Inflation targeting in low-income countries: Does IT work?

Michael Bleaney  Atsuyoshi Morozumi  Zakari Mumuni
University of Nottingham  University of Nottingham  Central Bank of Ghana

June 12, 2018

Abstract

Previous research on inflation targeting (IT) has focused on high-income countries (HICs) and emerging market economies (EMEs). Only recently has enough data accumulated for the performance of IT in low-income countries (LICs) to be assessed. We show that IT has not so far been effective in reducing inflation in LICs, unlike in EMEs. Weak institutions, a typical feature in LICs, help explain this result, particularly under floating exchange rate regimes. Our interpretation is that poor institutions, leaving fiscal policy unconstrained, impair central banks’ ability to conduct monetary policy in a way consistent with IT.

Keywords: Inflation targeting, Low-income countries, Institutions

JEL: E52, E58, O23

---

*School of Economics, University of Nottingham, University Park, Nottingham NG7 2RD, UK. Email: Michael.Bleaney@nottingham.ac.uk.
†Corresponding author. School of Economics, University of Nottingham, University Park, Nottingham NG7 2RD, UK, Email: Atsuyoshi.Morozumi@nottingham.ac.uk.
‡One Thorpe Road, Accra, Ghana, Email: Zakari.mumuni@bog.gov.gh.
1 Introduction

Inflation targeting (IT) was first adopted in 1990 by New Zealand, followed by a number of other high-income countries (HICs) and emerging market economies (EMEs). An IT central bank, which has price stability as its overriding objective, publicly announces a medium-term numerical target for inflation and commits to it using inflation expectations as an intermediate target. Existing empirical studies suggest that IT has significantly reduced inflation in EMEs, but has made little difference in HICs. Only in the twenty-first century have low-income countries (LICs) begun to adopt IT. To our knowledge this is the first study to analyze the performance of IT in LICs as a separate group.¹ This study adds to the literature by showing that IT effects in LICs are significantly different from in EMEs, and by providing possible explanations behind these heterogeneous effects within non-HICs.

Specifically, using an updated dataset covering up to 182 countries for the 1980-2016 period, we show that IT is not effective in reducing inflation in LICs, unlike in EMEs. With IT being less effective in HICs than in EMEs, the relation between the effectiveness of IT and income levels is non-monotonic. To understand why IT effects are different between LICs and EMEs, we examine the role of institutional quality. In particular, acknowledging that institutions in LICs often fail to make governments accountable to the public, we test if government accountability plays a role in the effect of IT on inflation rates. We find that, within a pooled sample of LICs and EMEs, accountability is negatively associated with the effectiveness of IT. This is the case particularly when exchange rate flexibility is taken into account as a prerequisite for successful IT framework. Our interpretation is that low government accountability tends to be associated with fiscal dominance, i.e., the subordination of monetary policy to fiscal requirements, and impairs central banks’ ability to conduct monetary policy in a way consistent with IT.

The rest of the paper is organized as follows. Section 2 provides a background for this study. Section 3 motivates why it is interesting to study IT effects in LICs, and presents

¹How exactly we define LICs is clarified below.
testable hypotheses. Section 4 explains the empirical methodology to address the hypotheses. Section 5 describes the data. Section 6 presents the results. Section 7 offers discussion and concluding remarks.

2 Background

The theoretical foundation of inflation targeting is rooted in the literature on commitment and discretion in monetary policy propounded by Kydland and Prescott (1977) and Barro and Gordon (1983). The theoretical literature has proposed a number of ways to deal with the inflation bias, which can be classified broadly into: reputational approaches (Barro and Gordon (1983)), delegation to a conservative central banker (Rogoff (1985)), the optimal contracts approach (Walsh (1995)) and inflation targeting (Svensson (1997)). In line with Svensson (1997), the empirical literature has tested whether inflation is significantly lower under IT than without it. This section highlights that little is known about whether IT works in LICs.

Table 1 lists the countries with IT experiences, together with their income classes and the adoption dates. We ensure that our income classification reflects income levels over the sample period. Specifically, we classify countries through the following three steps. First, for each of the years when PPP-adjusted GDP per capita are available (1990-2016), countries are sorted into four groups: the highest 25th percentile, 25th-50th, 50th-75th and 75th-100th. Second, counting the number of times each country appears in those four groups over the period, we classify countries that appear in the top 25th percentile most frequently as high income countries; likewise countries appearing in the 25th-50th, 50th-75th, and 75th-100th most frequently as upper-middle (lower-middle, low) income countries. Last, we reclassify the four groups into three, by combining the bottom two groups, resulting in HICs, EMEs, and LICs.

This yields 11 (14, 14) IT adopting countries in LICs (EMEs, HICs). For information, the

---

2PPP-adjusted GDP per capita is from World Bank’s World Development Indicator (WDI).
3We take this measure, to ensure that we have sufficient number of IT adopters in LICs.
table also shows the income classification used by the World Bank in 2016, which is based on income levels in 2015 alone.

The last two columns in the table give the year of IT adoption for each country. Following the literature, we consider two alternative dates: strict and loose adoption dates. The difference between these years is that the former corresponds to the time when countries simply announce inflation targets without strong commitment, possibly using other nominal anchors at the same time. The latter, on the other hand, is the year when a strong commitment is made to achieve the target. Those years largely follow Samarina et al. (2014), except that for countries not included in their study, the dates are taken from other sources including respective central bank websites. For some countries such as Israel, Colombia, Chile, Peru and Ghana, the difference between the alternative years is substantial (more than 5 years).

The main message of Table 1 is that IT is a recent phenomenon particularly in LICs. For example, according to strict IT adoption years, 9 out of 11 LICs adopted IT after 2005 (inclusive), and 5 adopted IT after 2009. Thus, samples used in many of the previous works omit IT-adopting LICs. To illustrate, Table 2 lists several empirical studies on IT, divided into three categories according to their country coverage: both advanced countries (roughly our HICs) and non-advanced countries (EMEs and LICs); only advanced countries; only non-advanced countries. The recurrent finding is that IT helps reduce inflation in non-advanced economies, but not in advanced economies. Importantly, however, because the time periods covered by many of those studies end in the mid-2000s, little is known about the effects of IT in LICs as a separate group. This paper aims to fill in this gap.\footnote{To note, a few works include LICs in their sample. First, Samarina et al. (2014), using data till 2011, cover a few IT adopters from LICs. However, they highlight the difference in IT effects between advanced economies and others, and do not consider the possible heterogeneity in the effects within non-advanced economies. Next, Gemayel et al. (2011) highlight IT in LICs, defined as countries eligible for the Poverty Reduction and Growth Trust (PGRT), which include Albania, Armenia, and Ghana (we also categorize these countries as LICs). However, due to the fact their data covers only till 2008, they use IT-adopting EMEs as a proxy for IT-adopting LICs, while acknowledging this approximation as one of caveats of their analysis (page 17 of their paper). Last, Bleaney and Francisco (2016) use a more updated dataset till 2013, but their focus is Sub-Saharan African countries, thus missing out a number of IT adopting LICs.}
| Country         | Income classification | This study | World Bank 2016 | IT adoption year |
|-----------------|-----------------------|------------|-----------------|-----------------|
| Albania         | LIC                   | Upper middle | 2009 | 2009 |
| Armenia         | LIC                   | Lower middle | 2006 | 2006 |
| Georgia         | LIC                   | Upper middle | 2009 | 2009 |
| Ghana           | LIC                   | Lower middle | 2007 | 2002 |
| Guatemala       | LIC                   | Lower middle | 2005 | 2005 |
| Indonesia       | LIC                   | Lower middle | 2006 | 2005 |
| Moldova         | LIC                   | Lower middle | 2009 | 2009 |
| Paraguay        | LIC                   | Upper middle | 2013 | 2013 |
| Peru            | LIC                   | Upper middle | 2002 | 1994 |
| Philippines     | LIC                   | Lower middle | 2002 | 2001 |
| Uganda          | LIC                   | Low         | 2011 | 2011 |
| Brazil          | EME                   | Upper middle | 1999 | 1999 |
| Chile           | EME                   | High        | 2001 | 1991 |
| Colombia        | EME                   | Upper middle | 1999 | 1991 |
| Dominican Republic | EME                | Upper middle | 2012 | 2012 |
| Hungary         | EME                   | High        | 2001 | 2001 |
| Mexico          | EME                   | Upper middle | 2001 | 1999 |
| Poland          | EME                   | High        | 1999 | 1998 |
| Romania         | EME                   | Upper middle | 2005 | 2005 |
| Russian Federation | EME                | Upper middle | 2014 | 2014 |
| Serbia          | EME                   | Upper middle | 2006 | 2006 |
| Slovak Republic | EME                   | High        | 2005 | 2005 |
| South Africa    | EME                   | Upper middle | 2001 | 2000 |
| Thailand        | EME                   | Upper middle | 2000 | 2000 |
| Turkey          | EME                   | Upper middle | 2006 | 2002 |
| Australia       | HIC                   | High        | 1994 | 1993 |
| Canada          | HIC                   | High        | 1995 | 1991 |
| Czech Republic  | HIC                   | High        | 1998 | 1998 |
| Finland         | HIC                   | High        | 1994 | 1993 |
| Iceland         | HIC                   | High        | 2003 | 2001 |
| Israel          | HIC                   | High        | 1997 | 1992 |
| Japan           | HIC                   | High        | 2013 | 2013 |
| Korea, Rep.     | HIC                   | High        | 2001 | 1998 |
| New Zealand     | HIC                   | High        | 1993 | 1990 |
| Norway          | HIC                   | High        | 2001 | 2001 |
| Spain           | HIC                   | High        | 1995 | 1994 |
| Sweden          | HIC                   | High        | 1995 | 1993 |
| Switzerland     | HIC                   | High        | 2000 | 2000 |
| United Kingdom  | HIC                   | High        | 1993 | 1992 |

Notes: This study classifies income based on PPP adjusted GDP per capita (from World Development Indicator, WDI) over the 1990-2016 period. World Bank’s 2016 income classification is based on income levels in 2015. IT adoption dates are from Samarina et al. (2014) except that for countries that they do not cover, we take dates from other sources including respective central bank websites. Finland, Spain and Slovak Republic left IT after adopting the Euro in 1999, 1999 and 2009, respectively.
Table 2: Previous empirical studies

| Study | Time period | Method | Results                  |
|-------|-------------|--------|--------------------------|
| Both advanced and non-advanced countries |          |        |                          |
| Mishkin and Schmidt-Hebbel (2007) | 1989-2004 | DiD, Panel | No effect for advanced Negative for non-advanced |
| Vega and Winkelried (2005) | 1990-2004 | PSM | Negative |
| de Mendonça and de Guimarães e Souza (2012) | 1990-2007 | PSM | No effect for advanced Negative for non-advanced |
| Samarina et al. (2014) | 1985-2011 | DiD, PSM | No effect for advanced Negative for non-advanced |
| Advanced countries only |          |        |                          |
| von Hagen and Neumann (2002) | 1978-2001 | DiD | Negative |
| Ball and Sheridan (2004) | 1985-2001 | DiD | No effect |
| Lin and Ye (2007) | 1985-1999 | PSM | No effect |
| Ball (2010) | 1985-2007 | DiD | Very small effect |
| Willard (2012) | 1985-2002 | Panel | No effect |
| Non-advanced countries only |          |        |                          |
| Batini and Laxton (2006) | 1985-2004 | DiD | Negative |
| Gonçalves and Salles (2008) | 1980-2005 | DiD | Negative |
| Lin and Ye (2009) | 1985-2004 | PSM | Negative |
| Brito and Bystedt (2010) | 1980-2006 | Panel | Negative |
| Gemayel et al. (2011) | 1990-2008 | DiD, Panel | Negative |
| Bleaney and Francisco (2016) | 1996-2013 | Panel | No effect |

Notes: A negative effect on inflation means that IT implementation significantly reduces the inflation level. \( \text{DiD (PSM)} \) stands for differences-in-differences (propensity score matching).

3 Hypotheses

Why is it interesting to examine the effect of IT on inflation in LIC as a separate group? Indeed, if IT performances in LICs and EMEs are alike, such a study may not be necessary, because as seen in Table 2 the previous studies already suggest that IT helps reduce the level of inflation in non-advanced countries. However, in what follows, we indicate that LICs and EMEs are not necessarily alike, and argue why IT performances might be different between them. We then clarify hypotheses which we test in the following sections.

First, the relevant fact is that the quality of institutions is generally lower in LICs than EMEs.\(^5\) Figure 1 compares the quality of institutions between LICs and EMEs, alongside

---

\(^5\) We define institutions generally as the rules and organizations of a society which affect economic incentives of different agents and thus shape interactions between them. In particular, we highlight institutions
HICs, using the measures of “executive constraints” and “democracy/autocracy” (both from Polity IV, Marshall et al. (2013)). Each bar represents the cross-country average of a country-level average of the corresponding variable over the sample period (1980-2016) for each income group. As elaborated below, these variables essentially reflect the degree to which a government is constrained and made accountable to the general public. With the larger value corresponding to stronger institutions, the message is that a government in LICs is generally less accountable to the public than in EMEs.

Figure 1: Institutional quality in different income groups

![Graph showing institutional quality in different income groups]

Notes: Executive constraints (Democracy/autocracy) ranges between 1 and 7 (−10 and 10). Each bar represents an average of country-level averages across LICs, EMEs, and HICs over the sample period. Larger values correspond to stronger institutions.
Source: Authors’ calculations

Next, why may the degree of government accountability be relevant for IT performance? We argue that this is because an unaccountable government may be associated with fiscal dominance, defined as the subordination of monetary policy to fiscal requirements. While it is admittedly difficult to measure the degree of dominance, one proxy would be the extent to which legal restrictions limit a central bank’s lending to the government, as quantified that affect interactions between a government and the general public. For example, institutions such as competitive elections and free media can help a government to be more accountable to the public.
by Cukierman et al. (1992) for the 1980-89 period and subsequently updated by Crowe and Meade (2007) for 2003. Figure 2 shows the correlation between government accountability and the degree of legal restrictions for LICs and EMEs. The larger value of the lending restriction measure means tighter restrictions, implying that fiscal dominance is less of a problem. The left sub-figure correlates lending restrictions in 1980-89 period and/or in 2003 with the contemporaneous value of executive constraints, for a pooled sample of 82 observations from 52 LICs and EMEs. Note that it is an added variable (partial regression) plot based on OLS estimations where income levels are controlled for, so that the positive and significant coefficient (at the 1 percent level) means that lower government accountability is associated with increasing fiscal dominance for a given income level. The right sub-figure repeats the exercise using democracy/autocracy as a proxy for government accountability, and gives the same result.

Then, fiscal dominance under an unaccountable government, in turn, is expected to impair central banks’ ability to conduct monetary policy in a way consistent with IT. More specifically, as Masson et al. (1997) argue, to the extent that government borrowing from the central bank is not properly restricted, inflationary pressures of a fiscal origin are present, inducing the creation of formal and informal indexation mechanisms in the private sector. This undermines the effectiveness of IT, in that it makes it difficult for the central bank to align inflation expectations, an intermediate target under IT, to its publicly announced target rate. Therefore, even if IT has a potential to help reduce inflation (as shown by the previous studies for EMEs), fiscal dominance under an unaccountable government may hinder the potential from being fulfilled.

Legal restrictions that limit a central bank (CB)’s lending to government is one of the four aspects of a central bank’s independence measured by Cukierman et al. (1992) and Crowe and Meade (2007). Other three aspects of independence are 1) whether CB’s management is protected from political pressure by secure tenure and independent appointment, 2) whether the government can participate in or overturn the CB’s policy decisions, 3) whether the legal mandate of the CB sets a clear objective for monetary policy.

A value of lending restrictions in 1980-89 period (one value per country) is from Cukierman et al. (1992), and a value in 2003 is from Crowe and Meade (2007). Only for a limited number of countries, two observations (1980-90, and 2003) are available.

For democracy/autocracy, 83 observations from 53 countries are available.
As a caveat, however, while we argue that different qualities of institutions within non-HICs may yield different IT effects on inflation, it is important to acknowledge that there are other factors which affect the IT performance. In particular, as highlighted by Masson et al. (1997), the type of exchange rate scheme should also have a critical bearing as a prerequisite for a successful IT framework. This is because when countries use the pegging of nominal exchange rates as an alternative anchor, monetary policy is already significantly constrained, so that the additional effect of IT on inflation expectation may be small. Thus, under fixed exchange rates, whether or not institutions eliminate fiscal dominance may be of second-order relevance.9

To summarize, our argument is that in low-income countries, where government accountability is generally low, the problem of fiscal dominance is present, which in turn reduces

---

9While considering the strict IT adoption dates often precludes the case where a central bank pursues exchange rates as a nominal anchor, we confirm that exchange rates are often categorized as soft peg even after the strict adoption dates. Therefore, it is still important to pay an attention to exchange rate flexibility.
prospect for a successful IT performance, particularly under a floating exchange rate regime.

Based on this argument, this paper tests the following two hypotheses.

1: IT is significantly less effective in reducing level of inflation in LICs than in EMEs. With IT also being less effective in HICs than in EMEs (as the previous literature shows), the relation between the IT effect and income levels is non-monotonic.

2: The different IT effects between LICs and EMEs are explained by differences in the degree of government accountability across the country groups. The role of accountability is particularly evident under floating exchange rate regimes.

4 Empirical Methodology

The standard regression specification tests for an IT effect by adding to an inflation regression a dummy variable that is equal to one when an IT regime is in place, and zero otherwise. The reference regression model for inflation in country \( i \) in year \( t \) is as follows:

\[
\pi_{i,t} = \alpha \pi_{i,t-1} + \beta IT_{i,t} + \sum_{j=1}^{n} \theta_j z_{i,j,t} + \mu_i + \nu_t + \gamma_i \text{trend}_{i,t} + \epsilon_{i,t},
\]

The lagged inflation term, \( \pi_{i,t-1} \) is expected to be always positive and significant, reflecting the persistence of inflation shocks. \( IT_{i,t} \), a dummy variable, takes the value of one if an IT regime is adopted in country \( i \) in year \( t \). \( z_{i,j,t} \) represent a vector of control variables, including exchange rate regime dummies (for a hard peg and for a float, so the omitted category is a soft peg); a dummy for a parity change (usually a devaluation) in a pegged regime in the current or previous year; and a dummy for a currency crisis in the current or the previous year. The latter two variables reflect the fact that devaluations and currency crises tend to be associated with spikes in the inflation rate. \( \mu_i \) and \( \nu_t \) are the country fixed effect and time dummies, capturing unobserved time-invariant country characteristics and global variations in inflation, respectively. Last, importantly, the right-hand side also
contains a country-specific linear time trend, $trend_{i,t}$. This is to address the possibility that initially high-inflation countries converge to the mean irrespective of implemented policies, including IT. This so-called "regression-to-the-mean" is consistent with the observation that even amongst non-IT countries, there are significant differences in time trend of inflation over the sample period.

To investigate how the effects of IT may differ across different income levels (Hypothesis 1), we consider two alternative specifications. The first is:

$$
\pi_{i,t} = \alpha \pi_{i,t-1} + \beta_L LIC_i \ast IT_{i,t} + \beta_E EME_i \ast IT_{i,t} + \beta_H HIC_i \ast IT_{i,t} + \sum_{j=1}^{n} \theta_j z_{i,j,t} + \mu_i + \nu_t + \gamma_i trend_{i,t} + \epsilon_{i,t},
$$

(2)

where $LIC_i$ is a time-invariant dummy variable, which takes the value of one if country $i$ is LIC (as defined above) and zero otherwise. $EME_i$ and $HIC_i$ are also dummies defined likewise. Our main interest is to compare coefficients on the interactions between income group and IT (i.e., $\beta_L$, $\beta_E$ and $\beta_H$). The second equation is:

$$
\pi_{i,t} = \alpha \pi_{i,t-1} + \beta IT_{i,t} + \delta y_{i,t} + \zeta y_{i,t} \ast IT_{i,t} + \chi y_{i,t}^2 + \psi y_{i,t}^2 \ast IT_{i,t} + \sum_{j=1}^{n} \theta_j z_{i,j,t} + \mu_i + \nu_t + \gamma_i trend_{i,t} + \epsilon_{i,t},
$$

(3)

where $y_{i,t}$ is the log of real GDP per capita (in US dollar) in country $i$ in year $t$. The idea is to make use of the time-variation of income levels to estimate how they interact with the IT effect. To allow for possible non-monotonicity between income levels and the IT effect, we add the interaction between squared income and the IT dummy as well. The coefficients of our interest are the ones on interaction terms, i.e., $\zeta$ and $\psi$. Both Eqs.2 and 3 include a country-specific linear trend to control for regression-to-the-mean.
Next, we examine the role of institutions as a factor which differentiates IT effects between LICs and EMEs (Hypothesis 2). The reference equation is:

$$\pi_{i,t} = \alpha \pi_{i,t-1} + \beta IT_{i,t} + \eta Account_{i,t} + \lambda IT_{i,t} * Account_{i,t} + \sum_{j=1}^{n} \theta_j z_{i,j,t} + \mu_i + \nu_t + \gamma_i trend_{i,t} + \epsilon_{i,t}. \quad (4)$$

$Account_{i,t}$ is an institution variable which measures the degree to which governments are accountable to the public in country $i$ in period $t$. As indicated above, we use “executive constraints” and “democracy/autocracy” as a proxy. Although these variables vary over our sample period, particularly within the sample of LICs and EMEs, they generally do not show frequent year-to-year variations. Thus, we estimate Eq.4 without country fixed effects as well to make use of cross-country variations in government accountability. Further, to take account of exchange rate flexibility as a prerequisite for successful IT performance, we interact $IT_{i,t}$, $Account_{i,t}$ and $Float_{i,t}$, which takes the value of one when exchange rate is floating and zero when a soft peg is adopted or there is no legal tender of their own.$^{10}$ The resulting equation is:

$$\pi_{i,t} = \alpha \pi_{i,t-1} + \beta IT_{i,t} + \eta Account_{i,t} + \kappa Float_{i,t} + \lambda IT_{i,t} * Account_{i,t} + \rho IT_{i,t} * Float_{i,t} + \sigma Account_{i,t} * Float_{i,t} + \nu IT_{i,t} * Account_{i,t} * Float_{i,t} + \sum_{j=1}^{n} \theta_j z_{i,j,t} + \mu_i + \nu_t + \gamma_i trend_{i,t} + \epsilon_{i,t}. \quad (5)$$

The three-way interactions allow us to examine the role of institutions in the IT effects on inflation conditional on an exchange rate regime. We estimate Eq.5 without country time fixed effects as well.

Having clarified the regression equations, it is important to realize that the estimation of the above dynamic panel data models using ordinary least squares (OLS) produces biased

$^{10}$ $z_{i,j,t}$ in Eq.5 do not include exchange rate regime dummies.
coefficients, because the lagged dependent variable is endogenous with respect to the fixed effects. However, this dynamic panel bias becomes smaller as the number of time periods rises. Thus, the fact that our sample of annual data spans the 1980-2016 period makes it reasonable to estimate a fixed effects model. For example, in the reference estimation below with 182 countries (Table 4), the average number of observations per country is 32.6.\textsuperscript{11}

However, this estimation method is still open to other biases, including the one caused if the decision to adopt IT is endogenous to the explanatory variables. This particular consideration has led a few investigators to adopt propensity score matching (PSM, cf. Table 2), which models the decision to adopt IT and then matches IT adopters with non-adopters that, according to the model, had a similar probability of adopting IT. Still, however, PSM has its own weaknesses: (1) it is more open to omitted variable bias than panel regressions, because it does not control for other determinants of inflation that may affect the result but are not related to the IT adoption decision; (2) it cannot control for unobserved country fixed effects; and (3) the model of which countries choose to adopt IT and in which year tends to be weak. Another possible option is to use a differences-in-differences approach (DiD, cf. Table 2) to address the causality of IT on inflation.\textsuperscript{12} However, this method is not free from weaknesses either. In particular, a non-negligible arbitrariness is bound to arise when defining the dividing line for non-IT-targeters used as a control group. Therefore, on balance, we prefer the panel regression approach for simplicity and greater robustness.

\textsuperscript{11}In theory, there are other methods to address the problem of dynamic panel bias such as difference and system Generalized Method of Moments (GMM), developed by Holtz-Eakin et al. (1988), Arellano and Bond (1991), and Blundell and Bond (1998). However these methods are not suitable in the current context, because the (relatively) large time dimension tends to increase the number of instruments exponentially, which in turn makes it difficult to check the validity of instruments (Roodman (2009)).

\textsuperscript{12}Samarina et al. (2014) compare the effects of IT between PSM and DiD, and show that the two approaches lead to the same conclusion that the development level of countries matters in the effectiveness of IT. However, their interest is HICs vs non-HICs, not the possible heterogeneous effects within non-HICs.
5 Data

We use a cross-country annual panel dataset of 182 countries over the 1980-2016 period. 90 (46, 46) countries are categorized as LICs (EMEs, HICs), and out of 37 IT countries included, 10 (13, 14) are LICs (EMEs, HICs).\(^{13}\) To avoid disproportionately large time variations in inflation rates affecting estimation results, countries with average consumer price index (CPI) inflation of over 50% per year (over the sample period) are already excluded. Also, to address the dynamic panel bias mentioned above, we only use countries which offer at least 10 observations over the sample period. Annual CPI inflation rate is measured as the annual log difference of the CPI multiplied by 100 (i.e., inflation=100*\(\triangle\)logcpi). The data for inflation are from the World Bank’s World Development Indicators (WDI), complemented by IMF’s World Economic Outlook (WEO) when WDI does not provide data.\(^{14}\) Table 3 shows that average inflation rates in LICs (EMEs, HICs) are 11.18, 13.31, 3.98%, respectively.

Annual real GDP per capita (in US dollars), used to estimate Eq.3, is from WDI. The average figure is highest in HICs (34,405 dollars) and lowest in LICs (1,583 dollars). We use two proxies for institutional quality to measure the degree to which governments are accountable. The underlying assumption for the choice of proxies is that governments are more (less) accountable when they are more (less) constrained. The first proxy, “executive constraints”, is from Polity IV, measuring the degree of institutionalized constraints on the decision-making powers of chief executives.\(^{15}\) Second, we use “democracy/autocracy”, also from Polity IV, which measures not only the degree of institutionalized constraints (as in “executive constraints”) but also other democratic elements such as the extent to which citizens’ political participation is guaranteed.\(^{16}\) The participation of the citizens in the governance process should prompt governments to be more accountable for their policy actions. For both variables, the larger value corresponds to the higher government accountability.

\(^{13}\)See above for how countries are classified by income levels and how IT adoption dates are defined.

\(^{14}\)In our dataset, correlation of inflation data (log difference of CPI) between WDI and WEO is 99 percent.

\(^{15}\)This variable is often used in the literature on institutions and development, including Acemoglu et al. (2001). In Polity IV, the variable name is “XCONST”.

\(^{16}\)The variable name in Polity IV is “POLITY2”.

14
Table 3: Descriptive statistics across different income groups

| Variable                      | Mean   | Std. Dev. | Min.    | Max.   |
|-------------------------------|--------|-----------|---------|--------|
| **Low-income countries (LICs)** |        |           |         |        |
| Inflation rates               | 11.18  | 22.28     | -129.94 | 477.49 |
| Real GDP pc (US dollars)      | 1582.73| 1241.6    | 131.65  | 9650.57|
| Executive constraint          | 3.89   | 1.95      | 1       | 7      |
| Democracy/autocracy           | 0.31   | 6.22      | -10     | 10     |
| Hard peg (dummy)              | 0.18   | 0.39      | 0       | 1      |
| Soft peg (dummy)              | 0.56   | 0.5       | 0       | 1      |
| Float (dummy)                 | 0.25   | 0.44      | 0       | 1      |
| Parity change (dummy)         | 0.12   | 0.32      | 0       | 1      |
| Currency crisis (dummy)       | 0.29   | 0.45      | 0       | 1      |
| **Emerging market economies (EMEs)** |        |           |         |        |
| Inflation rates               | 13.31  | 27.12     | -17.58  | 298.44 |
| Real GDP pc (US dollars)      | 7521.32| 3514.75   | 1216.08 | 19275.09|
| Executive constraint          | 5.42   | 1.91      | 1       | 7      |
| Democracy/autocracy           | 4.87   | 5.88      | -9      | 10     |
| Hard peg (dummy)              | 0.2    | 0.4       | 0       | 1      |
| Soft peg (dummy)              | 0.49   | 0.5       | 0       | 1      |
| Float (dummy)                 | 0.31   | 0.46      | 0       | 1      |
| Parity change (dummy)         | 0.1    | 0.3       | 0       | 1      |
| Currency crisis (dummy)       | 0.23   | 0.42      | 0       | 1      |
| **High-income countries (HICs)** |        |           |         |        |
| Inflation rates               | 3.98   | 7.93      | -19.41  | 155.57 |
| Real GDP pc (US dollars)      | 34405.05| 18338.83  | 486.98  | 111968.35|
| Executive constraint          | 5.65   | 2.27      | 1       | 7      |
| Democracy/autocracy           | 5.34   | 7.59      | -10     | 10     |
| Hard peg (dummy)              | 0.18   | 0.39      | 0       | 1      |
| Soft peg (dummy)              | 0.55   | 0.5       | 0       | 1      |
| Float (dummy)                 | 0.27   | 0.44      | 0       | 1      |
| Parity change (dummy)         | 0.05   | 0.22      | 0       | 1      |
| Currency crisis (dummy)       | 0.19   | 0.39      | 0       | 1      |

Notes: Statistics correspond to the reference datasets where countries with average CPI inflation of over 50% are excluded. The number of countries covered in LICs (EMEs, HICs) are up to 90 (46, 46) countries. The sample period is up to 1980-2016. Executive constraint (democracy/autocracy) ranges between 1 and 7 (-10 and 10). Further clarifications required on each variable are given in the text.

The average of both proxies is highest (lowest) in HICs (LICs). While one may argue that corruption measures are also relevant proxies for government accountability, our view is that institutional features such as constraints on politicians and citizens’ political participation are the ones that are more relevant in relation to fiscal dominance, rather than corruption as an outcome of such features.\textsuperscript{17}

\textsuperscript{17}This view is in line with Keefer and Knack (2007), who find that the level of capital spending increases in the worsening of institutional quality. They argue that what is associated with the level of capital spending
Turning to control variables, exchange rate regime data and information on parity changes are dummy variables based on Bleaney and Tian (2017).\textsuperscript{18} When countries are estimated to adopt a hard peg, soft peg, or floating regime in a given year, the respective variable takes the value of 1 (0 otherwise). For example, in LICs, the average of the hard peg dummy is 0.18, meaning that 18 percent of the observations (across all the LICs and years) are categorized as hard peg. Parity dummy takes the value of one in the case of parity changes in fixed exchange rate regimes. The currency crisis variable created by Bleaney et al. (2016) takes the value of one when an exchange market pressure index (EMPI), the sum of the percentage depreciation in the exchange rate and the percentage loss in foreign exchange reserves is large.\textsuperscript{19} Across LICs (HICs) and years in our dataset, 29 (19) percent of all observations take the value of one. Measures for legal restrictions which limit a central bank’s lending to the government, used above to consider the association between government accountability and fiscal dominance, are from Cukierman et al. (1992) and Crowe and Meade (2007).

6 Results

This section tests the two main hypotheses presented above. We first test if IT is significantly less effective in LICs than EMEs (Hypothesis 1), and then test if the difference in government accountability between the two country groups is a possible explaining factor for the different IT effects (Hypothesis 2).

\textsuperscript{18}An alternative is Reinhart and Rogoff (2004), which tends to under-record floats, as discussed in Bleaney and Tian (2017).

\textsuperscript{19}Specifically, the authors define that this takes 1 when the EMPI is in the upper quartile of their dataset (spanning 1980-2012).
6.1 IT effects across different income levels

6.1.1 Using time-invariant income dummies

Table 4 shows estimation results of Eq.1 for an unconditional effect of IT on inflation, and also results of Eq.2 for conditional effects upon income levels. The conditional effects are estimated using time-invariant country group dummies (LIC\(_i\), EME\(_i\) and HIC\(_i\)). Acknowledging the difficulty of defining IT adoption dates, we estimate equations using both strict and loose adoption dates. Also, given that using extra control variables (\(z_{i,j,t}\)) restricts the sample size greatly, results are shown with and without them. As noted, to take account of regression-to-the-mean, we include a country-specific linear trend as well as time dummies.

The first two columns estimate the equations without the controls using the strict IT adoption dates. Column (1) shows the unconditional IT effects, based on all the observations regardless of country’s income levels. The coefficient on the IT dummy of \(-0.04\) is insignificant, implying that the adoption of IT is not associated with a change in inflation rates when using the entire observations. However, Column (2), estimating the IT effects conditional on income levels, shows that for EMEs, the adoption of IT is significantly associated with lower inflation by 4.78 percentage points. Meanwhile, the coefficients for IT*LIC and IT*HIC are positive (2.49 and 2.27), albeit insignificant for the former. Notice that the coefficient is significantly more negative (i.e., IT is more effective) in EMEs than in LICs and HICs. This is based on the observation that p-values from testing the equality of interaction coefficients between IT*LIC and IT*EME (see LIC.EME in the table) and IT*HIC and IT*EME (see HIC.EME) are 0.035 and 0.0040. The lagged inflation variable is highly significant, showing that inflation is persistent.

Column (3) and (4) add extra control variables, still using strict adoption dates. They confirm the heterogeneous effects of IT across income levels: only for EMEs, the IT dummy is negatively associated with inflation rates, and the coefficient is significantly more negative than in LICs or HICs. Turning to controls, a floating exchange rate is significantly associated
Table 4: IT effects across different income levels

| Controls | Adopt dates | Strict | | Loose |
|----------|-------------|--------|--------|--------|
|          | Without | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| L.Infl | 0.516*** | 0.515*** | 0.430*** | 0.428*** | 0.516*** | 0.515*** | 0.430*** | 0.429*** |
|         | (18.427) | (18.454) | (8.366) | (8.293) | (18.435) | (18.449) | (8.366) | (8.308) |
| IT     | -0.037 | -1.809 | -1.405 | -3.269** | -0.032 | (-1.297) | (-1.087) | (-2.041) |
| IT*LIC | 2.486 | -1.014 | 2.426 | -0.359 | (-2.207) | (-2.712) | (-2.115) | (-2.121) |
| IT*EME | -4.782** | -7.551*** | -5.512** | -7.598** | -2.274** | 2.879** | -0.320 | -1.305 |
|         | (0.944) | (-0.517) | (0.906) | (-1.017) | (0.906) | (0.906) | (0.906) | (0.906) |
| IT*HIC | 2.274** | 2.879** | -0.320 | -1.305 | (2.538) | (2.050) | (-0.287) | (-0.839) |
|         | (2.538) | (2.050) | (-0.287) | (-0.839) | | | | |
| Hard peg | -4.987 | -5.005 | -4.986 | -5.032 | (-1.301) | (-1.319) | (-1.300) | (-1.312) |
|         | (3.130*** | 3.162*** | 3.160*** | 3.214*** | (3.469) | (3.549) | (3.492) | (3.600) |
| Float   | 3.111*** | 3.139*** | 3.103*** | 3.140*** | (2.910) | (2.936) | (2.899) | (2.929) |
| Parity chg | -0.856 | -0.837 | -0.864 | -0.855 | (-1.463) | (-1.445) | (-1.470) | (-1.463) |
|         | (3.322*** | 3.327*** | 3.317*** | 3.274*** | (5.404) | (5.437) | (5.413) | (5.418) |
| Cur crisis | 2.406*** | 2.406*** | 2.404*** | 2.343*** | (4.754) | (4.809) | (4.743) | (4.731) |
| L.Cur crisis | 2.406*** | 2.406*** | 2.404*** | 2.343*** | (4.754) | (4.809) | (4.743) | (4.731) |

Fixed effects: Yes Yes Yes Yes Yes Yes Yes Yes
Time dummies: Yes Yes Yes Yes Yes Yes Yes Yes
Specific trends: Yes Yes Yes Yes Yes Yes Yes Yes
LIC_EME: 0.0353 0.0540 0.0364 0.0843
HIC_EME: 0.00398 0.00172 0.0653 0.106
Observations: 5,928 5,928 4,536 4,536 5,928 5,928 4,536 4,536
Countries: 182 182 167 167 182 182 167 167
IT adopters: 37 37 33 33 37 37 33 33
Adj. R2: 0.540 0.541 0.462 0.463 0.541 0.541 0.462 0.463

Notes: Fixed-effect estimations. Constant, time dummies and country-specific linear trends are not shown for brevity. LIC_EME (HIC_EME) gives p-value from testing the equality of coefficients on IT between LIC and EME (HIC and EME). Inflation rate is calculated as a log difference of CPI. Countries with the average inflation of over 50 percent over the sample period are not included. t-statistics are in parentheses. Clustered standard errors are used to adjust for correlation of error terms within countries. *** p < 0.01, ** p < 0.05, * p < 0.1.

with higher inflation than the omitted category of a soft peg with no parity change, and the coefficient on a hard peg is negative, though insignificant. A currency crisis in the current
or the previous year is always associated with significantly higher inflation, as is a current (but not lagged) parity change in a pegged regime. Columns (5) to (8) present results using loose IT adoption dates. Unlike Columns (2) and (4), coefficients on IT*HIC in Columns (6) and (8) are negative, albeit insignificant, and the difference between coefficients on IT*EME and IT*HIC is marginally insignificant in Column (8) (p-value is 0.106). Still, heterogeneous IT effects across income levels are observed with or without extra controls. Overall, in LICs IT is significantly less effective than in EMEs, and more broadly, the relation between the effectiveness of IT and income levels appears to be non-monotonic.

6.1.2 Interaction with per capita GDP

Table 5 estimates Eq.3, making use of within-country variations in income levels. Specifically, we interact IT dummy with log of real GDP per capita and its squared value. The idea is to shed further light on the possible non-monotonic relation between income and the effectiveness of IT suggested above. The table shows results on both strict and loose adoption dates, with and without extra control variables.

Column (1) confirms a non-monotonic relation between income levels and the effectiveness of IT. Based on Eq.3, the marginal effect of the IT dummy on inflation is given by $\beta + \zeta \times Income + \psi \times Income^2 (= 112.90 - 25.39 \times Income + 1.41 \times Income^2)$. This indicates that the IT effect takes a U-shape with the maximum negative effect occurring at $Income = 9.00$, which corresponds to 8,103.1 US dollars in the level term. This is relatively close to the mean value of real GDP per capita among EMEs (7521.3 US dollars, see Table 3), implying that the relation is non-monotonic over the entire income range. Column (2) shows that with extra controls, the relation is again non-monotonic, with the maximum negative occurring at 6,185.7 dollars. Columns (3) and (4) indicate that the results are robust to the use of loose IT adoption dates. Therefore, together with the results from the analysis using time-invariant income dummies (Table 4), we argue that Hypothesis 1 has been supported.

---

\(^{20}\)The maximum negative effects at $Income = 9.00$ and $Income = 8.73$ in Columns (1) and (2) are -1.4% and -3.1%.
Table 5: IT effects across different income levels: Alternative approach

| Adopt dates | Strict | Loose |
|-------------|--------|-------|
| (1) (2) (3) (4) |       |       |
| Dependent variable: $100\times \Delta \log \text{cpi}$ |       |       |
| L.Infl       | 0.506*** | 0.421*** | 0.506*** | 0.421*** |
|             | (15.872) | (7.426) | (15.865) | (7.418) |
| IT ($\beta$) | 112.899** | 145.578* | 119.340** | 165.636** |
|             | (2.027) | (1.839) | (2.041) | (2.369) |
| IT*Income ($\zeta$) | -25.388** | -34.048* | -26.559** | -37.266** |
|             | (-2.051) | (-1.891) | (-2.052) | (-2.336) |
| IT*Income$^2$ ($\psi$) | 1.412** | 1.950* | 1.447*** | 2.044** |
|             | (2.088) | (1.941) | (2.064) | (2.312) |
| Income      | -13.551 | -14.681 | -13.483 | -14.612 |
|             | (-1.115) | (-0.937) | (-1.104) | (-0.931) |
| Income$^2$  | 1.004   | 0.764   | 1.006   | 0.768   |
|             | (1.519) | (0.872) | (1.514) | (0.875) |
| Hard peg    | -5.390  |        | -5.368  |        |
|             | (-1.385) |        | (-1.377) |        |
| Float       | 3.155*** |        | 3.228*** |        |
|             | (3.396) |        | (3.488) |        |
| Parity chg  | 3.190*** |        | 3.203*** |        |
|             | (2.877) |        | (2.880) |        |
| L.Parity chg| -0.869  |        | -0.888  |        |
|             | (-1.417) |        | (-1.441) |        |
| Cur crisis  | 2.881*** |        | 2.858*** |        |
|             | (5.112) |        | (5.098) |        |
| L.Cur crisis| 2.105*** |        | 2.070*** |        |
|             | (4.477) |        | (4.453) |        |

Fixed effects: Yes Yes Yes Yes
Time dummies: Yes Yes Yes Yes
Specific trends: Yes Yes Yes Yes
Observations: 5,649 4,330 5,649 4,330
Countries: 180 165 180 165
IT adopters: 37 33 37 33
Adj. R2: 0.541 0.475 0.541 0.475

Notes: Fixed-effect estimations. Constant, time dummies and country-specific linear trends are not shown for brevity. Inflation rate is calculated as a log difference of CPI. Countries with the average inflation of over 50 percent over the sample period are not included. t-statistics are in parentheses. Clustered standard errors are used to adjust for correlation of error terms within countries. Real GDP per capita, US Dollar (Income) is log transformed. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 

20
6.2 Role of government accountability

6.2.1 Without considering the role of exchange rate regimes

We showed above that IT is significantly less effective in reducing inflation in LICs than in EMEs. We now test the hypothesis that the degree of government accountability is a possible driving force behind this result (Hypothesis 2). We first consider the role of government accountability in the IT effect on inflation rates without taking account of the possible relevance of exchange rate regimes as a prerequisite for successful IT performance. Specifically, using the sub-sample of LICs and EMEs, Table 6 estimates the association between IT and inflation rates conditional on government accountability (Eq.4), proxied by “executive constraints” and “democracy/autocracy”. As mentioned, because these institutional variables do not show frequent time variations, we show results without country fixed effects as well, which exploit cross-country variations of accountability. For brevity, the table only shows results based on strict IT adoption dates (Results using loose adoption dates are in Table 10 in Appendix A).

Columns (1) to (4) are using executive constraints as a proxy for government accountability. The former (latter) two columns are without (with) extra controls, and Columns (1) and (3) include fixed effects, while Column (2) and (4) do not. In all these four columns, coefficients on the interaction between IT dummy and executive constraints, which reflects the role of accountability in the marginal effect of IT, are significantly negative. A rise in executive constraints (which ranges between 1 and 7) by the value of one corresponds to a fall in the marginal effect of IT by 1.15 to 3.03 percentage points. In Columns (5) to (8), democracy/autocracy is used as an accountability proxy. Again, the signs of interaction coefficients are all negative, although the coefficient is significant only in Column (5). Notice, however, that the coefficients being insignificant do not necessary indicate that the role of accountability in the effect of IT is not robust, because the relevance of exchange rate regimes is not taken into account yet.
Table 6: Role of government accountability in IT effects within LICs and EMEs (Strict IT dates)

| Account proxy | Executive constraints | Democracy/autocracy |
|---------------|-----------------------|---------------------|
| | Without (1) | With (2) | Without (5) | With (6) |
| L.Infl | 0.506*** (16.108) | 0.591*** (25.159) | 0.413*** (7.091) | 0.494*** (9.809) | 0.504*** (16.516) | 0.594*** (25.917) | 0.414*** (7.120) | 0.497*** (10.274) |
| IT | 12.046** (2.142) | 4.601 (1.915) | 13.622 (1.442) | 15.113 (1.490) | 4.073 (1.201) | -0.285 (0.918) | 1.129 (2.973) | 1.522 (3.129) |
| Account | 0.920** (2.226) | 0.456 (1.316) | 0.565 (1.477) | 0.399 (0.918) | 0.433*** (2.973) | 0.141 (1.329) | 0.286** (2.921) | 0.147 (1.168) |
| IT*Account | -2.080** (-2.274) | -1.153* (-1.733) | -2.776* (-1.756) | -3.030* (-1.756) | -0.643* (-1.793) | -0.272 (-1.756) | -0.621 (-1.756) | -0.661 (-1.756) |
| Hard peg | -5.291*** (0.610) | -1.747 (-7.354) | -1.174 (-0.513) | -5.425*** (-5.431) |
| Float | 3.687*** (3.197) | 3.885*** (4.039) | 3.500*** (3.169) | 4.065*** (4.331) |
| Parity chg | 4.497*** (3.102) | 4.996*** (3.335) | 4.409*** (3.130) | 4.936*** (3.385) |
| L.Parity chg | -0.161 (-1.042) | -0.161 (-1.042) | -0.763 (-1.043) | -0.367 (-0.515) |
| Cur crisis | 3.832*** (5.067) | 4.435*** (5.527) | 3.944*** (5.102) | 4.624*** (5.613) |
| L.Cur crisis | 3.076*** (4.530) | 3.227*** (5.397) | 3.051*** (4.671) | 3.261*** (5.479) |

Fixed effects | Yes | No | Yes | No | Yes | No | Yes | No |
Time dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
Specific trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
Observations | 3,555 | 3,555 | 2,871 | 2,871 | 3,662 | 3,662 | 2,978 | 2,978 |
Countries | 114 | 114 | 107 | 107 | 114 | 114 | 109 | 109 |
IT adopters | 23 | 23 | 20 | 20 | 23 | 23 | 20 | 20 |
Adj. R2 | 0.536 | 0.559 | 0.453 | 0.496 | 0.537 | 0.557 | 0.454 | 0.497 |

Notes: Based on the sub-sample of LICs and EMEs. Strict IT adoption dates are used. Constant, time dummies and country-specific linear trends are not shown for brevity. Executive constraints (democracy/autocracy) ranges from 1 to 7 (-10 to 10). Inflation rate is calculated as a log difference of CPI. Countries with the average inflation of over 50 percent over the sample period are not included. t-statistics are in parentheses. Clustered standard errors are used to adjust for correlation of error terms within countries. *** p < 0.01, ** p < 0.05, * p < 0.1.

To illustrate the implication of the negative interaction coefficients, Figure 3 plots marginal effects of IT together with 90 percent confidence interval for different levels of executive constraints. Sub-figures (a) to (d) correspond to Columns (1) to (4) of Table 6. They show that apart from sub-figure (a), IT is associated with significantly negative marginal effect of IT.
Figure 3: Marginal IT effects and government accountability within LICs and EMEs

(a) No control/With fixed effects

(b) No control/No fixed effects

(c) With control/With fixed effects

(d) With control/No fixed effects

Note: A marginal effect with 90% confidence interval is shown.
Source: Authors’ calculations

Figure 4: Distribution of government accountability in LICs and EMEs

LICs

EMEs

Notes: Executive constraints are used as a proxy for government accountability. Executive constraints range from 1 to 7. The higher the value is, the more government is constrained.
Source: Authors’ calculations
when the proxy takes the value of 7. Now, notice from Figure 4 (the histograms of executive constraints for LICs and EMEs) that about 45 percent of observations from EMEs take the values of 7, whereas only about 10 percent of observations from LICs do.\textsuperscript{21} Therefore, even when the relevance of exchange rates is not considered, there is some indication that government accountability works as a driving factor behind the different IT effects across income levels. A similar observation can be made for the case when democracy/autocracy is used as a proxy for government accountability (see Figure 6 and Figure 7 in Appendix A).\textsuperscript{22}

\textbf{6.2.2 Relevance of exchange rate regimes}

Next, to take account of the possible relevance of exchange rate regimes as a pre-requisite for successful IT performance, Table 7 estimates Eq.5 which entails three-way interactions among IT dummy, accountability proxy, and floating dummy. Using the notation of Eq.5, the marginal effect of IT on inflation is given as:

$$\frac{\partial \pi_{i,t}}{\partial IT_{i,t}} = \beta + \lambda * Account_{i,t} + \rho * Float_{i,t} + \upsilon * Account_{i,t} * Float_{i,t}. \quad (6)$$

Thus, the effects under different exchange rate regimes are:

$$\frac{\partial \pi_{i,t}}{\partial IT_{i,t}} = \begin{cases} 
\beta + \rho + (\lambda + \upsilon) * Account_{i,t} & \text{if } Float_{i,t} = 1 \\
\beta + \lambda * Account_{i,t} & \text{if } Float_{i,t} = 0.
\end{cases} \quad (7)$$

In Eq.7, $\lambda + \upsilon$ represents the role of accountability in the marginal effect of IT on inflation rates under a floating regime, and $\lambda$ indicates the role of accountability under a fixed regime. Table 7 has the same structure as Table 6, considering the alternative accountability proxies and regression equations with and without extra control variables. The key message of the table is simple: as shown in the rows on the size and p-value of $\lambda + \upsilon$, it is significantly negative

\textsuperscript{21}These histograms are based on the observations used to create sub-figures (a) and (b).
\textsuperscript{22}The marginal effect plots are based on Columns (5) to (8) of Table 6. To be compatible with margins Stata command, democracy/autocracy is re-scaled to 0 to 20 (from -10 to 10).
in most of the cases considered (except for Column (8), where the p-value is 0.104), whereas \( \lambda \) is insignificant for all the cases. This means that particularly under floating exchange rates, an increase in government accountability is associated with significantly more effective IT in terms of reducing inflation rates. For example, \( \lambda + \nu \) in Columns (1) to (4) indicates that under floating rates a rise in executive constraints by one is associated with a fall in the marginal effect by 2.25 to 3.82 percentage points. Under fixed exchange rates, however, government accountability plays virtually no role. Table 11 in Appendix A shows that the results are robust to the use of loose IT adoption dates.

To complete the analysis, Figure 5 illustrates how the marginal effects of IT on inflation rates change across government accountability, proxied by executive constraints. Sub-figures (a) to (d) corresponds to the first four columns of Table 7. Solid lines connect the point estimates of marginal effects under floating exchange rates, while dashed lines connect effects under fixed exchange rates. The key message is that only under floating exchange rates, a rise in government accountability is associated with a significantly negative effect of IT on inflation rates. Under floating exchange rates, except for sub-figure (a), the marginal effect is significantly negative when executive constraints take the value of 6 or 7, which correspond to about 60% (20%) of observations from EMEs (LICs) (see Figure 4). This observation supports our hypothesis that particularly under floating rates, government accountability works as a driving factor behind the different IT effects across income levels. Meanwhile, under fixed exchange rates, a difference in accountability matters little. The results using democracy/autocracy as an alternative accountability proxy conveys the same message (see Figure 8 in Appendix A).
Table 7: Role of government accountability across exchange rate regimes (Strict IT dates)

| Account proxy | Executive constraints | Democracy/autocracy |
|---------------|-----------------------|---------------------|
|               | Without | With | Without | With | Without | With |
| L.Infl        | 0.496*** (13.864) | 0.578*** (22.469) | 0.413*** (7.151) | 0.497*** (10.048) | 0.496*** (14.372) | 0.580*** (23.261) | 0.413*** (7.435) | 0.500*** (10.515) |
| IT (β)        | 3.761 (0.532) | 5.664 (1.031) | -1.379 (0.178) | 8.573 (0.870) | 3.341 (1.268) | 2.181 (0.774) | -1.488 (0.458) | 2.615 (0.742) |
| Account       | 0.397 (0.532) | 0.296 (1.031) | 0.193 (0.178) | 0.344 (0.870) | 0.248** (0.774) | 0.089 (0.458) | 0.171 (0.458) | 0.135 (0.742) |
| Float         | -2.338 (-0.878) | 0.880 (-0.371) | -1.769 (0.178) | 1.048 (0.458) | 1.725 (1.535) | 3.312*** (3.245) | 2.836*** (2.654) | 4.267*** (4.680) |
| IT*Account(λ) | -0.423 (-0.336) | -0.971 (-1.125) | 0.282 (0.208) | -1.261 (-0.756) | -0.306 (-1.010) | -0.262 (0.584) | 0.197 (-0.563) | -0.206 (-0.563) |
| IT*Float (ρ)  | 17.535*** (2.687) | 4.301 (0.762) | 17.554*** (2.162) | 5.368 (0.625) | 3.324 (1.409) | -1.370 (0.825) | 3.374 (-0.968) | -2.392 (-0.968) |
| Float*Account | 1.052** (1.989) | 0.517 (1.077) | 1.226*** (2.440) | 0.755 (1.443) | 0.344* (1.956) | 0.168 (2.385) | 0.358** (1.259) | 0.194 (1.259) |
| IT*Float*     | -3.397*** (-2.870) | -1.276 (-1.289) | -3.663** (-2.541) | -1.873 (-1.202) | -0.895** (-2.508) | -0.367 (-1.928) | -1.077* (-1.288) | -0.539 (-1.288) |
| Account (υ)   | -2.087 (-0.872) | 0.227 (0.312) | 4.264*** (3.036) | 5.373*** (3.644) | 4.229*** (3.083) | 5.358*** (3.717) | |
| Parity chg     |                 |                 | 4.264*** (3.036) | 5.373*** (3.644) | 4.229*** (3.083) | 5.358*** (3.717) | |
| L.Parity chg   |                 |                 | -0.649 (-0.872) | 0.227 (0.312) | -0.660 (-0.914) | -0.021 (-0.029) | |
| Cur crisis     |                 |                 | 3.905*** (5.067) | 4.496*** (5.465) | 4.011*** (5.129) | 4.680*** (5.581) | |
| L.Cur crisis   |                 |                 | 3.065*** (4.478) | 3.258*** (5.466) | 3.064*** (4.655) | 3.315*** (5.576) | |
| Fixed effects  | Yes   | No   | Yes   | No   | Yes   | No   | Yes   | No   |
| Time dummies   | Yes   | Yes  | Yes   | Yes  | Yes   | Yes  | Yes   | Yes  |
| Specific trends| Yes   | Yes  | Yes   | Yes  | Yes   | Yes  | Yes   | Yes  |
| λ + υ          | -3.820 (0.000643) | -2.247 (0.0247) | -3.380 (0.0222) | -3.134 (0.0654) | -1.201 (0.00674) | -0.629 (0.0585) | -0.879 (0.0787) | -0.745 (0.104) |
| λ, p-value     | 0.737 (0.000643) | 0.263 (0.0247) | 0.835 (0.0222) | 0.451 (0.0654) | 0.315 (0.00674) | 0.329 (0.0585) | 0.560 (0.0787) | 0.575 (0.104) |
| Observations   | 3,240 | 3,240 | 2,871 | 2,871 | 3,341 | 3,341 | 2,978 | 2,978 |
| Countries      | 110   | 110  | 107   | 107  | 110   | 110  | 109   | 109  |
| IT adopters    | 22    | 22   | 20    | 20   | 22    | 22   | 20    | 20   |
| Adj. R2        | 0.533 | 0.558 | 0.455 | 0.496 | 0.535 | 0.557 | 0.456 | 0.496 |

Notes: Based on the sub-sample of LICs and EMEs. Strict IT adopt dates are used. Constant, time dummies and country-specific linear trends are not shown for brevity. Executive constraints (democracy/autocracy) ranges from 1 to 7 (-10 to 10). λ + υ reflects how the marginal effect of IT on inflation changes as government accountability rises under floating exchange rates; λ reflects how the effect changes under fixed exchange rates. Inflation rate is calculated as a log difference of CPI. Countries with the average inflation of over 50 percent over the sample period are not included. t-statistics are in parentheses. Clustered standard errors are used to adjust for correlation of error terms within countries. *** p < 0.01, ** p < 0.05, * p < 0.1.
6.3 Alternative explanation: the role of initial inflation

Having shown that government accountability helps explain why IT may not be effective in LICs unlike in EMEs, we here examine an alternative possible explanation. That is, one may argue that IT has reduced inflation more in EMEs than in LICs (and HICs), simply because the pre-IT inflation rate in EMEs was higher than other countries. Indeed, Table 8 shows that the initial inflation, calculated as a 5-year average before the adoption of IT, is particularly higher in EMEs on average (18.19%, 13.69% without Brazil) than in LICs and HICs (7.32% and 4.44%), whereas the 5-year average after IT adoption in EMEs (5.53%, 5.31% without Brazil) is rather close to the corresponding figure in LICs and HICs (5.31% and 2.17%).
Notice that the fact that we always include a country-specific linear trend (to control for regression-to-the-mean) does take account of the effects of initial inflation to some degree. Still, however, there is an explicit way to address this issue (though not entirely satisfactory, as explained below), which is simply to interact the IT dummy with initial inflation rates. This is feasible despite the fact that initial inflation rates themselves, being time-invariant, are absorbed into country fixed effects. This is because for IT adopters, the interaction between the IT dummy and initial inflation shows time variations. What is unsatisfactory with this approach, however, is that for non-IT adopters, initial inflation (inflation before IT adoption) does not exist by definition.\footnote{This is directly related to the debatable feature of a differences-in-differences approach mentioned above, which is that the dividing line for non-IT-targeters has to be determined in an ad-hoc manner.} Nonetheless, since the IT dummy is always zero for these countries, the level of initial inflation would not matter at least for an estimation purpose.\footnote{For non-IT adopters, we simply set initial inflation to be zero.}

With this caveat, Table 9 estimates Eq.5 with the additional interaction term, “IT*Initial Infl”, where “Initial Infl” is the 5-year average inflation prior to the IT adoption. The table has the same structure as Table 7, except that only the regressions with country fixed effects are shown. This is because as emphasized, the initial inflation is not defined for countries that have never adopted IT. The results show that the coefficient of the new interaction variable is always negative, as expected, and significant (at the 1 percent level). However, the institutional variables also retain similar coefficients and significance levels to those in Table 7 under floating exchange rates (see the odd-numbered columns of Table 7 with fixed effects).\footnote{In Column (3) of Table 9, \( \lambda \), which reflects how the marginal effect changes under fixed exchange rates, is also negative and significant (though only marginally, with the p-value of 0.09). However, the effect is much smaller (less negative) than \( \lambda + \nu \), which captures the effect under floating exchange rates.} This suggests that, although the initial-inflation effect is significant and thus there is some truth in the alternative explanation, our institutional story is robust to its inclusion.
Table 8: Initial inflation rates across income levels

| Country            | Income group | Adopt year | Before | After | Change |
|--------------------|--------------|------------|--------|-------|--------|
| Albania            | LIC          | 2009       | 2.63   | 2.49  | .14    |
| Armenia            | LIC          | 2006       | 3.23   | 6.29  | -3.07  |
| Georgia            | LIC          | 2009       | 8.11   | 3.33  | 4.79   |
| Ghana              | LIC          | 2007       | 14.76  | 12.04 | 2.72   |
| Guatemala          | LIC          | 2005       | 6.68   | 5.87  | .82    |
| Indonesia          | LIC          | 2006       | 8.9    | 6.09  | 2.8    |
| Moldova            | LIC          | 2009       | 11.72  | 5.69  | 6.02   |
| Paraguay           | LIC          | 2013       | 5.66   | 4     | 1.67   |
| Peru               | LIC          | 2002       | 4.85   | 2.24  | 2.62   |
| Philippines        | LIC          | 2002       | 5.83   | 4.3   | 1.53   |
| Uganda             | LIC          | 2011       | 8.11   | 6.07  | 2.04   |
| **Average**        |              |            | **7.32** | **5.31** | **2.01** |
| Brazil             | EME          | 1999       | 76.63  | 8.33  | 68.3   |
| Chile              | EME          | 2001       | 5.01   | 2.53  | 2.49   |
| Colombia           | EME          | 1999       | 18.5   | 7.05  | 11.45  |
| Dominican Republic | EME          | 2012       | 6.35   | 2.53  | 3.83   |
| Hungary            | EME          | 2001       | 14     | 4.71  | 9.3    |
| Mexico             | EME          | 2001       | 17.5   | 4.28  | 13.22  |
| Poland             | EME          | 1999       | 19.33  | 4.22  | 15.11  |
| Romania            | EME          | 2005       | 22.6   | 6     | 16.6   |
| Russian Federation | EME          | 2014       | 7.45   | 10.62 | -3.17  |
| Serbia             | EME          | 2006       | 23.88  | 8.44  | 15.44  |
| Slovak Republic    | EME          | 2005       | 7.44   | 3.87  | 3.57   |
| South Africa       | EME          | 2001       | 6.45   | 4.74  | 1.71   |
| Thailand           | EME          | 2000       | 4.95   | 2.25  | 2.7    |
| Turkey             | EME          | 2006       | 24.57  | 7.78  | 16.79  |
| **Average**        |              |            | **18.19** | **5.53** | **12.67** |
| **Average (without Brazil)** |            |            | **13.69** | **5.31** | **8.39** |

| Country            | Income group | Adopt year | Before | After | Change |
|--------------------|--------------|------------|--------|-------|--------|
| Australia          | HIC          | 1994       | 4.05   | 1.93  | 2.12   |
| Canada             | HIC          | 1995       | 2.72   | 1.71  | 1.01   |
| Czech Republic     | HIC          | 1998       | 8.73   | 2.48  | 6.24   |
| Finland            | HIC          | 1994       | 4.21   | 1.04  | 3.16   |
| Iceland            | HIC          | 2003       | 4.22   | 6.07  | -1.85  |
| Israel             | HIC          | 1997       | 10.71  | 3.62  | 7.09   |
| Japan              | HIC          | 2013       | -.21   | 1.13  | -1.34  |
| Korea, Rep.        | HIC          | 2001       | 3.89   | 2.93  | .96    |
| New Zealand        | HIC          | 1993       | 4.25   | 2.01  | 2.24   |
| Norway             | HIC          | 2001       | 2.28   | 1.6   | .67    |
| Spain              | HIC          | 1995       | 5.42   | 2.42  | 3      |
| Sweden             | HIC          | 1995       | 5.57   | .47   | 5.1    |
| Switzerland        | HIC          | 2000       | .79    | .85   | -.05   |
| United Kingdom     | HIC          | 1993       | 5.56   | 2.07  | 3.48   |
| **Average**        |              |            | **4.44** | **2.17** | **2.27** |

Notes: Initial inflation is the 5-year average of inflation rates just before the adoption of IT. “Change” is obtained as the average of inflation just before IT adoption minus the (5-year) average just after the adoption. IT adoption year is based on the strict definition (cf. Table 1). When inflation data is not available for 5 years after IT adoption (e.g., Japan), the average is calculated using as many observations as available.
## Table 9: Role of initial inflation within LICs and EMEs

| Account proxy | Controls | Executive constraints | Democracy/autocracy |
|---------------|----------|-----------------------|---------------------|
|               | Without  | With                  | Without             | With                  |
|               | (1)      | (2)                   | (3)                 | (4)                   |

**Dependent variable: 100*Δlogcpi**

|                    | (1)     | (2)     | (3)     | (4)     |
|--------------------|---------|---------|---------|---------|
| L.Infl             | 0.493***| 0.410***| 0.492***| 0.410***|
|                   | (13.745)| (7.018) | (14.258)| (7.280) |
| IT ($\beta$)      | 12.132**| 3.279   | 13.186***| 4.672   |
|                   | (2.095) | (0.452) | (4.206) | (1.484) |
| Account            | 0.405   | 0.205   | 0.248** | 0.173   |
|                   | (1.082) | (0.555) | (2.055) | (1.519) |
| Float              | -2.170  | -1.680  | 1.773   | 2.866***|
|                   | (-0.819)| (-0.791)| (1.584) | (2.706) |
| IT*Account($\lambda$) | -0.346  | 0.688   | -0.381* | 0.162   |
|                   | (-0.369)| (0.694) | (-1.709)| (0.473) |
| IT*Float ($\rho$) | 14.915***| 15.882**| 3.028   | 3.016   |
|                   | (2.649) | (2.195) | (1.308) | (0.815) |
| Float*Account      | 1.019*  | 1.209** | 0.334*  | 0.354** |
|                   | (1.936) | (2.409) | (1.915) | (2.366) |
| IT*Float*          | -2.744***| -3.235**| -0.658**| -0.887* |
| Account ($\upsilon$) | -2.906  | -2.606  | -2.278  | -1.835  |
| IT*Initial Infl    | -0.914***| -0.690***| -0.956***| -0.736***|
|                   | (-4.499)| (-2.971)| (-4.550)| (-3.004)|
| Parity chg         | 4.254***|         |         | 4.215***|
|                   | (3.022) |         |         | (3.066) |
| L.Parity chg       | -0.664  | -0.679  |         |         |
|                   | (-0.897)|         |         | (-0.948)|
| Cur crisis         | 3.877***|         |         | 3.977***|
|                   | (5.083) |         |         | (5.152) |
| L.Cur crisis       | 3.038***|         |         | 3.031***|
|                   | (4.506) |         |         | (4.686) |

| Fixed effects      | Yes     | Yes     | Yes     | Yes     |
| Time dummies       | Yes     | Yes     | Yes     | Yes     |
| Specific trends    | Yes     | Yes     | Yes     | Yes     |
| $\lambda + \upsilon$ | -3.090  | -2.547  | -1.039  | -0.726  |
| $\lambda + \upsilon$, p-value | 0.000123 | 0.0298  | 0.00187 | 0.0790  |
| $\lambda$          | -0.346  | 0.688   | -0.381  | 0.162   |
| $\lambda$, p-value | 0.713   | 0.489   | 0.0903  | 0.637   |
| Observations       | 3.240   | 2.871   | 3.341   | 2.978   |
| Countries          | 110     | 107     | 110     | 109     |
| IT adopters        | 22      | 20      | 22      | 20      |
| Adj. R2            | 0.534   | 0.455   | 0.536   | 0.457   |

Notes: Initial inflation is the 5-year average of inflation prior to the adoption of IT. For further relevant information, see Notes for Table 7. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 

30
7 Discussion and Concluding Remarks

The standard result in previous research is that inflation targeting has made little difference to the inflation rate in the advanced countries, but has significantly reduced inflation in non-advanced countries (as indicated by Table 2). Because LICs have been slower to adopt inflation targeting than EMEs (Table 1), the samples of non-advanced countries used in previous research have contained very few LICs. Now that more time has passed, it is possible to consider the effectiveness of IT in LICs separately from EMEs. Our basic result is that IT has been far less effective in LICs than in EMEs. By using panel regression methods rather than differences-in-differences or propensity score matching, our results are able to control for unobserved country characteristics (through country fixed effects), for unexplained fluctuations in inflation that affect all countries equally (through time fixed effects), and for variation in the speed of disinflation in different countries (through country-specific time trends).

We gave a story as to why this should be the case. Specifically, we examined the role of institutions which affect the degree of government accountability in the effectiveness of IT in a sample of LICs and EMEs. Measures of institutional quality based on political arrangements are more structural and less subjective, and also less likely to be endogenous to outcomes, than those based on survey data such as perceptions of corruption. The results indicate that IT was more effective with stronger institutions. Various authors (e.g. Masson et al. (1997); Thornton (2016)) have pointed out that in lower-income countries pegging the exchange rate can also be an effective nominal anchor. If that is the case, the benefits from IT should be greater when the exchange rate is floating than when it is pegged. Allowing for this, we found that the institutional effect is particularly marked under floating rates, and not significant when the exchange rate is pegged. This is still true even when we control for the significant effect of the pre-IT inflation rate, which has tended to be particularly high in EMEs, on the reduction in inflation achieved under IT. Overall, given that institutions are generally
weaker in LICs than in EMEs (Figure 1), we believe that government accountability does help us grasp why IT may be less effective in LICs.

We argued that the reason why government accountability matters in the IT effect is that fiscal dominance under an unaccountable government creates inflationary pressures of a fiscal origin, and impairs the ability of central banks to align private sector’s inflation expectation to their target rate. However, we admit that this is merely a conjecture, where a formal model of institutional quality and inflation would be desirable. For example, Acemoglu et al. (2008) present such a model, showing that policy reforms aimed at increasing central bank independence do not necessarily help control inflation rates. Specifically, the model shows that the reform has a maximum impact when the quality of institutions is intermediate, because when institutions are strong, existing policies are less distorted so that reforms are unnecessary, while when institutions are weak, unconstrained policymakers who pursue personal rents may not implement reforms properly. Building a formal model of this kind and incorporating the interaction between monetary and fiscal policies may shed further light on our empirical results on the role of institutions in IT.

Acknowledgements

We thank Michael Ehrmann and Assaf Razin for their comments. Any remaining errors are our own responsibility.

Appendix

Please see the following.
### Table 10: Role of government accountability in IT effects within LICs and EMEs (Loose IT dates)

| Account proxy | Executive constraints | Democracy/autocracy |
|---------------|-----------------------|---------------------|
|               | Without (1)          | With (2)           |
|               | (3)                  | (4)                |
|               | (5)                  | (6)                |
|               | (7)                  | (8)                |
| Dependent variable: $100\times \Delta \log CPI$ |
| L.Infl 0.506*** | 0.591*** | 0.413*** | 0.494*** | 0.504*** | 0.593*** | 0.414*** | 0.497*** |
| (16.095) | (25.140) | (7.092) | (9.819) | (16.513) | (25.895) | (7.378) | (10.278) |
| IT 12.960** | 5.463 | 15.193 | 16.251 | 3.416 | -0.625 | 1.621 | 1.992 |
| (2.183) | (1.366) | (1.554) | (1.542) | (0.904) | (-0.226) | (0.377) | (0.538) |
| Account 0.947** | 0.478 | 0.615 | 0.428 | 0.434*** | 0.144 | 0.292** | 0.152 |
| (2.276) | (1.378) | (1.583) | (0.992) | (2.981) | (1.362) | (2.322) | (1.215) |
| IT*Account -2.385** | -1.415** | -3.014* | -3.197* | -0.678* | -0.318 | -0.687 | -0.717 |
| (-2.536) | (-2.188) | (-1.799) | (-1.753) | (-1.769) | (-1.227) | (-1.431) | (-1.563) |
| Hard peg 1.024 | 5.299*** | -1.199 | -5.439*** |
| (0.581) | (-4.720) | (-0.510) | (-5.409) |
| Float 3.676*** | 3.867*** | 3.493*** | 4.051*** |
| (3.181) | (4.003) | (3.154) | (4.300) |
| Parity chg 4.506*** | 4.997*** | 4.415*** | 4.934*** |
| (3.106) | (3.334) | (3.132) | (3.382) |
| L.Parity chg -0.787 | -0.163 | -0.760 | -0.369 |
| (-1.036) | (-0.223) | (-1.037) | (-0.516) |
| Cur crisis 3.777*** | 4.392*** | 3.907*** | 4.598*** |
| (5.060) | (5.503) | (5.102) | (5.596) |
| L.Cur crisis 3.009*** | 3.169*** | 3.003*** | 3.222*** |
| (4.470) | (5.333) | (4.616) | (5.428) |

Notes: Based on the sub-sample of LICs and EMEs. Loose IT adoption dates are used. Constant, time dummies and country-specific linear trends are not shown for brevity. Executive constraints (democracy/autocracy) ranges from 1 to 7 (-10 to 10). Inflation rate is calculated as a log difference of CPI. Countries with the average inflation of over 50 percent over the sample period are not included. t-statistics are in parentheses. Clustered standard errors are used to adjust for correlation of error terms within countries. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 

---

### A Supplementary results

Table 10: Role of government accountability in IT effects within LICs and EMEs (Loose IT dates)
Figure 6: Marginal IT effects and democracy/autocracy within LICs and EMEs

(a) No control/With fixed effects
(b) No control/No fixed effects
(c) With control/With fixed effects
(d) With control/No fixed effects

Notes: A marginal effect with 90% confidence interval is shown. Democracy/autocracy initially ranges from −10 to 10. The higher the value is, the more government is constrained. It is rescaled to 0 to 20 to be compatible with “Margins” Stata command.
Source: Authors’ calculations

Figure 7: Distribution of democracy/autocracy in LICs and EMEs

Notes: Democracy/autocracy initially ranges from −10 to 10. The higher the value is, the more government is constrained. It is rescaled to 0 to 20 to be compatible with “Margins” Stata command.
Source: Authors’ calculations
Table 11: Role of government accountability across exchange rate regimes (Loose IT dates)

| Account proxy | Executive constraints | Democracy/autocracy |
|---------------|------------------------|---------------------|
|               | Without (1) | With (2) | Without (3) | With (4) | Without (5) | With (6) | Without (7) | With (8) |
| L.Infl        | 0.496***    | 0.578***   | 0.412***    | 0.497***   | 0.496***    | 0.580***   | 0.413***    | 0.500***   |
| (13.857)      | (22.424)    | (7.146)    | (10.032)    | (14.365)    | (23.222)    | (7.433)    | (10.498)    |
| IT (β)        | 4.852       | 5.258      | 0.612       | 8.322      | 2.560       | 1.684      | -0.846      | 3.077      |
| (0.723)       | (0.928)     | (0.079)    | (0.901)     | (0.890)    | (0.606)    | (0.238)    | (0.848)     |
| Account       | 0.406       | 0.297      | 0.199       | 0.338      | 0.245**     | 0.088      | 0.167       | 0.133      |
| (1.084)       | (0.829)     | (0.541)    | (0.842)     | (2.013)    | (0.828)    | (1.463)    | (1.150)     |
| Float         | -2.554      | 0.678      | -2.048      | 0.827      | 1.768       | 3.355***   | 2.935***    | 4.361***   |
| (-0.951)      | (0.283)     | (-0.945)   | (0.385)     | (1.564)    | (3.266)    | (2.721)    | (4.742)     |
| IT*Account(λ) | -0.780      | -1.007     | -0.042      | -1.205     | -0.334      | -0.284     | 0.131       | -0.266     |
| (-0.688)      | (-1.178)    | (-0.031)   | (-0.795)    | (-1.095)   | (-1.091)   | (0.392)    | (-0.697)    |
| IT*Float (ρ)  | 18.780***   | 7.277      | 19.442***   | 9.179      | 3.310       | -1.295     | 2.932       | -2.424     |
| (3.274)       | (1.352)     | (2.637)    | (1.209)     | (1.359)    | (-0.491)   | (0.723)    | (-0.904)    |
| Float*Account | 1.117**     | 0.577      | 1.325**     | 0.837      | 0.355**     | 0.180      | 0.379**     | 0.211      |
| (2.065)       | (1.174)     | (2.553)    | (1.563)     | (1.995)    | (1.129)    | (2.460)    | (1.341)     |
| IT*Float*     | -3.617***   | -1.825*    | -4.119***   | -2.609*    | -0.925***   | -0.423     | -1.154**    | -0.612     |
| Account (υ)   | -3.596      | -1.944     | -3.162      | -1.940     | -2.785      | -1.162     | -2.091      | -1.425     |
| Parity chg     | 4.265***    | 5.378***   | 4.235***    | 5.365***   |
| (3.033)       | (3.642)     | (3.085)    | (3.718)     |
| L.Parity chg   | -0.664      | 0.214      | -0.890      | 0.294      | -0.671      | -0.033     | -0.927      | -0.046     |
| Cur crisis     | 3.861***    | 4.453***   | 3.988***    | 4.658***   |
| (5.072)       | (5.441)     | (5.138)    | (5.565)     |
| L.Cur crisis   | 3.017***    | 3.211***   | 3.038***    | 3.291***   |
| (4.545)       | (5.423)     | (4.642)    | (5.551)     |

Fixed effects: Yes, No
Time dummies: Yes, Ye, No
Specific trends: Yes, Ye, Yes

λ + υ = -4.397 - 2.832 - 4.161 - 3.814 - 1.259 - 0.706 - 1.023 - 0.878
λ + υ, p-value = 0.000199 0.00735 0.0104 0.0437 0.00768 0.0449 0.0453 0.0724
λ = -0.780 - 1.007 - 0.0422 - 1.205 - 0.334 - 0.284 0.131 - 0.266
λ, p-value = 0.493 0.241 0.975 0.428 0.276 0.278 0.696 0.487

Observations: 3,240 3,240 2,871 2,871 3,341 3,341 2,978 2,978
Countries: 110 110 107 107 110 110 109 109
IT adopters: 22 22 20 20 22 22 20 20
Adj. R2: 0.533 0.558 0.455 0.496 0.535 0.557 0.456 0.496

Notes: Based on the sub-sample of LICs and EMEs. Loose IT adopt dates are used. Constant, time dummies and country-specific linear trends are not shown for brevity. Executive constraints (democracy/autocracy) ranges from 1 to 7 (-10 to 10). λ + υ reflects how the marginal effect of IT on inflation changes as government accountability rises under floating exchange rates; λ reflects how the effect changes under fixed exchange rates. Inflation rate is calculated as a log difference of CPI. Countries with the average inflation of over 50 percent over the sample period are not included. t-statistics are in parentheses. Clustered standard errors are used to adjust for correlation of error terms within countries. *** p < 0.01, ** p < 0.05, * p < 0.1.
Figure 8: Marginal IT effects, democracy/autocracy and exchange rate regimes (Strict IT dates)

Notes: A solid (dashed) line connects point estimates under floating (fixed) exchange rate regime. A marginal effect with 90% confidence interval is shown. Democracy/autocracy initially ranges from −10 to 10. It is rescaled to 0 to 20 to be compatible with "Margins" Stata command. Source: Authors' calculations
References

ACEMOGLU, D., S. JOHNSON, P. QUERUBÍN, AND J. A. ROBINSON (2008): “When does policy reform work? The case of central bank independence,” *Brookings Papers on Economic Activity*, Spring, 351–429.

ACEMOGLU, D., S. JOHNSON, AND J. ROBINSON (2001): “The Colonial Origins of Comparative Development: An Empirical Investigation,” *American Economic Review*, 91, 1369–1401.

ARELLANO, M. AND S. BOND (1991): “Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations,” *Review of Economic Studies*, 58, 277–297.

BALL, L. M. (2010): “The performance of alternative monetary regimes,” NBER Working Paper 16124.

BALL, L. M. AND N. SHERIDAN (2004): “Does inflation targeting matter?” in *The inflation-targeting debate*, ed. by B. S. Bernanke and M. Woodford, Chicago: University of Chicago Press, 249–282.

BARRO, R. J. AND D. B. GORDON (1983): “Rules, discretion and reputation in a model of monetary policy,” *Journal of Monetary Economics*, 12, 101–121.

BATINI, N. AND D. LAXTON (2006): “Under what conditions can inflation targeting be adopted? The experience of emerging markets,” Central Bank of Chile Working Papers 406.

BLEANEY, M. AND M. FRANCISCO (2016): “Inflation and fiscal deficits in Sub-Saharan Africa,” *Journal of African Economies*, 25, 529–547.
Bleaney, M., S. Saxena, and L. Yin (2016): “Exchange rate regimes and growth collapses,” Discussion Paper 2016/02, University of Nottingham, Centre for Finance, Credit and Macroeconomics (CFCM).

Bleaney, M. and M. Tian (2017): “Measuring exchange rate flexibility by regression methods,” *Oxford Economic Papers*, 69, 301–319.

Blundell, R. and S. Bond (1998): “Initial conditions and moment restrictions in dynamic panel data models,” *Journal of Econometrics*, 87, 115–143.

Brito, R. D. and B. Bystedt (2010): “Inflation targeting in emerging economies: Panel evidence,” *Journal of Development Economics*, 91, 198–210.

Crowe, C. and E. E. Meade (2007): “The evolution of central bank governance around the World,” *Journal of Economic Perspectives*, 21, 69–90.

Cukierman, A., S. B. Webb, and B. Neyapti (1992): “Measuring the independence of central banks and its effect on policy outcomes,” *World Bank Economic Review*, 6, 353–398.

de Mendonça, H. F. and G. J. de Guimarães e Souza (2012): “Is inflation targeting a good remedy to control inflation?” *Journal of Development Economics*, 98, 178–191.

Gemayel, E. R., S. Jahan, and A. Peter (2011): “What can low-income countries expect from adoption inflation targeting?” IMF, Working Paper 11/276.

Gonçalves, C. E. S. and J. M. Salles (2008): “Inflation targeting in emerging economies: What do the data say?” *Journal of Development Economics*, 85, 312–318.

Holtz-Eakin, D., W. Newey, and H. Rosen (1988): “Estimating vector autoregressions with panel data,” *Econometrica*, 56, 1371–1395.
Keefer, P. and S. Knack (2007): “Boondoggles, rent-seeking, and political checks and balances: public investment under unaccountable governments,” The Review of Economics and Statistics, 89, 566–572.

Kydland, F. E. and E. C. Prescott (1977): “Rules rather than discretion: The inconsistency of optimal plans,” Journal of Political Economy, 85, 473–492.

Lin, S. and H. Ye (2007): “Does inflation targeting really make a difference? Evaluating the treatment effect of inflation targeting in seven industrial countries,” Journal of Monetary Economics, 54, 2521–2533.

——— (2009): “Does inflation targeting make a difference in developing countries?” Journal of Development Economics, 89, 118–123.

Marshall, M. G., T. R. Gurr, and K. Jaggers (2013): “Polity IV Project: Political Regime Characteristics and Transitions, 1800-2012. Dataset User’s Manual,” Center for Systemic Peace, Dataset downloadable at: http://www.systemicpeace.org/inscrdata.html.

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

Mishkin, F. S. and K. Schmidt-Hebbel (2007): “Does inflation targeting make a difference?” NBER Working Paper 12876.

Reinhart, C. M. and K. S. Rogoff (2004): “The modern history of exchange rate arrangements: a reinterpretation,” Quarterly Journal of Economics, 119, 1–48.

Rogoff, K. (1985): “The optimal degree of commitment to an intermediate monetary target,” Quarterly Journal of Economics, 100, 1169–1189.

Roodman, D. (2009): “A Note on the Theme of Too Many Instruments,” Oxford Bulletin of Economics and Statistics, 71, 135–58.
SAMARINA, A., M. TERPSTRA, AND J. DE HAAN (2014): “Inflation targeting and inflation performance: A comparative analysis,” Applied Economics, 46, 41–56.

SVENSSON, L. E. O. (1997): “Optimal inflation targets, “conservative” central banks, and linear inflation contracts,” American Economic Review, 87, 98–114.

THORNTON, J. (2016): “Inflation targeting in developing countries revisited,” Financial Research Letters, 16, 145–153.

VEGA, M. AND D. WINKELRIED (2005): “Inflation targeting and inflation behavior: A success story?” International Journal of Central Banking, 1, 153–175.

VON HAGEN, J. AND M. J. NEUMANN (2002): “Does inflation targeting matter?” Federal Reserve Bank of St. Louis Review, July/August 2002, pp.127-148.

WALSH, C. (1995): “Optimal contracts for central bankers,” American Economic Review, 85, 150–167.

WILLARD, L. B. (2012): “Does inflation targeting matter? A reassessment,” Applied Economics, 44, 2231–2244.