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# Political economy of central-bank mandates in developing countries

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*In this paper, I explain theoretically the coordination and conflict scheme of fiscal and monetary policy workings, and then empirically assess the effect of both inflation-targeting and non-inflation-only targeting policies on inflation and unemployment rates. I employ a difference-in-difference method to estimate the impact on inflation, the unemployment rate, and their volatilities in both 10 inflation-targeting (single-mandate) and 11 non-inflation-targeting (multiple-mandate) countries specifically from the sample of developing economies over the period from 1998 to 2018. Our key findings show that while the inflation-targeting countries effectively present a reduction in inflation and inflation volatility, the effects on the unemployment rate are negligible, while unemployment volatility is higher in the period 1998–2008. Finally, the paper argues that the unemployment rate should be used as a natural second target in a typical emerging-market economy case.*

**Keywords:** *inflation targeting, central banking, unemployment, political economy*

**JEL codes:** *E52, E58, E61, E63*

*‘The Federal Reserve is independent within Government, but not independent of Government.’<sup>1</sup>*  
William McChesney Martin, Chairman of the Federal Reserve Bank, 1951–1970

## 1 INTRODUCTION

Central banks of the past often had a large number of different functions. They included preserving and maintaining the value of currency, regulating and protecting financial markets, managing currency exchange rates, and contributing to higher economic growth. In the past few decades, a narrower concept of the role and responsibilities of central banks has evolved. As a result, an inflation-targeting (IT) monetary framework is a standard way that policy is conducted in most advanced and developing countries today.

At the same time, however, IT central banks largely restrict themselves from other goals and instruments for economic development. There is a growing debate that central banks should give equal weight to price and real economy variables, which also means extending

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1. Quoted from Meltzer (2009: 474).

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their policy mandates. Therefore, the goal of this paper is to investigate the issue of whether it is desirable to introduce the ‘dual mandate’ monetary policy of both price stability and maximum level of employment (such as in the case of the Federal Reserve) in developing economies.

The academic discussion is split on the ways to restructure inflation targeting in the post-2008 global financial crisis era. Hence, the major part of this research relates to an extensive strand of empirical literature on the performance assessment of inflation targeting. For example, seminal works by Ball/Sheridan (2004) and Lin/Ye (2007) show that the reduction of inflation in advanced economies is modest. On the other hand, Batini et al. (2005) and Vega/Winkelried (2005) find the opposite results and state that inflation targeting is effective in reducing inflation. This paper will contribute to the debate by incorporating and analysing unemployment as a real economy target variable for developing countries, and extend the analysis beyond the 2008 financial crisis. This is important, because after the 2008 financial crisis, a number of IT countries in the developing world switched to various forms of flexible inflation targeting, thereby suggesting the inefficiency of the standard strict version of the IT framework (Valera et al. 2017).

The importance of central banks for stabilization policies has evidently increased today, and this is particularly true during times of high financial distress. Therefore, the number of additional targets monetary authorities are tasked to achieve is rising as well. At the same time, the structure of those targets and the tools available to undertake them vary considerably from country to country and also depend on the level of economic development. In the developing world, the issue of the appropriate monetary policy for emerging markets is highly relevant again.

The major research questions of this paper are as follows. First, this paper specifically asks what degree of coordination with the fiscal authority does the central bank have to engage in to produce effective policymaking regarding a lower unemployment rate as a social welfare maximizing indicator? Second, what is the impact of the IT policy on the unemployment rate, especially in the context of single- and multiple-mandate frameworks? The broader agenda of the paper is to answer whether upgrading inflation targeting into a ‘dual mandate’ framework is effective for central banks in developing countries in terms of inflation and unemployment.

In this paper, I explain theoretically the coordination and conflict scheme of fiscal and monetary policy workings, and then empirically assess the effect of both IT and non-inflation-only targeting (non-IT) policies on inflation and unemployment levels. Following authors Ball/Sheridan (2004) and Kose et al. (2018), I employ a difference-in-difference method to estimate the impact on inflation, the unemployment rate and their volatilities in both 10 IT (single-mandate) and 11 non-IT (multiple-mandate) countries specifically from the sample of developing economies over the period from 1998 to 2018 (see Table 2, in Section 5). The period from 1998 to 1999 serves as a baseline period, when neither of the groups was applying IT policy. Our key findings show that while the IT countries effectively present a reduction in inflation and inflation volatility, the effects on the unemployment rate are negligible, and the unemployment volatility is higher in the period 1998–2008. Finally, the paper argues that the unemployment rate should be used as a natural second target in a typical emerging-market economy case.

Given the structure of policy space that evolved after the long domination of the IT framework, this paper recommends an adjustment of policy objectives that integrates distributional effects of monetary policy in developing countries. The main approach argues that a less aggressive reaction to headline inflation might decrease both the level and the volatility of unemployment. By responding primarily to domestic inflation, monetary authorities in developing countries might be partly accountable for the larger fluctuations

in labor market outcomes compared to countries with dual mandates, which incorporate other economic output measures as well. Large and positive trend inflation is a cause of first-order effects on the spread of relative prices coming from the goods market. As a result, in order to stabilize domestic output more efficiently, monetary policy should consider both the changes in unemployment and changes in inflation, when formulating its monetary policy strategy.

The rest of the paper is structured as follows. Section 2 provides an overview of the existing literature on performance assessment of IT countries using a key set of macroeconomic variables such as inflation, unemployment rate, and their sample volatilities. Section 3 introduces the main structure of coordinated fiscal and monetary policy, and the place of unemployment variables as a medium for optimal monetary policy. Section 4 presents the difference-in-difference methodology and Section 5 describes the variables and data sources. Section 6 provides all the empirical results and Section 7 concludes the study.

## 2 LITERATURE REVIEW

The implementation of an IT regime as a modern monetary policy by the Reserve Bank of New Zealand has started a wide-ranging debate in academic literature. After a number of initial success stories in advanced economies, some developing countries have also explored the methodology of IT and their respective central banks have gone on to adopt IT policy. However, in almost all emerging markets cases the process was accompanied by some preconditions. Mainly, central-bank authorities were advised to drop any other monetary objectives except the mandate of price stability. This also meant that a number of other vital macroeconomic variables such as the exchange rate, unemployment level, or economic growth should stay out of the scope of monetary regulators and would have no support from their respective monetary policies.

Theoretical foundations in favor of IT policy have long maintained an argument that a clear precommitment to an explicit inflation target will generate credibility of monetary policy, which in turn will help anchor long-run inflationary expectations and will alleviate some dynamic inconsistency issues (Svensson 1997; Bernanke et al. 1999; Mishkin 1999). One of the direct effects should be lower inflation variability (inflation volatility), in addition to a lower level of inflation.

By contrast, studies against inflation targeting have proposed that countries without strong fundamental institutions can end up with weakened or even collapsed credibility (especially the emerging-market economies), and therefore would create worse outcomes after the implementation of single-mandate inflation policy (Mishkin 2004; Caballero/Krishnamurthy 2005). Stiglitz (2008) pointed out that narrow focus on inflation may blind central bankers from other worthwhile objectives such as reducing unemployment. Hence, given conflicting theoretical views, the real impact of inflation targeting on unemployment is very much an empirical question. However, despite extensive empirical examination to track the effects of an IT regime, there is no clear conclusion and results are mixed on whether inflation targeting is solely responsible for the reductions in inflation, inflation variability, inflation expectations, and other real variables such as output and unemployment rate.

The following studies found a positive influence of inflation targeting on stabilizing inflation and its related indicators. For instance, Neumann/von Hagen (2002) analysed a sample of six advanced IT countries and three non-IT countries, and concluded that inflation targeting actually lowered inflation and the volatility of inflation. Vega/Winkelried (2005)

examined the mean, variance, and persistence of inflation for 23 countries using propensity score matching and concluded that inflation targeting has helped in reducing both the level of inflation and the variability of inflation. Mishkin/Schmidt-Hebbel (2007) studied 21 industrial and emerging countries utilizing ordinary least squares (OLS) and instrumental variables (IV) methods and show that inflation targeters' experience declines in inflation levels both in the short run and in the long run. A study by Lin/Ye (2009) considers 13 developing countries against 39 control-group countries based on data from 1985 to 2005, and finds that inflation targeting had a large and significant success in lowering inflation and its volatility.

In contrast, Ball/Sheridan (2004) show that adopting inflation targeting appears to have been irrelevant for a group of 20 OECD developed countries, involving neither gains nor losses in terms of overall economic performance. In addition, the authors mention that greater reduction in inflation and inflation variability observed in 'targeters' vis-à-vis 'non-targeters' largely disappears when controlling for mean reversion. Similarly, using intervention analysis and modeling inflation by using unrelated time series equations, Angeriz/Arestis (2006) via a sample of ten inflation targeters are able to show that the choice to inflation-target was adopted after those countries were already able to gain control of inflation levels. Another piece of research by Lin/Ye (2007) investigated the performance of inflation targeting in seven developed countries within a greater set of 22 advanced economies, and found no significant effects on either inflation or its volatility.

Regarding the experience of emerging-market economies, Goncalves/Salles (2008) used the difference-in-difference method to examine the records of 13 IT and 23 non-IT developing countries, and concluded that inflation targeting has contributed to the fall in inflation and to the fall in output variability. In addition, Batini et al. (2005), focusing on emerging markets covered by JP Morgan's EMBI Index over the period from 1997Q2 to 2001Q1, demonstrated that inflation targeting has favorable outcomes in emerging-market economies. Conversely, a study by Ardakani et al. (2018) shows that there is no significant difference in the inflation level and inflation volatility between targeters and non-targeters. In addition, the authors argue that inflation targeting enhances fiscal discipline in developing countries.

It is also important to mention that there were a number of studies which specifically aimed to assess the effectiveness of IT policy on alternative key macroeconomic variables. The impact of inflation targeting on the level of inflation expectations is illustrated in Johnson (2002) and Miller/Fang (2012); the impact of inflation targeting on output growth and its volatility is shown in Walsh (2009), Brito/Bystedt (2010), and Mollick et al. (2011); the impact on exchange rates and international reserves are discussed in Lin (2010); and the labor market outcomes and the inflation-unemployment trade-off are discussed by Lundborg/Sacklen (2006), Epstein (2008), Louis/Balli (2013), Seim/Zetterberg (2013), and Huang/Yeh (2014).

Other authors have advocated for alternative organization of multiple mandates for the central banks both in advanced and developing economies. Since there is a tremendous uncertainty regarding estimates of full employment, Palley (2018) suggests the inclusion of real wage growth in the interest-rate policy rule, which can help reduce the premature tightening caused by other components of inflation (for instance, housing inflation or price commodity shocks), which are not under the direct control of monetary policy. Hence, the relative size of the policy rule coefficients will depend on policymakers' judgment about whether inflation or real wage growth provide a more complete picture of the state of the economy. Seccareccia/Khan (2019) argue that price stability under inflation targeting can be delivered only at the cost of chronically high long-term unemployment and a distribution of income largely skewed towards capital income, which precludes real

wages to grow proportionate to productivity. Seccareccia/Lavoie (2010) similarly show that with a single-focused mandate of inflation targeting, wages tend to rise concomitantly with the inflation goal, because the inflation target increasingly acts as an incomes policy guidepost. Overall, the authors consider that expanding the mandates of the central bank and incorporating other factors, such as trend productivity growth or labor market indicators into the reaction function will be an important step in tackling the issues of economic inequality (Lavoie/Seccareccia 2012). At the same time, taking into account the relatively low bargaining power of workers in the developing world and the limited data on the distribution of income, specifying headline unemployment as a core variable is more efficient operationally and will benefit all workers in the economy. Analysing the last two business cycles, Schmitt (2013) shows that a full employment program is the best stimulus to wage growth, which especially boosts income gains of economically disadvantaged groups, who are frequently subject to discrimination.

Based on the review of previous literature, this paper suggests a relatively new take on inflation targeting as a single-mandate monetary policy compared to multiple-mandate central banks, which in turn effectively exposes many disadvantages of the latter. At the same time, the paper largely follows the strategy identified by Ball/Sheridan (2004) as a yardstick to measure all empirical studies on performance assessment of the IT framework. This paper contributes to the previous knowledge in several ways. First, I extend the time period well beyond the year 2008, which is likely to offer a more robust judgment of whether the adoption of inflation targeting is related to unemployment dynamics, including the post-financial-crisis experience. Second, despite the vast interest in the issue, the empirical evidence on the monetary policy effects on labor market outcomes is limited, and this paper aims to fill this gap with a large number of countries covered in the sample with a clear focus on developing countries. Also, this research brings the unemployment variable and its volatility under additional examination as a future cooperation ground for any mixed approach to fiscal and monetary policy in emerging economies.

Thus, the issue of coordination and conflict of fiscal and monetary policy is crucial. Our discussion will be introduced in a game theory framework, since any addition of 'real economy' variables to a broader set of monetary policy targets will require some sort of interaction with fiscal authorities. Overall, our examination of inflation and unemployment under the context of a 'dual mandate' monetary policy is a fresh way to discuss the old issue of alternatives to inflation targeting and the overall evolution of monetary policy in developing countries. The empirical section of the paper investigates whether the IT monetary framework actually delivered better results both in terms of inflation and unemployment in the context of emerging-market economies.

### 3 FISCAL AND MONETARY COORDINATION IN DEVELOPING ECONOMIES

The current operational mode of IT monetary policy in developing countries identifies long-run price stability as the only goal of monetary policy. There are many theoretical justifications why targeting annual average inflation alone is the optimal policy for central banks. However, in times of economic downturns, when central banks aim to contribute to stabilization policies, their institutional commitment to inflation can be binding and counterproductive. Instead of expanding credit through easier monetary policy, central banks are incentivized to raise interest rates –especially, considering the case of emerging economies, where supply shocks comprise a major component of domestic inflation, and counter-cyclical policy often goes in conflict with other main macroeconomic indicators (Fischer 1996). As a result, a

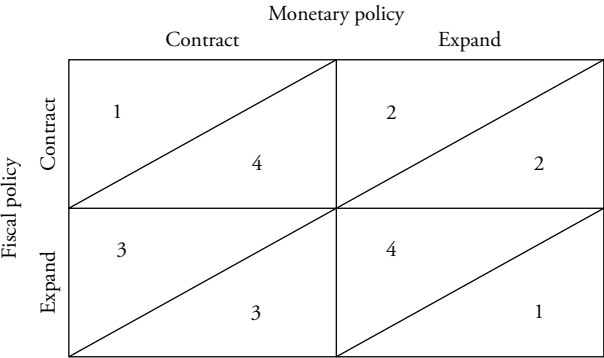
mechanism for temporary deviations from inflation targets, and thus, greater coordination with fiscal policy, should be in central banks’ toolkit to deliver optimal and social-welfare-enhancing economic policy.

This fact requires comprehensive understanding of the issues of coordination and conflict between monetary and fiscal policy. Most of the time, gains from coordination arise from the effective shortages of instruments compared to targets. If the number of fiscal instruments were the same as targets, the government might not have to coordinate its policies with those of the central bank. While monetary authority of a country is implicitly required to encourage non-inflationary growth policies, this paper maintains that an unemployment rate is an optimal coordinating variable in the fiscal–monetary mix.

Among many institutional arrangements between fiscal and monetary policies, the most relevant for developing countries is the case of two uncoordinated policymakers: one in charge of fiscal policy (the ministry of finance) and the other in charge of monetary policy (the central bank), with neither one dominating the other. According to Blinder (1982), it is possible to conceptualize this situation as a two-person non-zero-sum game. Since both policymakers understand that it is a repeated game, each would assume that the other would play his optimal strategy in response to their actions. As a result, naturally, the Nash equilibrium would emerge with each player playing his Nash strategy.

Figure 1 demonstrates the workings of the scheme. According to Blinder (1982), each independent agency has two available strategies: contract or expand. The key is that we assume that their preference ordering is different, and so order the outcomes accordingly. Particularly, the fiscal policymakers (preference ordering are below the diagonal in each box) are assumed to favor expansionary policy. Thus, when both choose to expand is best (rank 1), and when both choose to contract is worst (4). At the same time, monetary policy is tasked to fight inflation, which it does by contracting the economy, and thus its preference ordering goes in the opposite way.

As a result, if the central bank chooses to ‘expand,’ the fiscal authorities will also choose to ‘expand,’ which brings the central bank to the worst outcome (the lower right-hand box). Thus, the central bank plays ‘contract,’ and since the best response of the fiscal agency is to always play ‘expand,’ the outcome of the game will always go to the lower left-hand box (3–3 ranks). This is the game’s only Nash equilibrium, and tight monetary policy and a loose budget is a natural result of uncoordinated but intelligent behavior of two equal policymakers. However, both players also understand that the upper-right-hand



Source: Blinder (1982).

*Figure 1 The payoff matrix of coordinated policy*

box with easy money and tight fiscal policy mix is superior to the Nash equilibrium. That outcome is possible to reach only if two agencies fully coordinate and reach a deal. Thus, coordination between two policies is necessary, if governments want to achieve a better social outcome.

A similar matrix to the central bank's 'balanced approach' combining the inflation target and the unemployment objective is illustrated in Figure 2. We can see that inflation and employment goals can come into conflict at times. The arrow in Figure 2 represents a typical direction of interest-rate response by the central bank to either stimulate or tighten credit markets. So, when inflation is running high, central banks usually respond with contractionary monetary policy, but when unemployment is also high, it is essential to ease monetary policy. Therefore, a complementary and single approach is only possible when inflation is high and unemployment is running low, or when inflation is low and unemployment is relatively high: the upper-right-hand box, and the lower-left-hand box.

Otherwise, in the situations demonstrated in the upper-left-hand box and the lower-right-hand box (when both inflation and unemployment are low or both are high, respectively), a single decision on the interest-rate path becomes increasingly difficult. For instance, in situations where both inflation and unemployment are high, the central bank has to choose whether it can tolerate higher inflation at the risk of overheating the economy overall. This is also a crucial difference between single-mandate IT central banks and their multiple-mandate policy counterparts.

Furthermore, different sectors of the economy might require immediate surplus stimulus through a lower interest rate. For instance, government needs to shift the investment spending from housing towards business investment. Then, to achieve this objective, a central bank would need to keep interest rates high to discourage residential construction, while providing some preferential treatment and tax cuts to industrial capital. A special case arises with the foreign exchange rate, which heavily depends on the level of short-term interest rates to regulate the capital flows. Thus, an adequately coordinated fiscal and monetary policy should allocate resources in a relatively more efficient manner than no coordination at all.

The following schemes present other modes of coordination of fiscal and monetary regimes. For instance, according to Friedman's (1982) suggestion, one extreme case would consist of a system with unified stabilization authority with control over all the relevant instruments, both fiscal and monetary. It is also unlikely that fiscal policy tools will be concentrated in the hands of the central bank. Hence, a model can potentially work by

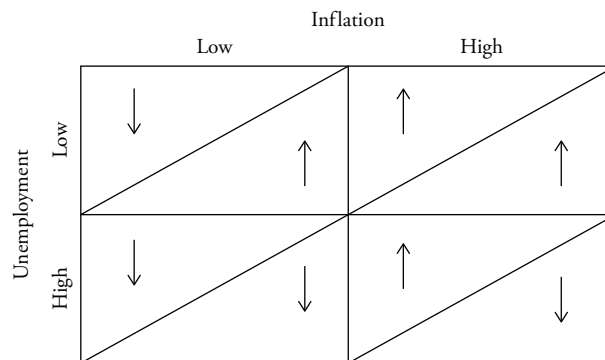


Figure 2 Interest-rate response matrix



subordinating a central bank to the executive branch. The ultimate real outcome that can result from single-policymaker management is to combine expansionary monetary policy with contractionary fiscal policy. However, the same combination of two policies considered optimal can actually be found in many uncoordinated two-agent policy settings. Therefore, while this example ensures an equal number of targets and instruments at any given time, the actual realization of this system is highly unlikely.

According to Blinder (1982), another alternative fiscal–monetary coordination model is a leader–follower arrangement, where policymaker ‘A’ decides first and then policymaker ‘B’ selects an optimal path observing the earlier choice made by ‘A.’ For instance, the fiscal authority first deciding on a budget deficit and then the central bank determining how much of that debt to monetize. The outcome depends on the number of instruments available to the follower to accommodate the moves of the leader, and ultimately who is the leader. Thus, if the follower has enough instruments to influence the target, the constraints imposed by the leader will not be binding. Under this type of arrangement, the follower’s attitude obviously affects the leader’s decision, which will be anticipating the response of the follower. The author suggests that in a dynamic framework, the coordination can reduce the loss from lack of coordination by making the leader implement policies more in line with the objectives of the follower.

In principle, assuming the institutional independence of the central bank, a greater coordination and cooperation seems to achieve better results, especially in the context of developing countries. Taking into account the time-inconsistency problems associated with decentralized decisionmaking as described in Kydland/Prescott (1977), economic growth as a target should not be the central bank’s objective. Instead, monetary authority can commit to pro-growth, social-welfare-maximizing strategies through coordination on the common indicator of the unemployment rate, in addition to the main target of inflation. At the same time, there are technical issues about focusing on unemployment, such as the large informal sector prevalent in developing economies. We acknowledge the challenges of focusing only on the standard core unemployment rate that countries’ statistical agencies report, thus leaving the incorporation of measurement questions for future research.

Empirically, the interaction of monetary and fiscal policies to identify the optimal mix is a complex issue. As central banks in emerging markets actively engage in macro-policy setting by the nature of their key functions, their potential self-isolation from fiscal objectives is imprudent towards the development goals a country might be pursuing. Thus, the coordination and cooperation between the two arms of government are essential and vital for public policies to realize. Starting with the broader example of the Federal Reserve (the Fed), which can also be useful in the case of developing countries, Greenwood et al. (2014) suggest that both the Treasury and the Fed should release joint statements on their plans for the maturity structure of the Treasury’s debt. This would make the decisionmaking explicit and force both sides to consider each other’s objectives. The Fed would have to understand the fiscal risks that the Treasury has to face, and the Treasury, in turn, would understand the macroeconomic conditions that the Fed works to navigate. As a baseline, this would align both parties with having to create a predetermined course.

By acknowledging a potential coordination failure of the institutional set-up between fiscal and monetary policies, we correspondingly support our arguments of supplementary benefits from the dual-mandate monetary policy approach in developing countries. While a vast literature studies the interaction of monetary and fiscal policies in determining inflation dynamics (Sargent/Wallace 1981; Sims 1994, Woodford 1994; 1995; 2001; Cochrane 2001; Reis 2016), a lack of policy coordination has not been comprehensively explored in the context of general equilibrium models. The main reason is that the lack of coordination can lead to explosive dynamics on inflation, output, and debt. For instance,

Bianchi/Melosi (2018) provide evidence that if the government's willingness to stabilize debt is declining, while the central bank is adamant about keeping inflation low, the economy enters a vicious spiral of higher inflation, monetary tightening, recession, and further debt accumulation. The mere possibility of this conflict represents a drag on the economy. Similarly, Loyo (1999) uses a perfect foresight endowment economy to show that if the central bank follows the Taylor principle while the fiscal authority does not stabilize debt, an explosive path for the price level arises.

A more detailed consideration of emerging economies and working coordination of their monetary and fiscal policies portrays similar institutional patterns. For instance, Aktas et al. (2010), using the case of Turkey, argue that a tight monetary policy within an IT framework could actually increase the price level due to the lack of fiscal discipline and the associated high-risk premium. As a result, deeper coordination of monetary and fiscal policies is important to reach a low-inflation environment. More recently, Buyukbasaran et al. (2019) found that monetary and fiscal policies move in same direction (tight monetary policy concurs with tight fiscal policy) in response to non-policy shocks, whereas they follow the opposite direction (tight monetary policy coincides with loose fiscal policy) in response to policy shocks. Jawadi et al. (2015), using a panel vector autoregressive (PVAR) model in a sample of BRICS countries, show evidence that a positive shock to the central-bank rate is followed by a decrease in government spending, thus amplifying the effects of monetary contraction. Also, a positive shock to government spending is accompanied by an increase in the growth rate of M2, thereby maximizing the effectiveness of fiscal policy. From a policy perspective, the authors suggest that macroeconomic coordination can prove useful in boosting the recovery from economic downturns or avoiding inflationary pressures during economic booms.

#### 4 METHODOLOGY: SINGLE MANDATE AND MULTIPLE MANDATE

I propose to use the difference-in-difference method to explore the average effect of inflation targeting (single mandate) on inflation and the real economy variable: unemployment, and its respective volatilities. The scheme of the method is represented in Table 1. There are two groups of countries: single mandate (SM) and multiple-mandate (MM) countries. According to previous literature (Kose et al. 2018), we also can describe non-IT (multiple-mandate) countries as the 'control group' and the IT-implementing group as the 'intervention group.' In Table 1, there are four time periods. The baseline period is when neither of two groups had a particular explicit monetary policy target. The treatment period characterizes the average effect of the SM implementation in the following period, while the control group did not pursue an IT framework. The next dimension demonstrates the net effect of SM over time. The overall average net effect of IT implementation (difference-in-difference estimator) is considered as the difference between 'intervention' and 'control' groups.

*Table 1 The difference-in-difference method*

	Single-mandate countries (intervention group)	Multiple-mandate countries (control group)
Baseline period	$SM_0$	$MM_0$
Treatment period	$SM_1$	$MM_1$
Difference across time	$SM_1 - SM_0$	$MM_1 - MM_0$
Difference-in-difference	$(SM_1 - SM_0) - (MM_1 - MM_0)$	

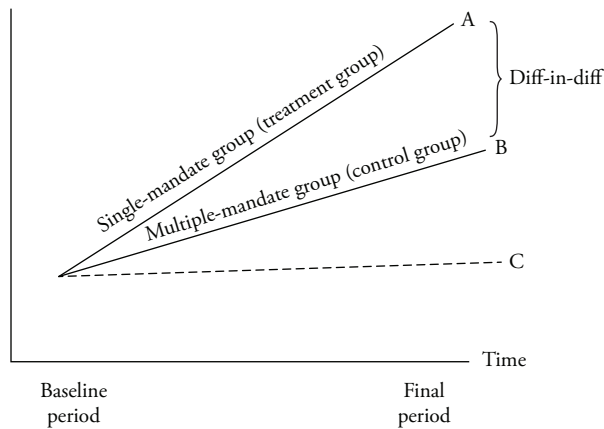


Figure 3 The difference-in-difference method in graphics

This method will allow us to treat inflation targeting as a quasi-controlled experiment. Therefore, I run the difference-in-difference regressions based on the following specification:

$$X_{i, \text{final}} - X_{i, \text{initial}} = \beta_0 + \beta_1 X_{i, \text{initial}} + \beta_2 D + \varepsilon,$$

where  $(X_{i, \text{final}} - X_{i, \text{initial}})$  is the difference-in-difference estimator for a variable  $i$ ;  $X_i$  is the initial value of an economic variable (inflation, output growth, exchange rate, unemployment) and their volatilities;  $D$  is a *dummy* variable equal to 1 when a country targets inflation, and 0 when country targets both inflation and unemployment or does not have any target at all;  $\beta_0$  is the constant term, and  $\varepsilon$  is an error term.

Furthermore, it is important to note that the previous literature has always been suspicious of the problem of self-selection, so that countries with initially high inflation tend to adopt an IT regime, which enables a more significant reduction in the level of domestic inflation. To address this issue, we add the initial inflation control variable, so the difference in inflation and unemployment rate will not reflect mean reversion, but a direct impact of the IT policy.

The mechanics of the difference-in-difference method is graphically illustrated in Figure 3. From the scheme, we can clearly differentiate between two groups: a multiple-mandate group, which is the control group, and a single-mandate group, which is the intervention group. Hence, point C serves as a reference point with respect to the evolution and trends of both the control and treatment group's variables of interest. Therefore, A–C would be representing the gain of IT monetary policy. At the same time, B–C is reflective of the non-targeting group, which did not pursue an IT framework after the baseline period. As a result, the key ratio we are interested in is A–B, which should be the sole estimator of the outcome of IT policy.

## 5 DATA AND EMPIRICAL APPROACH

Using the World Bank's *World Development Indicators* data set and IMF's *International Financial Statistics*, I have gathered a set of time series on ten single-mandate (inflation-targeting) and 11 multiple-mandate (developing) countries with a focus on inflation and unemployment statistics (Table 2). All 21 countries in the sample fall under the 'middle-income group of countries' identification of the World Bank. Also, the paper has

Table 2 Summary statistics

(a) IT or single-mandate group of countries, 1998–2018

Country	Adoption year	Inflation change (1998–2018)	Unemployment change (1998–2018)	Inflation volatility (1998–2018)	Unemployment volatility (1998–2018)
Brazil	1999	0.47	2.91	2.58	1.72
Colombia	2000	-15.40	-5.89	3.72	3.54
Ghana	2002	-6.81	-4.04	6.43	1.87
Indonesia	2005	-55.25	-0.94	11.89	1.32
Mexico	1999	-11.03	-0.29	3.78	0.90
Peru	2002	-5.93	-2.31	1.54	1.03
Philippines	2002	-4.02	-1.34	2.12	0.44
S. Africa	2000	-2.37	-3.23	2.28	3.09
Thailand	2000	-6.93	-2.64	2.16	0.85
Turkey	2006	-69.31	4.01	23.49	1.52
Mean	2001/06	-17.56	-1.38	5.99	1.63

Note:  $\Delta$  = (average value 2018, %YoY – average value 1998, %YoY).

Source: Author's calculation.

(b) Non-IT or multiple-mandate group of countries, 1998–2018

Country	Adoption year	Inflation change (1998–2018)	Unemployment change (1998–2018)	Inflation volatility (1998–2018)	Unemployment volatility (1998–2018)
Bulgaria	–	-15.86	-6.98	4.76	2.73
China	–	2.84	1.03	2.01	0.11
Congo	–	0.15	1.32	138.80	0.25
C. d'Ivoire	–	-4.25	-0.88	1.69	1.85
Egypt	–	10.53	3.56	6.34	1.58
India <sup>a</sup>	–	-8.37	-0.30	3.11	0.11
Morocco	–	-0.84	-4.77	0.90	0.24
Nigeria	–	2.09	4.48	3.78	1.96
Pakistan	–	-1.14	3.46	4.43	1.44
S. Lanka	–	-7.22	-5.05	4.84	0.56
Tunisia	–	4.18	-0.06	1.25	1.63
Mean	–	-1.626	-0.38	15.642	1.50

Note:  $\Delta$  = (average value 2018, %YoY – average value, 1998 %YoY).

a. India adopted a flexible IT framework only in August 2016, pursuing a 'multiple indicators approach' till 2017.

Source: Author's calculation.

rejected countries with GDP of less than \$10 billion a year, and countries with multiple gaps in their historical data. That helps to eliminate certain biases that can drive up the average results, such as small labor markets or highly dollarized economies.

Due to the heterogeneity of central-bank monetary frameworks regarding both the mandates and instruments to achieve their goals, we classify all the countries into two groups: (i) inflation targeting and (ii) non-inflation targeting. The term 'IT countries or

single-mandate' is assigned to those central banks which have an *overriding* goal and operational preference toward the price stability (inflation-targeting) mandate. The main instrument to achieve low inflation is the official interest rate, and they also adopt floating exchange rates. It is instructive that the identification strategy as a single-mandate central bank must be based on *statutory* (designed by law), *operational* (overriding principle), and *informational* (communicating the key principle of their decisions) channels. Therefore, as an identification issue, we track the website of each central bank in the sample and check the legislative statute on monetary policy stance. Hence, if the monetary institutions by law are obliged to commit to low inflation as an overriding objective, then we prescribe that central bank to a group with single-mandate IT countries. Similarly, if a central bank pursues multiple goals both statutorily and operationally (such as nominal GDP targeting, macroprudential and financial stability, real exchange-rate level and others), and communicates its behavior to the public in a proper manner, then we prescribe such central banks to a non-IT or multiple-mandate group of countries.

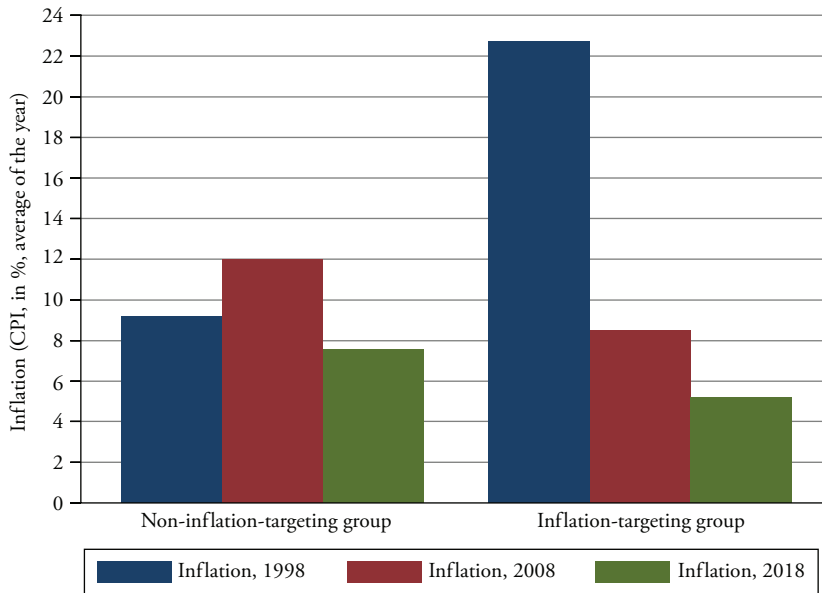
Inflation and unemployment have been defined as the annual percentage changes (% YoY) of the consumer price index (CPI) and the annual percentage rate of adult unemployment out of the total labor force (annual % YoY), respectively. Both inflation and unemployment volatility indicators were calculated as corresponding standard deviations relative to the mean of each individual country's data series on inflation and unemployment in the period covered by the analysis (1998–2008), and in the two sub-sample periods (1998–2008 and 2009–2018). Table 2 summarizes the data and initial conditions.

The aim of the empirical part is to estimate whether having adopted the single-mandate policy for central banks made any difference in terms of both inflation and unemployment figures using multiple-mandate countries as a control group. Therefore, the paper will investigate the economic and statistical significance of the parameter  $\beta_2$ , which will control for the intervention group (IT policy) change.

Inflation dynamics is graphically presented in Figure 4 and unemployment dynamics presented in Figure 5. One of the important details to note is that at the beginning of the common period (1998–1999), single inflation targeters (IT group) experienced a much higher level of inflation than multiple-mandate (non-IT group) central banks. By 2008, IT countries brought about a significant reduction in the growth rate of inflation. At the same time, by the end of the control period, both of them succeeded in bringing inflation down, with IT countries having on average lower inflation than non-IT countries. Whereas IT countries decreased inflation levels more aggressively, the number of both groups stabilized around a comparable and close range of 5–7 percent per year growth rate.

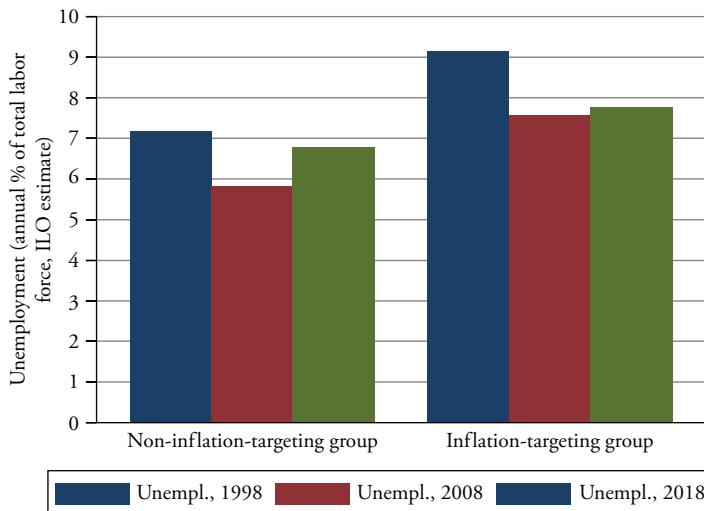
A key aspect of interest is the analysis of the core unemployment dynamics in both types of central banks. Importantly, in contrast to the performance on the inflation front, multiple-mandate countries (non-IT group) performed better than IT countries, having lower unemployment across the whole-period analysis and in the two sub-sample periods. At the same time, both IT and non-IT countries experienced a slight increase in average headline unemployment post the 2008 period.

These initial numbers form the basis to further investigate the practical implications of IT monetary policy as a superior tool to bringing down inflation rates. Therefore, in addition to the average levels, it is useful to examine the volatility dynamics of both inflation and unemployment rates. Another important point is that over the entire time period non-IT countries achieved a comparable decline in inflation, but experienced twice as much volatility in inflation rate on average than the IT group during the given time period. As Figure 6 illustrates, the volatility in unemployment in both groups is somewhat equivalent, which might also indicate that non-inflation-only targeting central banks can achieve a lower unemployment rate without generating any additional volatility.



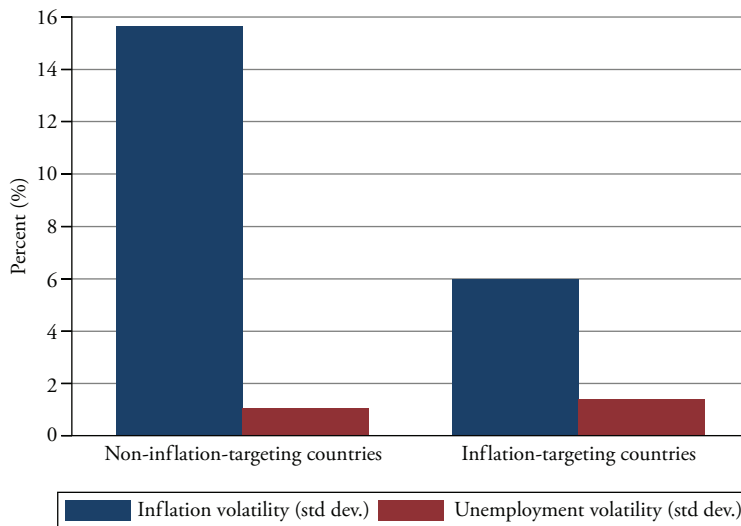
Source: Author's calculations.

Figure 4 Inflation dynamics in both groups (annual % CPI), 1998, 2008, 2018



Source: Author's calculations.

Figure 5 Unemployment dynamics in both groups (annual % total labor force, ILO estimate), 1998, 2008, 2018



Source: Author's calculations.

*Figure 6 Inflation and unemployment volatility dynamics (average standard deviation, %YoY) in both groups, 1998–2018*

Following the methodology outlined in the previous section, the paper now presents the results of difference-in-difference strategy estimations. The main focus is to quantitatively detect whether implementing the IT framework delivered any significant benefits in terms of reduction in inflation and unemployment, especially in comparison to multiple-targeting central banks.

The difference-in-difference specification requires a clear identification of 'initial' and 'final' time periods. In this paper, both for the IT countries and non-inflation-targeting group (non-IT group), the year 1998 is the initial period. The final period, 2018, is determined to produce a long enough time window for policies to shape the main economic performance outcomes of interest and was subject to data availability for all countries in the sample.

## 6 RESULTS

In the benchmark regression specifications in Table 3, we run three-period regression models (1998–2018, 1998–2008, and 2009–2018, respectively) to evaluate the effects of targeting inflation-only policy on average headline inflation and unemployment rates. In the first two model specifications (1 and 3), the IT group of countries actually reduced inflation on average by 0.44 and 0.33 percentage points of inflation. The third specification (5) post the 2008 crisis also shows that the IT group reduced inflation on average by 0.48 percentage points more than non-IT group. The outcomes of regression designs depict the fact that IT countries were more successful in bringing down the levels of inflation. In addition, we found that the unemployment levels in the IT dummy were not statistically significant.

Another important aspect that helps to analyse the effectiveness of single-mandate policies against multiple-mandate regimes is to compare the volatility of both inflation and unemployment series. In Table 4, we substitute the inflation and unemployment

Table 3 Inflation and unemployment regressions

Dependent variables	(1) $\Delta\pi$ (1998–2018)	(2) $\Delta\eta$ (1998–2018)	(3) $\Delta\pi$ (1998–2008)	(4) $\Delta\eta$ (1998–2008)	(5) $\Delta\pi$ (2009–2018)	(6) $\Delta\eta$ (2009–2018)
Initial inflation	-0.392* (2.340)	–	-0.645** (3.970)	–	0.604** (3.170)	–
Initial unemployment	–	-0.487* (2.490)	–	-0.427** (3.600)	–	-0.248 (1.180)
IT dummy	-0.438* (2.730)	0.368 (1.580)	-0.329* (2.140)	0.131 (0.930)	-0.485* (2.690)	0.397 (1.650)
Constant	2.979 (1.160)	3.113 (1.850)	8.292** (5.110)	1.727 (1.700)	-3.551 (1.870)	2.069 (1.430)
Observations	21	21	21	21	21	21
R-squared	0.940	0.310	0.940	0.620	0.370	0.190

Note:  $\Delta\pi$  denoting the change in inflation, and  $\Delta\eta$  denoting the change in unemployment rates. Standard errors in parentheses: \*  $p < 0.05$ , \*\*  $p < 0.1$ .



Table 4 Inflation and unemployment volatility regressions

Dependent variables	(1) $\Delta\pi$ (1998–2018)	(2) $\Delta\eta$ (1998–2018)	(3) $\Delta\pi$ (1998–2008)	(4) $\Delta\eta$ (1998–2008)	(5) $\Delta\pi$ (2009–2018)	(6) $\Delta\eta$ (2009–2018)
Inflation SD	–0.067 (0.500)	–	–0.151 (1.390)	–	1.720** (3.180)	–
Unemployment SD	–	–1.760* (2.530)	–	–1.722* (4.560)	–	0.851 (1.290)
IT dummy	–16.580* (2.130)	–0.722 (0.580)	–18.870* (2.300)	0.357*** (0.400)	0.340 (0.120)	–0.816 (0.810)
Constant	–0.578 (0.100)	2.256 (1.620)	5.730* (0.960)	0.497 (0.690)	–4.090 (1.570)	–0.405 (0.400)
Observations	21	21	21	21	21	21
R-squared	0.200	0.280	0.260	0.540	0.380	0.130

Note: Volatility is defined as an average standard deviation for a given variable for each sub-period separately: before the 2008 crisis, after the 2008 crisis, and the whole period 1998–2018, respectively.  $\Delta\pi$  denotes the change in inflation, and  $\Delta\eta$  denotes the change in unemployment rates. Standard errors in parentheses: \*  $p < 0.05$ , \*\*  $p < 0.1$ .

volatilities in place of the changes of inflation and unemployment, and then perform the earlier standard regressions with the IT dummy variable. The paper defines the volatility as an average standard deviation in each group over the given time period (1998–2018, 1998–2008, or 2009–2018).

From the first two specifications (1 and 3), we can observe that IT countries have experienced much lower inflation volatility than the non-IT group of central banks (−6.6 and −18.9 percentage points of standard deviation on average). At the same time, while considering the pre-2008 period only, IT countries demonstrated a higher volatility in unemployment than the non-IT group (specification 4). This finding may suggest that IT countries might not be adequately equipped to face the challenges of unexpected crises and provide higher social provision in terms of lower fluctuations of unemployment in certain periods. In any case, considerably extending the time period proves to be crucial to assess the overall ability of monetary policy to better cope with negative macroeconomic shocks, which are often the main sources of instability in developing countries.

## 7 CONCLUSION

The paper explores a principal trade-off between a fall in inflation and a possible rise in overall unemployment, which can arise as a consequence of one-target monetary regimes that contribute to excessive contractionary monetary policies during the economic downturns in developing countries. The results demonstrate that over the time period analysed, single-mandate central banks effectively lowered the level and volatility of the inflation rate, but at the same time, the effects of the IT policy on the unemployment rate were negligible, while the unemployment volatility was higher in the period 1998–2008. We conjecture that when central banks respond only to the changes in domestic inflation, they are essentially giving away control over other socially important macroeconomic indicators. Hence, when formulating their monetary policy strategy, central banks should consider including both the changes in inflation and the changes in unemployment rate in the policy reaction functions.

The main implication of the paper is that monetary authorities should be able to temporarily deviate from their inflation targets in times of crisis and choose to have a slightly higher inflation level in order to bring the level and volatility of unemployment down. Especially in the case of developing economies, 1 percent of excessive inflation is likely to have much less economic output-reducing effects than 1 percent of additional unemployment, due to the more precarious labor market conditions in those countries. Therefore, since both IT and multiple-mandate targeting groups seem to have presented a similar range for the inflation level at the end of the period analysed (5 percent to 7 percent YoY in 2018, as shown in Figure 4), why must the central banks of developing countries be constrained only to a price stability mandate? Monetary policy in emerging-market economies should be an active facilitator to a country's economic policy and commit to a maximum lower level of unemployment as a direct consequence of these coordinated programs.

In conclusion, taking into consideration that conventional monetary policymaking largely relies on a single instrument of interest-rate setting, it is important to have a highly coordinated fiscal–monetary policy mix to promote more responsible socioeconomic programs. It is particularly relevant to the case of developing economies, which are highly sensitive to their macroeconomic environment and shocks often originating from abroad. Therefore, in the long term, this paper advocates for a modification of a single-mandate monetary policy into an augmented IT framework with the unemployment rate as its second coordinated target.

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