ***	0,0258 ***
$full\ PIT_{i,10}$					0,0231 ***	0,0219 ***	0,0227 ***	0,0200 ***
$\Delta\ln y_{i,t-1}$			0,0953 **	0,0984 **			0,0955 **	0,0985 **
$\Delta\ln kinv_{i,t}$			0,0435 ***	0,0428 ***			0,0433 ***	0,0426 ***
$\Delta\ popg_{i,t}$				-0,0029 ***				-0,0028 ***
Pre-Adoption	0,0309	0,0278	0,0300	0,0233	0,0564	0,0489	0,0602	0,0439
Post-Adoption	0,1030 ***	0,0978 ***	0,0978 ***	0,0868 ***	0,2601 ***	0,2472 ***	0,2492 ***	0,2219 ***
Wald Het.	60096,61 ***	60026,8 ***	71138,2 ***	70674,5 ***	62382,81 ***	62362,77 ***	77085,7 ***	76572,1 ***
Woold.Autocorr.	44,42 ***	44,14 ***	65,88 ***	65,64 ***	44,68 ***	44,40 ***	66,10 ***	65,86 ***
F test	3917,49 ***	3980,64 ***	64,96 ***	94,88 ***	9711,44 ***	14045,62 ***	165,57 ***	626,33 ***
Within R^2	0,95	0,95	0,04	0,05	0,95	0,95	0,04	0,05
N	4338	4338	4296	4296	4338	4338	4296	4296
Countries	128	128	128	128	128	128	128	128

Notes: * Indicate the significance level of 10%, ** the significance level of 5% and *** the significance level of 1%. To the coefficients of the equation, the significance level are based on the Driscoll and Kraay's standard errors - Driscoll and Kraay (1998).

The estimations in Table 2 consider the case of full sample and full-fledged IT. In a general way, the results are close to those observed for the case of soft IT. In brief, the result that the adoption of IT is advantageous for economic growth is observed (the effects of IT are constant and the coefficients are near the average of 0.02). The only difference in relation to the previous case is that with a conservative date for the adoption of IT, the period "$PIT_{i,0}$" becomes significant. This result suggests that a more formal and explicit adoption of IT implies more credibility and the effects on the output are immediate.

Table 3 - *Estimations – Developing countries and soft IT*

Variable	*Soft IT*							
	j = 5				*j = 10*			
	Dynamic Model		*Error Correction Model*		*Dynamic Model*		*Error Correction Model*	
	Invest	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*
$\ln y_{i,t-1}$	0,9701 ***	0,9695 ***	-0,0328 **	-0,0346 ***	0,969 ***	0,9685 ***	-0,0341 **	-0,0355 ***
$\ln kinv_{i,t}$	0,0239 ***	0,0242 ***			0,0236 ***	0,0239 ***		
$popg_{i,t}$		-0,0025 **				-0,0025 **		
$\ln kinv_{i,t-1}$			0,0173 ***	0,0188 ***			0,017 ***	0,0185 ***
$\ln popg_{i,t-1}$				-0,0057 ***				-0,0057 ***
$soft\ PIT_{i,-10}$					0,0026	0,002	0,0032	0,0016
$soft\ PIT_{i,-9}$					-0,0181	-0,0188	-0,0173	-0,0189
$soft\ PIT_{i,-8}$					-0,0047	-0,0055	-0,0029	-0,0045
$soft\ PIT_{i,-7}$					-0,0146	-0,0155	-0,0069	-0,0088
$soft\ PIT_{i,-6}$					-0,0107	-0,0118	-0,0094	-0,0116
$soft\ PIT_{i,-5}$	0,0108	0,01	0,0111	0,0095	0,0113	0,0101	0,0121	0,0097
$soft\ PIT_{i,-4}$	0,0028	0,002	0,0009	-0,0011	0,0033	0,0021	0,0019	-0,0008
$soft\ PIT_{i,-3}$	0,0193 **	0,0185 **	0,019 **	0,017 **	0,0198 **	0,0186 **	0,0202 **	0,0173 **
$soft\ PIT_{i,-2}$	0,0154	0,0146	0,0136	0,0117	0,0159	0,0148	0,0148	0,012
$soft\ PIT_{i,-1}$	0,0024	0,0017	0,0016	-0,0001	0,0029	0,0019	0,0028	0,0003
$soft\ PIT_{i,0}$	0,0082	0,0072	0,0084	0,0066	0,0088	0,0074	0,0097	0,007
$soft\ PIT_{i,1}$	0,0291 ***	0,0283 ***	0,0284 ***	0,0264 ***	0,0298 ***	0,0286 ***	0,0297 ***	0,0269 ***
$soft\ PIT_{i,2}$	0,0295 ***	0,0286 ***	0,0272 ***	0,0252 ***	0,0304 ***	0,0291 ***	0,0287 ***	0,0258 ***
$soft\ PIT_{i,3}$	0,024 ***	0,023 ***	0,0224 ***	0,0201 ***	0,0254 ***	0,024 ***	0,0243 ***	0,0211 ***
$soft\ PIT_{i,4}$	0,0272 ***	0,026 ***	0,0257 ***	0,0231 ***	0,0286 ***	0,027 ***	0,0277 ***	0,0242 ***
$soft\ PIT_{i,5}$	0,0304 ***	0,0291 ***	0,0293 ***	0,0265 ***	0,032 ***	0,0303 ***	0,0315 ***	0,0277 ***
$soft\ PIT_{i,6}$					0,0232 **	0,0212 **	0,023 ***	0,0187 **
$soft\ PIT_{i,7}$					0,0231 **	0,0211 **	0,023 **	0,0183 **
$soft\ PIT_{i,8}$					0,0308 ***	0,029 ***	0,0316 ***	0,0275 ***
$soft\ PIT_{i,9}$					0,0222 *	0,0202 *	0,0213 **	0,0171 *
$soft\ PIT_{i,10}$					0,0329	0,0306	0,0346 *	0,0297
$\Delta\ln y_{i,t-1}$			0,093 **	0,0968 **			0,093 **	0,0965 **
$\Delta\ln kinv_{i,t}$			0,0373 ***	0,0365 ***			0,0371 ***	0,0363 ***
$\Delta\ popg_{i,t}$				-0,003 ***				-0,0029 ***
Pre-Adoption	0,0508	0,0468	0,0463	0,0130	0,007802	-0,0021	0,0185	-0,0037
Post-Adoption	0,1403 ***	0,1351 ***	0,1330 ***	0,0898 ***	0,2783 ***	0,2611 ***	0,2754 ***	0,2371 ***
Wald Het.	9598,85 ***	9837,3 ***	10974,6 ***	11581,1 ***	9542,05 ***	9792,21 ***	15068,8 ***	14784,5 ***
Woold.Autocorr.	45,62 ***	45,33 ***	65,56 ***	65,25 ***	45,91 ***	45,63 ***	65,61 ***	65,30 ***
F test	2522,54 ***	2935,67 ***	21,23 ***	0,0448 ***	3890,48 ***	4124,81 ***	66,25 ***	149,48 ***
Within R^2	0,94	0,94	0,04	0,05	0,94	0,94	0,04	0,05
N	3465	3465	3424	3424	3465	3465	3424	3424
Countries	105	105	105	105	105	105	105	105

Notes: * Indicate the significance level of 10%, ** the significance level of 5% and *** the significance level of 1%. To the coefficients of the equation, the significance level are based on the Driscoll and Kraay's standard errors - Driscoll and Kraay (1998).

After the analysis considering all countries in the sample, next estimations take into account specific effects of the adoption of IT on developing and advanced countries. Tables 3 and 4 present the estimations for developing economies (analysis for the soft IT and full-fledged IT cases, respectively). The results in both cases (soft and full-fledged IT) are in agreement with those observed for the full sample estimations. Therefore, we can state that the adoption of IT is also relevant in the case of developing countries for sustaining economic growth. However, an important change in the previously observed results is that there is a possible anticipation of the positive effects from the adoption of IT (some coefficients of the periods before adoption are significant). As it is the case of developing countries, a possible increase in the credibility due to the announcement of a numerical target or the expectation regarding the change in the conduct of the monetary policy can be a possible explanation.[12]

Table 4 - *Estimations – Developing countries and full-fledged IT*

Variable	*Full IT*							
	j = 5				*j = 10*			
	Dynamic Model		*Error Correction Model*		*Dynamic Model*		*Error Correction Model*	
	Invest	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*
$\ln y_{i,t-1}$	0,9694 ***	0,9689 ***	-0,0336 **	-0,0352 ***	0,9674 ***	0,9671 ***	-0,0356 ***	-0,0368 ***
$\ln kinv_{i,t}$	0,0239 ***	0,0242 ***			0,0239 ***	0,0242 ***		
$popg_{i,t}$		-0,0025 **				-0,0024 **		
$\ln kinv_{i,t-1}$			0,0172 ***	0,0187 ***			0,0174 ***	0,0188 ***
$\ln popg_{i,t-1}$				-0,0057 ***				-0,0055 ***
$full\ PIT_{i,-10}$					-0,0009	-0,0018	-0,0018	-0,0037
$full\ PIT_{i,-9}$					-0,0022	-0,0031	-0,0013	-0,0034
$full\ PIT_{i,-8}$					-0,0055	-0,0064	-0,0047	-0,0068
$full\ PIT_{i,-7}$					0,0042	0,0033	0,0139 *	0,0118
$full\ PIT_{i,-6}$					0,0101	0,0092	0,0098	0,0077
$full\ PIT_{i,-5}$	0,0155	0,0148	0,0146	0,0131	0,0188 *	0,0178	0,0183 *	0,016
$full\ PIT_{i,-4}$	0,0097	0,0089	0,0082	0,0065	0,0131	0,012	0,012	0,0095
$full\ PIT_{i,-3}$	0,0192 **	0,0183 *	0,0191 **	0,0171 **	0,0227 **	0,0215 **	0,0229 **	0,0202 **
$full\ PIT_{i,-2}$	0,0207 **	0,0196 *	0,0198 **	0,0174 *	0,0242 **	0,0228 **	0,0236 **	0,0206 **
$full\ PIT_{i,-1}$	0,0097	0,0087	0,0091	0,0066	0,0133	0,012	0,0131 *	0,0098
$full\ PIT_{i,0}$	0,0161 **	0,0147 **	0,0163 ***	0,0135 **	0,0198 **	0,0181 **	0,0202 ***	0,0168 **
$full\ PIT_{i,1}$	0,0189 ***	0,0176 **	0,0189 **	0,0157 **	0,0228 ***	0,0211 ***	0,0231 ***	0,0191 ***
$full\ PIT_{i,2}$	0,0205 **	0,0191 **	0,0201 **	0,0169 **	0,0251 **	0,0233 **	0,025 ***	0,0209 **
$full\ PIT_{i,3}$	0,0253 ***	0,0238 ***	0,0252 ***	0,0218 ***	0,0301 ***	0,0282 ***	0,0302 ***	0,026 ***
$full\ PIT_{i,4}$	0,0329 ***	0,0313 ***	0,0315 ***	0,028 ***	0,0378 ***	0,0358 ***	0,0367 ***	0,0323 ***
$full\ PIT_{i,5}$	0,0384 ***	0,0367 ***	0,0365 ***	0,0327 ***	0,0433 ***	0,0412 ***	0,0417 ***	0,0371 ***
$full\ PIT_{i,6}$					0,0317 ***	0,0296 ***	0,0312 ***	0,0265 ***
$full\ PIT_{i,7}$					0,0466 ***	0,0444 ***	0,0451 ***	0,0402 ***
$full\ PIT_{i,8}$					0,0622 ***	0,0603 ***	0,057 ***	0,0528 ***
$full\ PIT_{i,9}$					0,0579 ***	0,056 ***	0,049 ***	0,0448 ***
$full\ PIT_{i,10}$					0,0395 ***	0,0373 ***	0,0377 ***	0,033 ***
$\Delta \ln y_{i,t-1}$			0,0934 **	0,0971 **			0,0933 **	0,0969 **
$\Delta \ln kinv_{i,t}$			0,0374 ***	0,0366 ***			0,0372 ***	0,0365 ***
$\Delta\ popg_{i,t}$				-0,0029 ***				-0,0029 ***
Pre-Adoption	0,0748 *	0,0703 *	0,0709 **	0,0607 *	0,0979	0,0872	0,1056	0,0816
Post-Adoption	0,1360 ***	0,1283 ***	0,1322 ***	0,1150 ***	0,3968 ***	0,3773 ***	0,3767 ***	0,3327 ***
Wald Het.	9088,31 ***	9338,33 ***	10327,1 ***	10953,4 ***	9251,76 ***	9459,96 ***	20452,5 ***	19903,3 ***
Woold.Autocorr.	45,66 ***	45,38 ***	65,55 ***	65,26 ***	47,17 ***	46,90 ***	66,41 ***	66,13 ***
F test	3264,6 ***	3646,76 ***	28,3 ***	32,68 ***	40778,05 ***	38396,02 ***	121,22 ***	205,82 ***
Within R^2	0,94	0,94	0,04	0,04	0,94	0,94	0,04	0,05
N	3465	3465	3424	3424	3465	3465	3424	3424
Countries	105	105	105	105	105	105	105	105

Notes: * Indicate the significance level of 10%, ** the significance level of 5% and *** the significance level of 1%. To the coefficients of the equation, the significance level are based on the Driscoll and Kraay's standard errors - Driscoll and Kraay (1998).

The analysis regarding the case of advanced countries (tables 5 and 6) denotes that the adoption of IT is not harmful to the output. Once again, we observe for the control variables a significant adjustment of the short-term dynamics and the expected signs. Although a lower number of significant coefficients in comparison with the previous samples, independently of the classification soft or full-fledged IT, the negative effects

[12] Regarding the effect of credibility on a developing country, see de Mendonça (2007b) and de Mendonça and de Guimarães e Souza (2009).

of the adoption of IT on output and economic growth are not observed[13]. One point that cannot be neglected is that in the case of advanced countries the gain of credibility due to the adoption of IT is lower than in the other countries (see de Mendonça and de Guimarães e Souza, 2012).

Table 5 - *Estimations – Advanced countries and soft IT*

Variable	*Soft IT*							
	j = 5				*j = 10*			
	Dynamic Model		*Error Correction Model*		*Dynamic Model*		*Error Correction Model*	
	Invest	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*
$ln\ y_{i,t-1}$	0,9892 ***	0,9898 ***	-0,0112 **	-0,0109 *	0,9877 ***	0,9887 ***	-0,0125 **	-0,0121 **
$ln\ kinv_{i,t}$	0,0703 ***	0,0787 ***			0,0726 ***	0,0813 ***		
$popg_{i,t}$		-0,0112 ***				-0,0112 ***		
$ln\ kinv_{i,t-1}$			0,0171 **	0,0216 **			0,0165 **	0,021 **
$ln\ popg_{i,t-1}$				-0,0047 ***				-0,0045 ***
$soft\ PIT_{i,-10}$					0,0052	0,0047	-0,0019	-0,002
$soft\ PIT_{i,-9}$					-0,0009	-0,0008	-0,0069	-0,0068
$soft\ PIT_{i,-8}$					0,0054	0,0057	-0,0022	-0,0019
$soft\ PIT_{i,-7}$					0,0151 ***	0,0168 ***	0,0092 ***	0,01 ***
$soft\ PIT_{i,-6}$					0,0139 ***	0,0137 ***	-0,0011	-0,0008
$soft\ PIT_{i,-5}$	0,0073	0,0066	-0,0037	-0,0038	0,0098	0,0089	-0,0029	-0,003
$soft\ PIT_{i,-4}$	0,0063	0,0054	-0,0002	-0,0004	0,0088 *	0,0077	0,0008	0,0005
$soft\ PIT_{i,-3}$	-0,0097	-0,0103	-0,0094 **	-0,0097 ***	-0,0071	-0,008	-0,0084 **	-0,0088 **
$soft\ PIT_{i,-2}$	-0,0204 **	-0,0198 **	-0,0071 *	-0,0072 *	-0,0176 *	-0,0173 *	-0,0061	-0,0062
$soft\ PIT_{i,-1}$	-0,0137 **	-0,0133 **	-0,0108 **	-0,0107 **	-0,0109 *	-0,0108 *	-0,0099 *	-0,0099 *
$soft\ PIT_{i,0}$	-0,0082	-0,0075	0,0001	0,0003	-0,0054	-0,0049	0,001	0,0011
$soft\ PIT_{i,1}$	0,0009	0,0021	-0,0009	-0,0003	0,0038	0,0048	-0.0000	0,0004
$soft\ PIT_{i,2}$	0,0078	0,0081	-0,0005	-0,0002	0,0107	0,0107 *	0,0004	0,0006
$soft\ PIT_{i,3}$	0,0148 ***	0,0145 ***	0,0022	0,0024	0,0176 ***	0,017 ***	0,0032	0,0032
$soft\ PIT_{i,4}$	0,0166 ***	0,0163 ***	0,0018	0,002	0,0194 ***	0,0188 ***	0,0029	0,003
$soft\ PIT_{i,5}$	0,0075	0,0065	-0,0043	-0,0044	0,0102 *	0,0089	-0,0031	-0,0033
$soft\ PIT_{i,6}$					0,0096 **	0,0077 **	0,0104 ***	0,0097 **
$soft\ PIT_{i,7}$					0,0128 ***	0,0111 ***	0,0155 ***	0,0148 ***
$soft\ PIT_{i,8}$					0,0047	0,0022	0,0038 *	0,0029
$soft\ PIT_{i,9}$					0,0117 *	0,0084	0,0073	0,0061
$soft\ PIT_{i,10}$					0,0027	-0,0008	0,0027	0,0012
$\Delta ln\ y_{i,t-1}$			0,2059 **	0,2027 **			0,2026 **	0,1995 **
$\Delta ln\ kinv_{i,t}$			0,2109 ***	0,2112 ***			0,2115 ***	0,2118 ***
$\Delta\ popg_{i,t}$				-0,0043				-0,004
Pre-Adoption	-0,0302	-0,0314	-0,0312 **	-0,0317 ***	0,0217	0,0206	-0,0294	-0,0289
Post-Adoption	0,0476 ***	0,0475 ***	-0,0016	-0,0006	0,1032 ***	0,0888 ***	0,0431 *	0,0386 *
Wald Het.	374,44 ***	390,65 ***	793,3 ***	797,56 ***	390,45 ***	408,95 ***	795,6 ***	792,03 ***
Woold.Autocorr.	207,74 ***	200,034 ***	118,01 ***	132,67 ***	212,12 ***	203,60 ***	117,83 ***	130,49 ***
F test	3490,57 ***	4035,53 ***	76,82 ***	109,85 ***	7557,31 ***	10660,74 ***	158,3 ***	818,62 ***
Within R^2	0,99	0,99	0,52	0,52	0,99	0,99	0,52	0,53
N	873	873	872	872	873	873	872	872
Countries	23	23	23	23	23	23	23	23

Notes: * Indicate the significance level of 10%, ** the significance level of 5% and *** the significance level of 1%. To the coefficients of the equation, the significance level are based on the Driscoll and Kraay's standard errors - Driscoll and Kraay (1998).

[13] In general, the outcomes are higher to estimates after IT adoption (positive values) than before that (negative values), as shown in the Figure A.3.1.

Table 6 - *Estimations – Advanced countries and full-fledged IT*

Variable	*Full IT*							
	j = 5				*j = 10*			
	Dynamic Model		*Error Correction Model*		*Dynamic Model*		*Error Correction Model*	
	Invest	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*	*Invest*	*Invest/Popg*
$\ln y_{i,t-1}$	0,9885 ***	0,9893 ***	-0,0117 **	-0,0114 **	0,987 ***	0,9883 ***	-0,0128 **	-0,0122 **
$\ln kinv_{i,t}$	0,0702 ***	0,0784 ***			0,0725 ***	0,081 ***		
$popg_{i,t}$		-0,0111 ***				-0,0113 ***		
$\ln kinv_{i,t-1}$			0,0175 **	0,0218 **			0,0165 *	0,0208 **
$\ln popg_{i,t-1}$				-0,0046 ***				-0,0045 ***
$full\ PIT_{i,-10}$					0,0103 *	0,0089 *	-0,0003	-0,0006
$full\ PIT_{i,-9}$					0,0034	0,0028	-0,005	-0,0051
$full\ PIT_{i,-8}$					0,0052	0,0056	-0,0006	-0,0003
$full\ PIT_{i,-7}$					0,0158 ***	0,0179 ***	0,0056	0,0066 *
$full\ PIT_{i,-6}$					0,0103 ***	0,0103 ***	-0,0061 *	-0,0058 *
$full\ PIT_{i,-5}$	-0,0024	-0,002	-0,0065	-0,0062	0,0001	0,0002	-0,0059	-0,0058
$full\ PIT_{i,-4}$	-0,0133	-0,0132	-0,0045	-0,0046	-0,0107	-0,0109	-0,0038	-0,0041
$full\ PIT_{i,-3}$	-0,0143	-0,0149	-0,0103 ***	-0,0106 ***	-0,0116	-0,0126	-0,0097 **	-0,0101 ***
$full\ PIT_{i,-2}$	-0,0117 *	-0,0117 *	-0,002	-0,0022	-0,0089	-0,0091	-0,0014	-0,0016
$full\ PIT_{i,-1}$	0,003	0,0032	-0,0036	-0,0034	0,0058	0,0056	-0,0031	-0,003
$full\ PIT_{i,0}$	0,0105 *	0,0107 **	0,007 **	0,0071 **	0,0133 **	0,0131 **	0,0075 **	0,0075 **
$full\ PIT_{i,1}$	-0,0004	-0,0004	-0,0003	-0,0003	0,0025	0,0022	0,0003	0,0002
$full\ PIT_{i,2}$	0,0074	0,0066	-0,0001	-0,0003	0,0103 *	0,0091 *	0,0004	0,0001
$full\ PIT_{i,3}$	0,0192 ***	0,0178 ***	0,0036	0,0033	0,022 ***	0,0202 ***	0,0041	0,0037
$full\ PIT_{i,4}$	0,0172 ***	0,0157 ***	0,0053	0,0049	0,0199 ***	0,018 ***	0,006	0,0055
$full\ PIT_{i,5}$	0,0073	0,0057	-0,0026	-0,0031	0,01 *	0,0079	-0,0018	-0,0024
$full\ PIT_{i,6}$					0,0049 **	0,003	0,0108 ***	0,0099 **
$full\ PIT_{i,7}$					0,0098 **	0,0082 *	0,0121 ***	0,0113 **
$full\ PIT_{i,8}$					0,0014	-0,0016	-0,0015	-0,0026
$full\ PIT_{i,9}$					0,0099	0,0058	0,0047	0,0032
$full\ PIT_{i,10}$					0,0061 *	0,0016	0,0028	0,0011
$\Delta \ln y_{i,t-1}$			0.2046**	0,202 **			0,205 **	0,2032 **
$\Delta \ln kinv_{i,t}$			0.2108***	0,2111 ***			0,2118 ***	0,212 ***
$\Delta\ popg_{i,t}$				-0,0044				-0,0045
Pre-Adoption	-0,0386	-0,0386	-0,0268 *	-0,0270 *	0,0198	0,0187	-0,0304	-0,0298
Post-Adoption	0,0507 ***	0,0454 ***	0,0058	0,0045	0,0968 ***	0,0743 ***	0,0379	0,0300
Wald Het.	380,13 ***	400,15 ***	813,13 ***	808,52 ***	401,41 ***	421,32 ***	835,39 ***	830,11 ***
Woold.Autocorr.	209,31 ***	201,38 ***	116,49 ***	133,70 ***	210,00 ***	204,00 ***	118,24 ***	134,67 ***
F test	3912,88 ***	4959,21 ***	76,26 ***	148,47 ***	5145,11 ***	5642,08 ***	110,17 ***	482,86 ***
Within R^2	0,99	0,99	0,52	0,52	0,99	0,99	0,52	0,52
N	873	873	872	872	873	873	872	872
Countries	23	23	23	23	23	23	23	23

Notes: * Indicate the significance level of 10%, ** the significance level of 5% and *** the significance level of 1%. To the coefficients of the equation, the significance level are based on the Driscoll and Kraay's standard errors - Driscoll and Kraay (1998).

4. Final comments

An important result of the several estimations in this study is that there is a positive constant effect on the output after the adoption of IT. This observation suggests that there is a possible structural change capable of changing the economic growth. As a general result, we can state that the adoption of IT implies gains for economic growth or that it does not imply a sluggish economic growth. In particular, although the positive effects of IT on output are lower for the case of advanced economies, they are not as negative as pointed out by some critics.

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6. Appendix

Table A.1 - *Countries by Level of Development Classification and IT Adoption*

	Group of Countries								
	Advanced Economies			*Developing Economies*					
		IT soft	*IT full*		*IT soft*	*IT full*		*IT soft*	*IT full*
ITers	Australia	2006	2007	Armenia	2006	2007	Korea	1998	2001
	Canada	1991	1994	Brazil	1999	1999	Mexico	1995	2001
	Finland[a]	1993	1995	Chile	1991	2000	Peru	1994	2002
	Iceland	2001	2001	Colombia	2000	2000	Philippines	2002	2002
	New Zealand	1990	1990	Czech Republic	1998	1998	Poland	1999	1999
	Norway	2001	2001	Ghana	2003	2007	Romania	2005	2006
	Spain[a]	1995	1995	Guatemala	2005	2006	Serbia	2007	2009
	Sweden	1993	1995	Hungary	2001	2001	Slovak Republic	2005	2005
	Switzerland	2000	2000	Indonesia	2005	2006	South Africa	2000	2000
	United Kingdom	1993	1993	Israel	1992	1997	Thailand	2000	2000
							Turkey	2002	2006
Non-ITers	Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, Portugal, United States.			Afghanistan, Albania, Algeria, Angola, Argentina, Azerbaijan, Bahrain, Bangladesh, Belarus, Bolivia, Bosnia and Herzegovina, Botswana, Brunei, Bulgaria, Cambodia, Cameroon, China, Costa Rica, Côte d'Ivoire, Croatia, Cuba, Cyprus, Dem. Rep. Congo, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Gabon, Georgia, Haiti, Honduras, Hong Kong, India, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Lao PDR, Latvia, Lebanon, Libya, Lithuania, Macao, Macedonia, Madagascar, Malaysia, Morocco, Mozambique, Nepal, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Puerto Rico, Qatar, Russia, Saudi Arabia, Senegal, Singapore, Slovenia, Sri Lanka, Sudan, Syrian Arab Republic, Tanzania, Trinidad and Tobago, Tunisia, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia.					

Notes: a) Finland and Spain have left IT to join the European Monetary Union (EMU) in 1999. The classification of countries are based on their level of development proposed by IMF (initial classification - before 1997).

Table A.2 - *Cross-Dependence Test by Sample*

	All Sample				Advanced Economies				Developing Economies			
Variable	CD-test	p-value	avg ρ	avg $\lvert\rho\rvert$	CD-test	p-value	avg ρ	avg $\lvert\rho\rvert$	CD-test	p-value	avg ρ	avg $\lvert\rho\rvert$
ln $y_{i,t}$	234.42	0.000	0.493	0.651	94.65	0.000	0.965	0.965	162.30	0.000	0.438	0.607
ln $kinv_{i,t}$	32.88	0.000	0.071	0.337	29.40	0.000	0.300	0.377	24.27	0.000	0.066	0.339
$popg_{i,t}$	65.18	0.000	0.124	0.362	14.55	0.000	0.148	0.285	69.99	0.000	0.163	0.396
	Observations (average):			31.34	Observations (average):			39.73	Observations (average):			30.04
Δln $y_{i,t}$	46.32	0.000	0.100	0.200	30.41	0.000	0.311	0.323	35.79	0.000	0.100	0.199
Δln $kinv_{i,t}$	16.93	0.000	0.034	0.168	23.54	0.000	0.240	0.262	11.80	0.000	0.030	0.169
Δ$popg_{i,t}$	-0.40	0.000	-0.001	0.186	4.49	0.000	0.046	0.166	-0.58	0.563	-0.002	0.195
	Observations (average):			30.79	Observations (average):			39.64	Observations (average):			29.41
	Countries:			128	Countries:			23	Countries:			105

Notes: Under the null hypothesis of cross-section independence CD ~$N(0,1)$.

Figure A.1 - *Lags and Lead Estimates by Sample and IT Classification*

Source: Author's calculations. These estimates are calculated by the model's coefficients average and are multiplied by 100 for comparison purposes.