8.1 Introduction

The current wave of globalization has encouraged economic growth in the world economy and affected all sides of international economic involvement. A new “conventional wisdom” on globalization is that trade and financial openness do not lead to higher economic growth by themselves, in the absence of institutional reforms. So globalization needs to be complemented by institutional reforms, in both developed and developing countries, so as to fully reap its potential benefits. Over the past few decades, developing and emerging market economies have also introduced major policy reforms and some have experienced significant economic growth. However, different policy patterns have led to different growth path for developing countries. Some economies are faced with substantial difficulties, while others have experienced rapid economic growth. It is a useful lesson for policy makers in least developed countries (LDCs) to learn from the successful stories of other developing countries; and it is also important for academic economists to investigate the successful cases of developing countries, abstract from the reality and formulate an analytical framework, from which policy implication can be drawn for LDCs on how to achieve positive and sustainable economic growth.

In this paper, we study the case of China with a focus on its economic growth targeting, which can be thought of as an implicit adoption of a nominal GDP (NGDP) targeting rule and a special form of a rule-based monetary policy regime. To that end, we start with a review of the literature on monetary economics and a discussion on rule-based monetary policy settings in Sect. 8.2. In Sect. 8.3, we develop an analytical framework to examine the case of economic growth targeting in China. In our model economy, key features for developing countries include the degree of commitment by the central bank, semi-dependence between the monetary authority and the fiscal authority, and the risk of sovereign default. From our analytical results, we find that under a GDP growth targeting regime, when the central bank is more committed to its growth target, the actual growth rate becomes close to the target level, the inflation rate increases moderately for those countries with flatter supply curves (which holds...
true for most developing countries), and the social welfare improves. Moreover, higher growth rate is associated with lower tax levied by the fiscal authority, and it is inversely related to the government’s default probability. Section 8.4 concludes and indicates policy implications for developing countries.

8.2 Background: Rule-Based Monetary Policy

All central banks are responsible for managing their monetary policy. Monetary policy is broadly defined into two types—discretionary monetary policy, and rule-based monetary policy. In the literature on monetary economics, there is the “inflationary bias” result with the influential papers by Kydland and Prescott (1977), and Barro and Gordon (1983a) predicting that the rate of inflation will be biased toward a higher level under a discretionary monetary policy than under a rule-based monetary policy regime. The reason for this counter-intuitive “inflationary bias” result is due to the time-inconsistency problem, in which a central bank with discretion will have the incentive to raise the inflation ex post, and the public knows this ex ante. To eliminate this “inflationary bias”, it is well established that a credible commitment to a nominal targeting rule is required in a rule-based policy setting.

In a rule-based monetary policy regime, central banks (monetary authorities) must set parameters to formulate their monetary policy. It has become a common practice for central banks in many countries around the world, including both developed economies and developing economies, to gravitate toward an approach that is focused on the strong commitment to a binding rule for a nominal anchor. The reasons, for having a simple and publicly announced nominal variable as the monetary target, are transparency and the anchoring of expectation. As long as the public believes the central bank’s promise to target a certain variable—whether it is the money supply, the exchange rate, or the inflation level, this monetary target is established as the nominal anchor, based upon which household and business form their expectation and make their economic decision accordingly.

To conduct rule-based monetary policy, the choice of a nominal anchor by central banks is like a “fashion business”. From a historical point of view, “money supply targeting” gained prominence in the 1970s, which was adopted as the main monetary policy regime to bring down inflation by central banks in major advanced economies, including the United Kingdom and the United States. The monetarism school of economic thought maintains that the total amount of money in an economy, that is, the money supply, is the major determinant of GDP in the short run and the price level over the long run. Monetarists believe that the policy objective of central banks is to achieve low and stable inflation, which is best met by targeting the growth rate of money supply. However, the adoption of “money supply targeting” as the main monetary policy regime was ended due to the velocity shocks in the 1980s.

Whilst advanced economies adopted “money supply targeting”, the exchange rate was the favored nominal anchor that was adopted to stabilize inflation by central banks in many developing economies in the late 1980s and early 1990s. In an
8.2 Background: Rule-Based Monetary Policy

Table 8.1 “Inflation Targeting” countries and years of adoption

| Country        | Year | Country     | Year | Country      | Year |
|----------------|------|-------------|------|--------------|------|
| New Zealand    | 1990 | Hungary     | 2001 | Ghana        | 2007 |
| Canada         | 1991 | Mexico      | 2001 | Uruguay      | 2007 |
| United Kingdom | 1992 | Iceland     | 2001 | Albania      | 2009 |
| Australia      | 1993 | South Korea | 2001 | Georgia      | 2009 |
| Sweden         | 1993 | Norway      | 2001 | Paraguay     | 2011 |
| Czech Republic | 1997 | Peru        | 2002 | Uganda       | 2011 |
| Israel         | 1997 | Philippines | 2002 | Dominican Republic | 2012 |
| Poland         | 1998 | Guatemala   | 2005 | Japan        | 2013 |
| Brazil         | 1999 | Indonesia   | 2005 | Moldova      | 2013 |
| Chile          | 1999 | Romania     | 2005 | India        | 2015 |
| Colombia       | 1999 | Serbia      | 2006 | Kazakhstan   | 2015 |
| South Africa   | 2000 | Turkey      | 2006 | Russia       | 2015 |
| Thailand       | 2000 | Armenia     | 2006 |             |      |

Source IMF AREAER database

“exchange rate targeting” policy regime, the central bank targets the level of the exchange rate of an “anchor” currency (for example, the US dollar), which has low and stable inflation. However, the vulnerability of “exchange rate targeting” policy regime was exposed during the currency crises in the 1990s.

After the currency crises of 1994–2001, “inflation targeting” has become the preferred nominal anchor in place of “exchange rate targeting”. According to Mishkin (1999), and Mishkin and Savastano (2001), ‘inflation targeting’ involves the public announcement of a well-defined numerical target for inflation - a small range or a point target, which shows a strong commitment of the central bank to price stability as its prime monetary policy objective, and a high degree of accountability and transparency in its strategy and implementation. In 1990, New Zealand was the first country to adopt inflation targeting. Since then, many monetary authorities around the world have either implicitly or explicitly adopted inflation targeting. The IMF (2019)’s Annual Report on Exchange Arrangements and Exchange Restrictions indicates that in 2015, 38 countries were found to be directly targeting inflation, and 26 of these countries could be classified as developing economies (see Table 8.1).

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1 IMF (2019), “Annual Report on Exchange Arrangements and Exchange Restrictions 2018”, Monetary and Capital Markets (MCM) Department, International Monetary Fund (IMF), Washington DC, April 16.

2 They are: Albania (2009), Armenia (2006), Brazil (1999), Chile (1999), Colombia (1999), Dominican Republic (2012), Georgia (2009), Ghana (2007), Guatemala (2005), Hungary (2001), India (2015), Indonesia (2005), Korea (2001), Mexico (2001), Moldova (2013), Paraguay (2011), Peru (2002), Philippines (2002), Poland (1998), Romania (2005), Russia (2015), Serbia (2006), South Africa (2000), Thailand (2000), Turkey (2006), Uganda (2011), and Uruguay (2007).
In theory, “inflation targeting” should function well, in terms of achieving low and stable inflation, and anchoring expectation by the public. Empirically, there are mixed findings of the effect of inflation targeting, with the effectiveness of inflation targeting largely debated (Walsh 2009). On the one hand, some empirical studies suggest that inflation targeting helps to enhance macroeconomic performance of adopted economies, by keeping a check on both inflation and inflation expectation while managing long-term interest rates. On the other hand, Mishkin and Schmidt-Hebbel (2007) find no evidence that inflation targeting improves economic performance. Samarina et al. (2014) argue that the impact of inflation targeting on inflation performance depends on the stage of economic advancement that a country is at, and they find that inflation targeting has no effect for advanced economies, but a significant negative impact for emerging and developing economies.

As the year 2020 gathers pace, there has been an outbreak of COVID-19 pandemic, which is an infectious disease that is caused by a newly discovered coronavirus. With the pandemic spreading around the world, it induced a sudden and violent shock across the economy. Many governments have implemented massive fiscal stimulus programs, some fiscal authorities have borrowed heavily to finance schemes that support firms and workers, and some governments have financed their fiscal deficits by printing the extra money that they need to cover their public expenditure. Against the backdrop of COVID-19 pandemic and the monetization of fiscal deficits, some economists start to talk about the return of inflation, and the limitation of “inflation targeting”. In such an economic environment, another danger will be that policymakers withdraw stimulus too soon, as central banks that adopt inflation targeting may worry about overshooting their inflation target.

Recently (late August 2020), Jerome Powell, the chairman of the US Federal Reserve, announced changes to the Fed’s monetary framework and made its biggest monetary policy shift in decades, from “inflation targeting” to “average inflation targeting” (AIT). In the face of persistently low inflation, the Fed’s existing inflation target of 2% will henceforth be an average, and the central bank may pursue efforts to push inflation above the target. Whether and how monetary policy will change in practice is still not clear. But the macroeconomic developments that led the Fed to revise its strategy would definitely also influence other central banks to adjust their own monetary policies. The Fed’s policy change could start a trend and initiate a global shift in central bank practice. For developing and emerging market economies, their monetary authorities might choose to stay put or follow suit, or seek an alternative nominal anchor in conducting their monetary policies.

In addition to money supply targeting, exchange rate targeting, and inflation targeting, another potential nominal anchor is “nominal GDP (NGDP) targeting”. Originally proposed in Meade (1978) and Tobin (1980), the idea of directing monetary policy toward targeting nominal GDP attracted interest in the 1980s and the 1990s. See, for example, Bean (1983), West (1986), Frankel (1990), Feldstein and

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3See, for example, https://www.economist.com/finance-and-economics/2020/08/27/the-fed-makes-its-biggest-inflation-policy-change-in-decades, https://www.economist.com/finance-and-economics/2020/09/05/will-the-feds-policy-shift-start-a-trend.
Stock (1994), Hall and Mankiw (1994), among others. Since the Global Finance Crisis (GFC), there has been a revival of research proposals that central banks should consider targeting the nominal GDP level, including Woodford (2012), Sumner (2014), Frankel (2014), Armenter (2017), Bai, Kirsanova and Leith (2017), Bhandari and Frankel (2017), Dai and Xu (2019). When faced with macroeconomic shocks, an “inflation targeting” regime places the entire burden on output adjustment, while a NGDP targeting rule, as argued in Bhandari and Frankel (2017), has the advantage of absorbing shocks through both the price and output adjustments.

Dai and Xu (2019) show another advantage of a NGDP targeting rule is that it has the inherent flexibility as a NGDP target can be divided between a price goal and an output goal. According to the IMF’s AREAER database for its “Annual Report on Exchange Arrangements and Exchange Restrictions”, the People’s Bank of China (PBoC) adopts a monetary policy framework of monetary aggregate target.4 Moreover, the Law of the People’s Republic of China (PRC) on the PBoC stipulates that “the aim of monetary policies must … promote economic growth”. So the nominal anchor of “monetary aggregate”, combined with China’s emphasis on GDP growth target, resembles that of a NGDP targeting rule. In the next section, we examine China’s case of economic growth targeting, which can be thought of as an implicit adoption of a NGDP targeting rule and a special form of a rule-based monetary policy regime.

8.3 Analytical Framework

Textbook treatment of monetary policies typically does not distinguish developing countries from developed countries. The literature on monetary policy for developing countries hardly existed until the publication of Agenor and Montiel (1996, 1999).

There are important features about developing countries that differentiate them from developed countries, including less developed institution, lower central bank credibility. See, for example, Fraga et al. (2003). This suggests that the optimal design of monetary policy by central banks should not be the same in a systematical way between developing countries and developed countries. As such, we need different macroeconomic models, or at least some variants of existing models, for developing and emerging market economies. In this section, we aim to contribute to the literature on monetary policy for developing countries. To that end, we examine China’s case of economic growth targeting, and attempt to formulate an analytical framework that abstracts from China’s experience, based upon which useful lessons and importantly policy implication can be drawn for LDCs.

As a developing country, China has set an annual economic growth target5, which has driven the nation’s economic policies for decades. Gross domestic product (GDP)

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4See IMF’s AREAER—China country report, Section III.E.2, (position as of September 30, 2019).
5Due to the uncertainties associated with the COVID-19 pandemic, the Chinese government does not explicitly set a GDP growth target for the year 2020, which is the first time ever for China in
is often considered to be one of the best measures of how well the economy is performing. The national income accounts divide GDP into four broad categories of spending: consumption, investment, government purchases, and net exports, \( Y = C + I + G + NX \). There are two kinds of demand, domestic demand \((C, I, G)\) and external demand \((NX)\). On the one hand, the PBoC can directly affect the domestic demand via the interest rate channel. On the other hand, monetary policy can only exert influence over the external demand via the exchange rate channel. Interest rates and exchange rates are connected by the “interest rate parity” condition. So we omit the exchange rate but focus on the interest rate in our analysis. This modeling strategy is also justified by the fact China’s growth has been driven mainly by domestic demand, rather than external demand over the past two decades (see Fig. 8.1).

In our model economy, the central bank uses the nominal interest rate as its monetary policy instrument to achieve its policy objective. We follow Barro and Gordon (1983a) to assume that there is a direct connection between the nominal interest rate and the inflation rate, and henceforth we follow Lohmann (1992) and

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30 years. However, its budget projections suggest that the Chinese government is implicitly aiming for a GDP growth rate of 5.4% in 2020.

6On July 31, 2020, Chinese leaders concluded at a meeting of the Political Bureau of the Communist Party of China (CPC) that in the post COVID-19 era China faces a protracted war with long- and medium-term challenges and risks, and the leaders stated that China will pursue a ‘dual circulation’ strategy that is centered on ‘internal circulation’ and is supplemented by ‘external circulation’. For ‘internal circulation’ to be the central driver of China’s economic growth, there must be enough domestic demand in the Chinese economy. This further justifies our modeling strategy of focusing on the domestic demand and the interest rate channel.
Walsh (1995) to treat price or the inflation rate as the choice variable by the central bank.

We consider a central bank that establishes a target for the economic activity within the country for a given period of time. The central bank chooses its own policy objective function, with the policy goal of inflation stabilization and growth rate targeting. The policy objective function by the central bank is assumed to take the general form as: 

$$Q = (\pi - \pi^*)^2 + \omega (g - g^*)^2,$$

where the variable $g$ is the actual GDP growth rate. The parameter $g^*$ is the target GDP growth rate. The variable $\pi$ is the actual inflation rate, and the parameter $\pi^*$ is the optimal inflation rate. The parameter $\omega > 0$ and it measures the relative importance that is assigned to the policy goal of growth rate targeting as opposed to inflation stabilization by the central bank.

One key feature about developing countries, which distinguishes them from developed countries, is the degree of central bank commitment. This also depends on the degree of central bank independence from the central government. To model that, we introduce the parameter $\delta$, with $\delta \in (0, 1]$, as a proxy for the degree of commitment to economic growth targeting by the central bank. The higher the parameter $\delta$, the more committed the central bank is to growth targeting, and the more credible the central bankers are, as perceived by the general public. In our model setup, we assume that the central bank aims to minimize a quadratic loss function which takes the form as follows:

$$Q = (\pi - \pi^*)^2 + \omega (g - \delta g^*)^2$$

To model the supply curve, we combine Okun (1962)’s Law and the Phillips curve. Okun’s Law is an empirical observation, or a “stylized fact”, which links the unemployment rate to the GDP growth rate relative to the trend growth rate or “natural” rate of growth, 

$$\mu - \mu_n = -\beta (g - \bar{g}),$$

where the variable $\mu$ is the actual unemployment rate, and the parameter $\mu_n$ is the “natural” rate of unemployment. The variable $g$ is the actual GDP growth rate, and the parameter $\bar{g}$ is the trend growth rate or the “natural” rate of growth, which is assumed to be known or can be estimated by the central bank. We assume it to equal to the target growth rate $g^*$ as in the policy objective function by the central bank.

The expectations-augmented Phillips curve is: 

$$\pi = \pi^e - \gamma (\mu - \mu_n),$$

where the variable $\pi$ is the actual inflation rate, and the parameter $\pi^e$ is the expected inflation rate, which we assume to be equal to the optimal inflation rate $\pi^*$, as in the central bank’s policy objective function.

Combining Okun’s Law and the expectations-augmented Phillips curve, we obtain our supply equation, which shows that the economy faces a trade-off between inflation and output growth. This is the constraint in the optimization problem by the central bank.

$$g = g^* + \alpha (\pi - \pi^*)$$

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\(^7\) \(-\beta (g - g^*) = \mu - \mu_n = -\frac{1}{\gamma} (\pi - \pi^e), g - g^* = \frac{1}{\beta \gamma} (\pi - \pi^e)\).
The Lagrangian of the optimization problem becomes:

$$L = -[(\pi - \pi^*)^2 + \omega(g - \delta g^*)^2] + \lambda[g - g^* - \alpha(\pi - \pi^*)]$$

The first-order conditions from the optimization problem give us the reaction functions of inflation and output growth, $\pi = \pi^* - \frac{\alpha}{2} \lambda$, and $g = \delta g^* + \frac{1}{2\omega} \lambda$, where $\lambda$ is the Lagrangian multiplier, which is also known as the “shadow price” of relaxing the constraint in the optimization problem. Solving these two reaction functions along with the constraint, we obtain the Nash equilibrium inflation and growth rates as functions of the parameter $\delta$.

$$\pi = \pi^* + \frac{\alpha \omega (\delta - 1)}{1 + \alpha^2 \omega} g^*$$

$$g = \frac{1 + \alpha^2 \omega \delta}{1 + \alpha^2 \omega} g^*$$

Next, we examine the effect of central bank commitment on inflation and output growth, by taking the partial derivatives of the Nash equilibrium with respect to the commitment parameter $\delta$.

$$\frac{\partial \pi}{\partial \delta} = \frac{\alpha \omega}{1 + \alpha^2 \omega} g^* > 0$$

$$\frac{\partial g}{\partial \delta} = \frac{\alpha^2 \omega}{1 + \alpha^2 \omega} g^* > 0$$

Two observations can be made. From the first result, the optimality of the degree of central bank’s commitment depends on the slope of the supply curve. The effect of commitment falls into two ranges. On the one hand, for flatter supply curves with $\alpha > 1$, an increase in $\delta$ will cause a trivial increase in $\pi$. On the other hand, for steeper supply curves with $\alpha \in (0, 1)$, an increase in $\delta$ will cause a large increase in $\pi$. That is, a more committed central bank (with higher $\delta$) could lead to an overheated economy with higher inflation. By taking into account the commitment of the central bank (as proxied by $\delta$), we find that growth targeting may be optimal only for those countries with flatter supply curves ($\alpha > 1$), which happens to be true for most developing countries, as they are usually price takers in the world market.

From the second result, we observe that an increase in the commitment parameter $\delta$ will cause an increase in output growth. That is, the more committed the central
bank is to its policy goal of growth targeting, the more likely it will reach its growth target.

Lastly, the level of social welfare can be estimated by substituting the Nash equilibrium inflation and growth rates into the policy objective function $Q = (\pi - \pi^*)^2 + \omega(g - \delta g^*)^2$, and taking the negative sign of the quadratic loss function, $W = -\frac{\omega(1-\delta)^2}{1+\alpha^2\omega} (g^*)^2$. The effect of central bank’s commitment on the social welfare can be examined by taking the partial derivative of the welfare with respect to the commitment parameter $\delta$, which we find to be positive. So a more committed central bank will not only cause the growth rate to be close to its target level, but also improves social welfare in the economy, $\frac{\partial W}{\partial \delta} = 2\frac{\omega(1-\delta)}{1+\alpha^2\omega} (g^*)^2 > 0$.

To summarize, we have: Under a GDP growth targeting regime, when the central bank is more committed to its growth target, (1) the actual growth rate becomes close to the target level; (2) the actual inflation rate increases moderately for those countries with flatter supply curves; and (3) the social welfare improves with a more committed central bank in this economy.

**Model Extension 1: with Fiscal Authority**

Another key feature about developing countries, which differs them from developed countries, is that their monetary authority and fiscal authority are not completely independent from each other. In other words, there is semi-dependence between the monetary authority and the fiscal authority in developing countries. In this extension, we introduce the fiscal authority in an extended model setup, with the loss function as:

$$Q_2 = \omega_1(\pi - \pi^*)^2 + \omega_2(g - \delta g^*)^2 + \omega_3(PG - \overline{PG})^2$$

where the parameter $\overline{PG}$ is a non-negative target provision of public goods that are provided by the fiscal authority; the weight parameters $\omega_1$, $\omega_2$, and $\omega_3$ are the weights on the inflation objective, the growth objective, and the objective of minimizing the deviation of public goods provision in the loss function. These weights reflect the relative preference of each policy goal by the government.

Following Alesina and Tabellini (1987), the government budget constraint, expressed in real terms, is:

$$PG = \tau + \pi$$

where $\tau$ is the tax rate levied by the fiscal authority. This is the second constraint in the optimization problem by the central bank. The Lagrangian of the optimization problem becomes:

$$\mathcal{L}_2 = -[\omega_1(\pi - \pi^*)^2 + \omega_2(g - \delta g^*)^2 + \omega_3(PG - \overline{PG})^2]$$
$$+ \lambda_1[g - g^* - \alpha(\pi - \pi^*)] + \lambda_2(PG - \tau - \pi)$$
The Nash equilibrium solutions for inflation and output growth can be derived from the first-order conditions associated with the optimization problem.

$$\pi = \frac{\omega_1 + \alpha^2 \omega_2}{\omega_1 + \alpha^2 \omega_2 + \omega_3} \pi^* + \frac{\alpha \omega_2 (\delta - 1)}{\omega_1 + \alpha^2 \omega_2 + \omega_3} g^* - \frac{\omega_3}{\omega_1 + \alpha^2 \omega_2 + \omega_3} (\tau - P_G)$$

$$g = \frac{\omega_1 + \alpha^2 \omega_2 \delta + \omega_3}{\omega_1 + \alpha^2 \omega_2 + \omega_3} g^* - \frac{\alpha \omega_3}{\omega_1 + \alpha^2 \omega_2 + \omega_3} (\tau + \pi^* - P_G)$$

The effect of government tax rate $\tau$ on inflation and output growth can be examined by taking the partial derivatives of the Nash equilibrium.

$$\frac{\partial \pi}{\partial \tau} = -\frac{\omega_3}{\omega_1 + \alpha^2 \omega_2 + \omega_3} < 0$$

$$\frac{\partial g}{\partial \tau} = -\frac{\alpha \omega_3}{\omega_1 + \alpha^2 \omega_2 + \omega_3} < 0$$

We find that an increase in the government tax rate $\tau$ will cause a decrease in the actual inflation rate $\pi$ and a decrease in output growth rate $g$. The intuition behind this result is that with more tax levied, households will have less disposable income for consumption, which will translate into lower output growth and exert downward pressure on the price level.

To summarize, we have: Under a GDP growth targeting regime with semi-dependence between the monetary authority and the fiscal authority, if there could be some coordination between them, for example, more commitment from the central bank and lower tax rate levied by the fiscal authority, then the GDP growth target would more likely be achieved in this economy.

**Model Extension 2: the risk of sovereign default**

In addition to the features of central bank commitment and semi-dependence between the monetary authority and the fiscal authority, a third feature about some developing countries is that there exists the possibility that their government might default. In this model extension, we include the modeling of sovereign default risk into our analytical framework. The government budget constraint becomes:

$$P_G = \tau + \pi + (1 + r_g) d$$

where the variable $d$ is the level of government debt, and $r_g$ is the rate of return on government debt, which satisfies the following condition:

$$p (1 + r_g) + (1 - p) \times 0 = 1 + r_f$$

where the parameter $p$ is the probability of no default by the government, and $(1 - p)$ is the probability of default by the government. The intuition behind this equation
Table 8.2  Model results—summary

| Agency               | Parameter | Output growth | Type                        |
|----------------------|-----------|---------------|-----------------------------|
| Monetary authority   | $\delta$ | $\delta \uparrow = \uparrow > g$ | Commitment by the central bank |
| Fiscal authority     | $\tau$   | $\tau \downarrow = \uparrow > g$ | Tax rate levied by the fiscal authority |
| Fiscal authority     | $p$      | $p \uparrow = \uparrow > g$ | Probability of no sovereign default |

is that with no sovereign default, the return we get is $(1 + r_g)$; and with default, the return we get is 0. The probability-weighted return under the scenario of no default and default by the government should be equal to the risk-free rate of return $(1 + r_f)$.

Solving for $r_g$, we have: $r_g = \frac{1 + r_f}{p} - 1$.

The Lagrangian of the optimization problem becomes:

$$L_3 = -[\omega_1 (\pi - \pi^*)^2 + \omega_2 (g - \delta g^*)^2 + \omega_3 (PG - \bar{PG})^2] + \lambda_1 [g - g^* - \alpha (\pi - \pi^*)] + \lambda_2 [PG - \tau - \pi - (1 + r_g)d]$$

Solving this new optimization problem, we derive the effect of sovereign default risk on inflation and output growth as: $\frac{\partial \pi}{\partial p} > 0$ and $\frac{\partial g}{\partial p} > 0$. The interpretation is that with a lower default probability by the government, the actual inflation and output growth will be higher. The intuition behind this result is that if the government is perceived by the general public to have a lower chance of default, then it will be able to issue more debt $d$ for public spending, which in turn will boost economic growth and put upward pressure on the price level.

To summarize, we have: Under a GDP growth targeting regime with semi-dependence between the monetary authority and fiscal authority and with sovereign default risk, if we have more commitment from the central bank, lower tax rate levied by the fiscal authority, and more credibility from the fiscal authority, then it would be more likely that the GDP growth target would be achieved and sustainable economic growth would be maintained in this economy (Table 8.2).

### 8.4 Conclusion and Policy Implication

Whilst textbook discussion of monetary policies usually comes in the context of developed countries, we contribute to the literature on monetary policy for developing countries in this paper. To formalize the practice of China’s unconventional economic growth targeting in an analytical framework, there are three contributions from our paper. First, we take into account the degree of central bank commitment, which is one key feature that distinguishes developing countries from developed countries. Second, we model the semi-dependence between the monetary authority and the fiscal authority, which is another key feature about developing countries, as their monetary authority is often not completely independent from the central government. Third,
our modeling of sovereign default risk is a feature of some developing countries, especially least developed countries (LDCs).

From our analytical results, we find that under a GDP growth targeting regime, when the central bank is more committed to its growth target, the actual growth rate becomes close to the target level; the inflation rate increases moderately for those countries with flatter supply curves. So the optimality of the degree of commitment by the central bank depends on the slope of supply curve, which hold for most developing countries, as they are usually “small open” economies that take prices as given in the world market. The social welfare improves with a more committed central bank in the economy. Our first model extension considers the case of semi-dependence between the monetary authority and fiscal authority, from which we find that higher growth rate is associated with lower tax levied by the fiscal authority. Our second extension considers the case with sovereign default risk, from which we find economic growth is inversely related to the government’s default probability.

Lessons could be drawn from our model results for LDCs as they usually have less committed central banks, semi-dependence between their monetary authorities and fiscal authorities, and the risk of sovereign default. When they evaluate their alternative policy options, the analytical results from our paper can be taken into consideration. A growth target is more likely to be achieved with more commitment from the central bank, some coordination between the monetary authority and fiscal authority, a lower probability of sovereign default and more credibility from the central government. So if LDCs also consider the policy option of growth targeting as China does, then it is critical for them to improve and strengthen the governance, accountability, and institutional capacities of their central banks and fiscal authorities, which are the necessary requirements for them to achieve positive and sustainable economic growth.

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