Political Economy behind Central Bank Independence

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This paper proposes a model that analyzes the reasons behind the establishment and persistence of central bank independence (CBI) in a competitive democracy where both incumbent and opposition parties have the right to veto the delegation of monetary policy. We show that in a country with a high level of corruption, the absence of CBI is used by the opposition party to keep the economy unstable to increase its own chances of getting elected. The model also predicts persistence of CBI once it is established, due to the incumbent's fear of losing the office if the autonomy is removed.

1 Introduction

The ability of a central bank to commit to a specific monetary policy often engenders strong economic performance in the long run (Kydland and Prescott (1977), Barro and Gordon (1983)). However, governments might have an incentive to limit central bank independence (CBI), which can hinder a central bank from sticking with a specific policy. Such perverse incentives arise from the fact that the results of future elections often depend on short-term economic performance. Without institutional control, politicians might manipulate economic variables before elections through fiscal and monetary instruments. Yet, as suggested by Rogoff (1985), creating an independent monetary authority should resolve the time-consistency problem associated with monetary policy. In other words, if monetary policy is delegated to an independent institution, the government loses access to monetary tools, which reduces the extent of a political cycle and provides more economic stability. Unfortunately, such independent institutions do not always exist.

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This paper studies two questions: (1) why some countries establish an independent monetary authority, while others do not; and (2) why CBI is a persistent institution as suggested by the data. The explanation we offer applies only to competitive democracies wherein two parties have veto power in relation to the independence of monetary authority. We show that the presence/absence of CBI is associated with a number of parameters, including the level of corruption, the quality of politicians, discount factor of the future, value of economic growth and inflation in the voter preferences. Even though such parameters are responsible for creating a particular economic environment, the most striking result we obtain is that in countries with high levels of corruption CBI is often vetoed by the opposition, not by the potentially corrupt incumbent. This happens because the opposition is interested in keeping the economy unstable to undermine the incumbent and increase its own chances of winning election. In addition, the model predicts persistence of CBI once it is established. This is due to the incumbent's fear of losing the office if CBI is removed.

Classical models of political business cycles (Sibert and Rogoff (1988), Persson and Tabellini (1990)) predict the permanent presence of manipulations with policy instruments in electoral years. Much empirical work confirms the existence of fiscal political cycles (e.g., Persson and Tabellini (2003), Brender and Drazen (2005), Akhmedov and Zhuravskaya (2004), Brender and Drazen (2013)). However, prior investigations of political monetary business cycles have yielded mixed results, mostly due to reforms in CBI (Acemoglu and et al. (2008)). Studies that find evidence of pre-electoral monetary expansion (e.g., Tufte (1978), Alesina and Roubini (1992), Hallerberg, de Souza and Clark (2002), Block (2002), Burkovskaya (2013)), are focused on countries without an independent monetary institution at the time. By contrast, Drazen (2000) discovers that monetary cycles disappear in the US after 1979, when Paul Volcker becomes chairman of the Federal Reserve[1]. Furthermore, the negative relationship between CBI and inflation is supported by numerous empirical findings (e.g., Alesina and Summers (1993), Loungani and Sheets (1997), Franzese (1999), Berger, de Haan and Eijffinger (2001), Klomp and de Haan (2010)). Despite evidence of the clear advantages of CBI for the economy, not all countries choose to establish this institution. An important question is why?

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[1]P. Volcker is associated with the independence of the Fed.

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The economic literature offers various reasons behind the absence of CBI. Cukierman (1994) points out that there is no need for CBI given political stability. McCallum (1995) argues that the time-consistency problem cannot be resolved by CBI as the government can always reverse the delegation. However, Jensen (1997) and Moser (1999) assert that the time-consistency problem can be reduced when such a reversal is costly. In addition to these reasons, there is a lack of desire to solve the problem of inflationary opposition (Milesi-Ferretti (1995)), inflation aversion, benefits of unanticipated inflation, and the natural rate of unemployment (Eijffinger and Schaling (1998), Farvaque (2002)). In contrast, our contribution to the literature centers on general change and the persistence of institutions. Acemoglu and Robinson (2000, 2001, 2008) and Acemoglu et al. (2008) discuss the relationship between distribution of de jure and de facto political power and the persistence and change of institutions. The authors argue that those with political power who are negatively affected by the policy reform are likely to use that power to block its effective implementation. Indeed, our model demonstrates that the main reason for the absence of CBI is one of the politicians. The incumbent might be corrupt or the opposition might veto CBI to improve her own chances of winning the election.

An example of the first scenario is modern-day India, where there is demand for CBI from the central bank and economists, however, the incumbent government is trying to undermine the attempts through fixing the bill in its own interests[2]. Good examples of the second case are Ukraine and Brazil, where support for the incumbent is very low. In Ukraine, the incumbent, Petro Poroshenko, assigned an independent chief, Valeriya Gontareva, to the country's central bank. However, during her time in office, while cleaning up the financial sector, she faced pressure and death threats from the opposition supported by the Ukrainian oligarchy[3]. A group of parliamentarians submitted legislation to sabotage CBI[4]. In the end, the massive pressure resulted in the chief's resignation[5]. At the same time, in Brazil, active preparation of a CBI bill was taking place after the impeachment of

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[2] "India seeks to bury controversy over central bank," Financial Times, July 30, 2015.

[3] "Valeria Gontareva: Ukraine's central bank reformer," Financial Times, March 26, 2017.

[4] "Attack targets Central Bank independence, Gontareva reputation," KyivPost, October 21, 2016.

[5] "Ukraine's Reformist Central Bank Chief Resigns Amid Pressure," RadioFreeEurope RadioLiberty, April 10, 2017.

President Dilma Rousseff in 2016[6]. However, a year later, the reform was postponed due to lack of support in Congress[7]. Other examples include South Korea and Israel in 1997 before they finally achieved CBI. In both countries, the incumbent formed a commission that strongly recommended improving the independence of the monetary authority (Cargill (2001), Cukierman (2007)), but the recommendation did not proceed due to lack of support. It was not until there was a financial crisis and pressure from the International Monetary Fund that South Korea established CBI in 1998. The reform was postponed in Israel for another 13 years.

Another key point is that multiple studies of various CBI indices over different time periods (e.g., Crowe and Meade (2007, 2008), Dincer and Eichengreen (2014), de Haan et al. (2017)) indicate the steady development and persistence of independence of monetary institutions over time. Changing legislation on CBI often requires a constitutional amendment (e.g., Brazil, Chile, Colombia, Switzerland) or an act to pass in both houses of parliament (e.g., Australia, Canada, UK), thus, an agreement between several veto parties is required. The previous literature suggests that several veto players approving CBI lends credibility to it (e.g., Moser (1999), Keefer and Stasavage (2003)). That might be an explanation for the persistence. However, the presence of two veto players delivers credibility only if at least one of the players is not interested in undermining CBI. In our model, the presence of two veto players is the reason for a lack of CBI in some cases, while persistence is guaranteed through the threat of economic instability and loss of office for the incumbent. For example, a Central Bank reform in Argentina in 2012 away from independence resulted in hyperinflation and loss of the next presidential elections for the Frente Para la Victoria[8] candidate. In other words, the incumbent is the guarantor of the credibility of CBI when put in place, whereas the opposition is using its veto power to prevent the establishment of CBI in the first place.

Our model relies on three fundamental assumptions: (1) the country is democratic, (2) there are at least two veto players in the legislative process, and (3) the voters observe only

[6]"Brazil to formally enshrine central bank's autonomy," Financial Times, July 12, 2016.

[7]"Independence May Remain Elusive for Brazil Central Bank Head," by M.S. Lima and M. Malinowski, Bloomberg Politics, September 18, 2017

[8]Frente para la Victoria was the political party of Cristina Fernandez de Kirchner, the president of Argentina between 2007 and 2015.

CBI status and not the voting behind it. None of these assumptions can be relaxed. Below we discuss these assumptions in more detail.

First, democracy is crucial for the existence of political cycles. A dictator has a wide range of means[9] to win political competition, and, as a result, the ruler does not usually need to stimulate the economy. Consequently, the economy might show stability during the regime (e.g., Mexico during Porfiriato, Putin's Russia). Moreover, the dictator is interested in improving the quality of work done by the central bank since it contributes to the stability of the regime itself. For example, Mexico increased the autonomy of its central bank in 1993 under the Partido Revolucionario Institucional[10]. However, real independence of monetary authority is not possible in the presence of a dictator.

Second, as we already discussed before, two veto players provide credibility to CBI when it is established and absence otherwise. Removing this assumption would allow the incumbent to change the delegation at any moment. The model would then predict the existence of only one equilibrium with CBI. In fact, the high-quality incumbent will always choose CBI, while the low-quality incumbent might prefer its absence. However, reversing independence would send a negative message about the politician's type. As a result, the equilibrium will be separating regardless of the actual choice of the incumbent. Given that CBI delivers price stability, even the low-quality incumbent would choose to keep it in this case.

Third, we make an assumption that the voters do not observe the actual voting, because in many cases when CBI is permanently absent, no voting actually takes place. The incumbent or the other party might want to introduce CBI, however, such a proposal often dies before reaching the formal legislative process due to clear lack of support (e.g., Brazil). Normally, voters do not pay attention to such details of the political process, therefore what we model as voting can be considered unobservable in this case. When formal voting on CBI takes place and CBI is established, the legislative procedure is observable in real life. However, it would not affect our results and for simplicity of modelling we assume a lack of information on the issue. If the behind-the-scenes political process was more observable, then we would have to give up this assumption. If politics were more public, voters could

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[9]For example, jailing political competitors.

[10]Partido Revolucionario Institucional held power for 71 years (1929-2000) in Mexico.

punish the party that vetoes CBI, hence, leading to more independence.

This paper also relates to the models of political business cycles inspired by the pioneering work of Nordhaus (1975). In Alesinas (1987) model of partisan cycles, the economy is influenced by electoral expectations. After the rational expectations revolution, Rogoff and Sibert (1988) and Rogoff (1990) propose a signaling model with rational voters, who do not have information on the politician's type. In this model, politicians have different levels of competency in delivering government services. Persson and Tabellini (1990, 2000) apply the approach developed by Rogoff and Sibert to monetary policy and the economy described by the Phillips curve. Drazen (2000) introduces a separate monetary authority that is neither directly associated with the government nor completely independent. Ferre and Manzano (2014) add CBI to the partisan model of Alesina (1987). In the current study, we modify the model of Persson and Tabellini (2000) by adding a negotiation stage wherein both candidates might agree to establish or abolish CBI.

In this paper, we offer a toy two-period game that helps demonstrate the causes behind the existence or absence of CBI. We restrict the political business cycle model of Persson and Tabellini (1990, 2000) to two periods, while adding CBI as a potential monetary policy provider. The game goes as follows: there is an incumbent and a contender up for elections at the end of period 1. Before any economic activity in period 1 starts, both politicians decide whether or not to change the current status of the central bank. The status can be changed only if both parties agree on the issue. The voters observe the current status of the central bank and know whether it has changed. The voters do not observe the actual voting, and they form their expectations about inflation based on the status of CBI. All economic activity is described by a rational expectations Phillips curve that takes into account the ability type of the incumbent to provide economic policy. Such ability can be high or low. After period 1 economic activity occurs, the voters observe the current level of output and form beliefs about the type of the incumbent. At the end of period 1, elections take place, and in period 2, post-electoral economic activity occurs. The game has two types of perfect pure strategy equilibria: (1) separating equilibrium – both politicians agree on CBI in the beginning of the game; and (2) pooling equilibria – the contender vetoes CBI, keeping monetary tools in the incumbent's hands. In pooling equilibria, this results

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in both types stimulating the economy to produce the same output in period 1, making it impossible for voters to distinguish the quality of the economic policy or the performance of the incumbent. There is multiple pooling equilibria of this type, each of them can be characterized by two parameters: the level of inflation expectations and the probability of incumbent re-election, which is bounded from above by the probability of the high-type politician.

The existence of one or another equilibrium is defined by a number of parameters in the model. The rent from office holding, which we associate more with corruption than with the presidential salary, and the future discount factor both reduce the probability of CBI. The reason for this is that the higher rent from office holding and the discount factor increase re-election incentives for both types of politicians. Consequently, the low-type incumbent would prefer to mimic the output of the high-type through monetary expansion, for which the absence of CBI is crucial. The probability of a high-type politician, the weight of output in voter preferences, and the difference between the politicians abilities have a positive influence on the establishment of CBI. All of these parameters make the low-type incumbent prefer a more able politician to run the country instead of herself.

On the other hand, the rent from office holding, future discount factor, and the probability of incumbent re-election positively affect the existence of any given pooling equilibrium. All of these factors increase the incumbent's value from being re-elected and encourage the low-type incumbent to hide private information about her type. However, this story is not complete. The above justification explains why the type of equilibrium is pooling rather than separating in the absence of CBI, yet the reason for the actual absence is different: as long as the probability of incumbent re-election is lower than that of the high-type probability (which is the existence requirement), *the contender* prefers the lack of CBI to increase her own chances of winning election. Specifically, imagine a situation with high inflation expectations and the high level of corruption that guarantees high rent from office holding. As a result, the low-type incumbent is encouraged to provide monetary stimulation in the absence of CBI. Even though an incumbent of any type might prefer living as a private citizen in a country with CBI and no inflation instead of running the country with high inflation, the foundation of CBI still fails. This is because voters generally do not favor any

incumbent government due to high uncertainty about how well the country is actually run. The opposition (contender) is interested in keeping that uncertainty in place by refusing CBI.

However, if the game starts with CBI, then independence will never get reversed. If an incumbent agrees to do so, the voters will immediately take it as a signal of the low-type being in power and form inflation expectations. Therefore, the incumbent will never be able to get re-elected. To make matters worse, she will have to face inflation. This explanation is in line with the high cost delegation argument in Jensen (1997) and Moser (1999) – but in our model, the cost of delegation is *always* high as the price is losing the office. Such a high cost delivers persistence of the institution and solves the time-consistency problem.

This paper is organized as follows: Section 2 introduces the model. Section 3 analyzes the possible equilibria. Section 4 provides comparative statics. All proofs are provided in the Appendix.

2 The Model

2.1 Setup

In this section, we extend the model of opportunistic political business cycles of Persson and Tabellini (2000) to a setting that includes political decision on delegation of monetary policy. Note that we use only a two-period economy that might be extended to an infinite dynamic setting. However, that would overcomplicate the derivations and yield similar results, hence, we see it as unnecessary. We assume that there are two politicians – an incumbent and a contender – who are up for election. Each politician is characterized by her type, which is private information. We suppose that there are two types – high μ_H with probability ρ and low μ_L with probability $1 - \rho$. The type is related to the ability to boost the economy, which is described by the Phillips curve

$$y = \pi - \pi^e + \mu,$$

where μ is the incumbent's ability, π is inflation, and π^e is expected inflation rate. Therefore, generally, the output is higher with a more able politician.

Voters' utility depends positively on output y_t in every period $t = 1, 2$ and negatively on inflation π_t with a discount for the second period:

$$u_v = -\frac{1}{2}\pi_1^2 + by_1 + \beta\left(-\frac{1}{2}\pi_2^2 + by_2\right)$$

The utility of the politicians is similar to the voters, however, they receive additional rent H if holding the office. We link the size of the rent with corruption: the greater the corruption, the more opportunities the incumbent has to extract rent. We assume that both types of politicians receive non-negative utility from holding the office and the individual rationality constraints are met, which requires that $H > b\rho\Delta\mu$[11].

Generally, monetary instruments are in the hands of the incumbent, however, if the monetary policy is delegated to CBI, then – without loss of generality, – it targets zero inflation[12].

The timing of the model is as follows:

1. The game starts with the central bank, either independent or not. Before any first-period economic activity, politicians simultaneously decide whether or not to change the current status of the central bank. Only if both politicians agree does the delegation of monetary policy actually change.

   Having at least two parties with veto power is essential in order to guarantee credibility of legislation.

2. The voters observe whether the status of the central bank has changed, and set the expectation of inflation.

3. Monetary policy is used: the incumbent stimulates the economy according to her utility function in the case of no delegation to CBI. Otherwise, CBI sets the inflation target to zero.

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[11] This condition requires that the rent from holding office is high enough that the low-type has incentives to run for office. Otherwise, we would face an economy with only able politicians, which seems to contradict reality.

[12] Consider the CBI loss function $L_t = \pi_t^2$ in each period $t = 1, 2$.

4. The voters observe economic growth, but not inflation, and form beliefs about the type of incumbent.

   We assume that inflation reacts slower to the expansionary monetary policy than the output. Hence, in the short-run, the population is able to "feel" increased economic activity (e.g., through getting hired or observing increases in demand), however, the prices have not yet adjusted accordingly.

5. The election takes place, and the second-period economic activity is observed with either the new or re-elected incumbent.

We use the pure-strategy Perfect Bayesian Equilibrium concept to solve this game. See the Appendix for all the proofs.

3 Equilibria

3.1 Monetary policy is delegated to CBI

In this section, we study the case when the central bank is independent during economic activity. The voters know the inflation target and set the appropriate expectation.

Lemma 1. *If the central bank is independent, then $\pi_1 = \pi_2 = \pi_1^e = \pi_2^e = 0$. The high-type incumbent gets re-elected, the low-type incumbent loses the election, and the incumbent's expected payoffs are*

$$u^I(\mu_H) = (1 + \beta)(b\mu_H + H)$$

$$u^I(\mu_L) = b\mu_L + H + \beta b E\mu.$$

Note that it does not matter whether the status of the central bank has changed or not since the inaccessibility of monetary instruments perfectly reveals the incumbent's type through the observed output. Consequently, the high-type incumbent is re-elected, while the low-type is not because the voters prefer uncertainty about the incumbent's type over the certainty that it is low.

3.2 No independent monetary authority

In the absence of CBI and after the election is over, both types of politicians prefer the same level of inflation, which is also expected by rational voters.

Lemma 2. *If the central bank is not independent, then $\pi_2 = \pi_2^e = b$, and the utility of the politician in office in period 2 is*

$$u_2^I(\mu) = -0.5b^2 + b\mu + H.$$

3.2.1 Change from CBI to no delegation

In this section, we investigate the subgame, in which CBI is being reversed by mutual agreement of the politicians.

Lemma 3. *If the status of the central bank changes from independent to dependent, then in the equilibrium $\pi_1 = \pi_2 = \pi_1^e = \pi_2^e = b$, the incumbent always loses elections and receives expected payoff*

$$u^I(\mu) = -0.5b^2 + b\mu + H + \beta b E\mu.$$

The high-type incumbent receives the highest payoff only in the case of CBI, because she is guaranteed re-election and the country experiences economic stability that is represented in the model by a lack of inflation. In the absence of CBI, even if the high-type is reelected, the effect of the monetary expansion on output will be offset by the inflation expectation, and the economy will experience instability through inflation. Henceforth, the high-type incumbent always vetoes any attempt to remove CBI. In effect, rational voters presume that the type of the incumbent is low and elect the contender if such a situation is observed.

Note that overriding CBI does not signal anything about the type of the contender: CBI reversal hands over the office to the opposition, and, as a result, the contender always supports the reversal in this case.

3.3 Absence of CBI before and after the status decision and equilibria

In this section, we study the possible outcomes of the subgame that results from the permanent lack of delegation of monetary policy, and how it affects the final outcome of the game. To simplify the notation, we denote $\Delta\mu = \mu_H - \mu_L$ the difference in ability between the high and low types.

Theorem 1. *The game has two types of equilibria:*

1. ***Separating:*** *the monetary policy is delegated to CBI immediately, $\pi_1 = \pi_2 = \pi_1^e = \pi_2^e = 0$. The high-type incumbent gets re-elected and the low-type incumbent loses the election. This equilibrium exists if*

$$0.5\Delta\mu^2 + b(1 + \beta\rho)\Delta\mu - \beta H > 0. \tag{1}$$

2. ***Pooling:*** *the central bank stays dependent, $q \leq p = \rho$, output is $y^p = E\mu$, inflation is*

$$\pi_1^H = -(1 - \rho)\Delta\mu + \pi_1^e \text{ and } \pi_1^L = \rho\Delta\mu + \pi_1^e$$

$$\pi_2 = \pi_2^e = b,$$

and the incumbent gets re-elected with probability q. This equilibrium exists if

$$-0.5(\rho\Delta\mu + \pi_1^e - b)^2 + q\beta(H - b\rho\Delta\mu) > 0. \tag{2}$$

Notice that the persistent absence of CBI does not reveal any information about the type of the incumbent. Depending on the values of the parameters, the subgame might have different outcomes that result in different types of equilibria.

First, the separating equilibrium exists in the subgame characterized by the permanent absence of CBI if condition (1) holds. In this situation, the rent from holding the office is not high enough, hence, the low-type does not have incentives to stimulate the same level of output as the high-type because it requires very high inflation. Consequently, both types choose the optimal level of inflation, which is also expected by voters. As a result, output is different under different types of politicians, thus, the type is revealed. Subsequently, the

high-type gets re-elected, while the low-type does not.

If the separating equilibrium is played in the subgame with a permanent absence of CBI, then both types of incumbent would prefer to delegate the monetary policy as it would reduce inflation while delivering the same output and re-election outcome. Given that the high-type gets re-elected and the low-type does not under CBI or without it, – the contender's probability of winning the election is the same in both scenarios. Henceforth, the opposition prefers CBI since it delivers more economic stability.

Second, the pooling equilibria is characterized by an identical level of output under both types of politicians but with different levels of inflation. The low-type has to stimulate the economy more than the high-type to achieve the equilibrium output. In order for such equilibria to exist, it is necessary that the probability of incumbent re-election $q \leq \rho$. The following paragraphs explain why.

Suppose that $q > \rho$, – i.e., the probability of incumbent re-election is greater than the probability of high-type politician. In this case, the probability of electing the contender in the absence of CBI is $1 - q$. However, if the monetary policy is delegated to CBI, the opposition wins as often as the incumbent happens to be the low-type, which is $1 - \rho$. Thus, the contender prefers the delegation to CBI in this situation. Subsequently, rational voters know about the preference of the contender, and, as a result, associate the persistent absence of CBI with the low-type incumbent and elect the contender. The last point contradicts the assumption about $q > \rho$.

Hence, if $q \leq \rho$ and condition (2) holds, then the pooling equilibria exist. Note that we are dealing with the case of multiple equilibria with different levels of inflation. The voters expect an average level of inflation π_1^e, and the politicians have to adjust their monetary expansion to the level of the expectations to achieve the required level of output. In this case, the contender's probability of winning the election is greater in the absence of CBI. Consequently, the opposition always vetoes the delegation. Note that in this situation, actual preferences of the low-type over CBI *do not* matter, as long as the low-type has incentives to pool with the high-type and be re-elected with probability q instead of choosing the optimal level of inflation and losing the election, which is guaranteed by condition (2). Hence, it might be the case that the low-type *prefers* CBI over economic instability and yet

the delegation does not occur.

4 Comparative Statics

Note that we have obtained two conditions on the parameters that define whether separating or pooling equilibria exist. In this section, we discuss how the model parameters affect those conditions. We start by analyzing the existence of CBI equilibrium and later focus on the persistent absence of CBI.

4.1 Equilibrium with CBI

The equilibrium with CBI exists if inequality (1) holds. Now we define a function

$$f_1(H, \Delta\mu, b, \rho, \beta) = 0.5\Delta\mu^2 + b(1 + \beta\rho)\Delta\mu - \beta H,$$

then condition (1) can be rewritten as $f_1(H, \Delta\mu, b, \rho, \beta) > 0$. To provide comparative statics, we obtain the derivatives of the above function with respect to the model parameters.

4.1.1 Rent from holding office

$$\frac{\partial f_1(H, \Delta\mu, b, \rho, \beta)}{\partial H} = -\beta < 0$$

The negative derivative with respect to H implies that the higher the rent that the incumbent can obtain by holding office, the less likely condition (1) holds, and the less likely CBI is established. The conclusion is reasonable as the higher the payoff from holding the office, the higher the incentives of the low-type to hide her type to get re-elected.

4.1.2 The ability of politicians

$$\frac{\partial f_1(H, \Delta\mu, b, \rho, \beta)}{\partial \Delta\mu} = \Delta\mu + b(1 + \beta\rho) > 0$$

The greater the difference in the ability of the politicians, the more likely CBI will be established. The greater the economic performance under the high-type in comparison with the low-type, the more incentives the low-type has to be just a citizen who enjoys economic wellbeing rather than run the country with mediocre performance.

4.1.3 Weight of output in utility

$$\frac{\partial f_1(H, \Delta\mu, b, \rho, \beta)}{\partial b} = \Delta\mu(1 + \beta\rho) > 0$$

The greater the weight of output in everyone's utility, the more likely we are to see the independent central bank. The conclusion is straightforward: the high-type is better at providing economic wellbeing and she will always get re-elected with an independent central bank.

4.1.4 Probability of the high-type

$$\frac{\partial f_1(H, \Delta\mu, b, \rho, \beta)}{\partial \rho} = b\beta\Delta\mu > 0$$

The greater the probability of the high-type politician, the more likely the CBI. A higher probability of the high-type increases the expected economic performance if the uncertain contender wins. As a result, the low-type has more incentives to be a private citizen of a country run by a professional.

4.1.5 Future discount factor

$$\frac{\partial f_1(H, \Delta\mu, b, \rho, \beta)}{\partial \beta} = b\rho\Delta\mu - H < 0$$

The greater the value of the future, the less likely the independence of the central bank. This is another straightforward conclusion: the more the low-type values the future, the more the low-type values holding office in the future, hence, the more incentives the low-type has to hide the information about her own ability.

4.2 Equilibrium with dependent central bank

Condition (2) has to hold for the existence of the pooling equilibrium with the dependent central bank. We define the function

$$f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e) = -0.5(\rho\Delta\mu + \pi_1^e - b)^2 + q\beta(H - b\rho\Delta\mu),$$

and rewrite inequality (2) as $f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e) > 0$. By analogy, we study partial derivatives to discuss the influence of the different model parameters.

4.2.1 Rent from holding office

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial H} = q\beta > 0$$

The greater the rent from holding the office, the higher the probability of the equilibrium without the independent central bank.

4.2.2 Future discount factor

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial \beta} = q(H - b\rho\Delta\mu) > 0$$

The more valuable the future is, the more likely there will be equilibrium with the dependent central bank.

4.2.3 Probability of re-election

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial q} = \beta(H - b\rho\Delta\mu) > 0$$

The higher the probability of re-election in the pooling equilibrium, the more likely that equilibrium will occur. The conclusion is reasonable because the higher the probability of re-election, the higher the expected payoff for the low-type and the stronger the incentives for the low-type to keep information hidden.

The impact from the rest of the parameters is not as straightforward.

4.2.4 Politicians ability and the probability of the high-type

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial \rho} = \Delta\mu(b(1 - q\beta) - \rho\Delta\mu - \pi_1^e)$$

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial \Delta\mu} = \rho(b(1 - q\beta) - \rho\Delta\mu - \pi_1^e)$$

If the level of expected inflation in the pooling equilibrium is high, then the probability of a high-type and the difference between types have negative effect on the occurrence of equilibrium without the CBI. Higher inflation makes it preferable for all parties involved to take control of the economy. Hence, the low-type does not want to expand the economy further and reveals her type, and as a result, the opposition loses incentives to veto CBI.

However, if the equilibrium level of inflation is lower than optimal, then the greater the probability of the high-type or difference in ability require the more that inflation to achieve the equilibrium level of output. Subsequently, inflation gets closer to the optimal level. However, we do not expect this to happen in reality.

4.2.5 Weight of output in utility and expected inflation

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial b} = b - (1 + q\beta)\rho\Delta\mu - \pi_1^e$$

$$\frac{\partial f_2(H, \Delta\mu, b, \rho, \beta, q, \pi_1^e)}{\partial \pi_1^e} = -\rho\Delta\mu - \pi_1^e + b$$

If the level of inflation, the probability of high-type, or the difference in ability are high, then the greater the weight of output in preferences or the expected inflation, the lower the chance of the pooling equilibrium. This is because the low-type will prefer the country to be run by a more able politician.

However, if the level of inflation, the probability of high-type, and the difference in ability are all low, – while the weight of output is already high, – the greater the weight of output in preferences or the expected inflation, the closer the equilibrium inflation is to optimal. As a result, the more incentives politicians have to deviate from the equilibrium

output and expand the economy.

4.3 Discussion

Denote $H_1 = \frac{1}{\beta q}(0.5(\rho\Delta\mu + \pi_1^e - b)^2) + b\rho\Delta\mu$ and $H_2 = \frac{1}{\beta}(0.5\Delta\mu^2 + b(1 + \beta\rho)\Delta\mu)$. The equilibrium with CBI exists if $H < H_1$ and the pooling equilibrium exists if $H > H_2$. There is no direct relationship between H_1 and H_2, implying that dependent on the parameters, multiple equilibria is possible or the equilibrium might not exist. However, very low or very high rent would result in a unique equilibrium: low with CBI and high without it. In effect, we can predict that reducing corruption, and thus lowering the rent, in developing countries would seriously reduce incentives of the low-type politicians to expand the economy before elections. Consequently, more stable economies would reveal the type of the incumbent, and thus, decrease the probability of the opposition to win elections in the case of the high-type incumbent. Henceforth, the contender will have more incentives to support the establishment of CBI.

Note that an attempt to improve CBI often comes after a period of high inflation (e.g., USA (1979), Israel (1985), Argentina (1991)) or a financial crisis (e.g., South Korea (1998)). Growing inflation in our model means increasing π_1^e. A spike in π_1^e might break the existence of the pooling equilibria condition (2). If the other parameters are such that condition (1) is satisfied – for example, rent H is not too high – then the economy switches to the equilibrium with CBI (e.g., USA). However, if condition (1) is not satisfied, implying that the rent H is still too high, CBI will not be established and at some point when inflation decreases the country will return to the pooling equilibrium (e.g., Argentina). In the case of a financial crisis that is not necessarily associated with high inflation, a country might experience pressure due to its inability to borrow from outside market or to receive financial aid. This kind of pressure reduces rent H and makes the equilibrium with CBI more likely (e.g., South Korea).

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A   Appendix

A.1   Proof of Lemma 1

If the status of the central bank is independent, then the economy does not experience inflation. Voters are rational and also do not expect inflation. Hence, $\pi_1 = \pi_2 = \pi_1^e = \pi_2^e = 0$. This results in $y = \mu$ in both periods, and voters observe the output. Thus, the state of the economy reveals the type of the incumbent. The high-type gets re-elected, while uncertainty is better than the low-type, so the low-type loses the election. The payoffs of both types of incumbent are straightforward.

A.2   Proof of Lemma 2

There is no need to get re-elected in period 2, so the incumbent maximizes her utility.

$$\max_{\pi_2} b(\pi_2 - \pi_2^e + \mu) - 0.5\pi_2^2 + H.$$

Hence, the first-order condition suggests $\pi_2 = b$. Voters are rational, so they form consistent inflationary expectations $\pi_2^e = b$. The politician payoff is straightforward.

A.3   Proof of Lemma 3

First, consider separating equilibrium at this stage. Then the low-type does not have incentives to pretend to be the high-type and chooses the optimal level of inflation, which is $\pi_L = b$. Hence, the high-type also chooses the optimal level, which is $\pi_H = b$. Since voters are rational, the inflationary expectations are $\pi_1^e = b$. Note that then the payoff of the high-type incumbent is

$$u^I(\mu_H) = (1 + \beta)(-0.5b^2 + b\mu_H + H) < (1 + \beta)(b\mu_H + H),$$

A.4   Proof of Theorem 1

To establish final equilibrium results, we have to consider what happens in the subgame with permanent absence of CBI.

Separating equilibrium: Given that the voters distinguish between the types, the low-type chooses the optimal level of inflation, which is $\pi_L = b$. The optimal level of inflation is also available to the high-type, hence, $\pi_H = b$. Thus, the inflationary expectations are $\pi_1^e = b$. For this equilibrium to exist, the low-type should not have incentives to mimic the high-type. The payoff of the low-type in the equilibrium is

$$u^I(\mu_L) = -0.5b^2 + b\mu_L + H + \beta(-0.5b^2 + bE\mu).$$

If the low-type pretends to be the high-type, then inflation has to be higher than b, $\pi_L =$

$b + \Delta\mu$. In this case, the payoff of the low-type would be

$$u_{LH}^I(\mu_L) = -0.5(b + \Delta\mu)^2 + b\mu_L + H + \beta(-0.5b^2 + b\mu_L + H).$$

For equilibrium to exist, the latter must not be greater than the original utility, thus,

$$-0.5\Delta\mu(2b + \Delta\mu) + \beta(b\mu_L + H - bE\mu) < 0$$

$$0.5\Delta\mu^2 + b(1 + \beta\rho)\Delta\mu - \beta H > 0.$$

Now consider the first stage where politicians decide on the delegation. Initially, there is no CBI. First, consider the high-type incumbent. The payoff of the high-type with CBI is

$$u_{CBI}^I = (1 + \beta)(b\mu_H + H).$$

The payoff of the high-type without CBI in separating equilibrium is

$$u_{sep}^I = (1 + \beta)(-0.5b^2 + b\mu_H + H).$$

Note that $u_{CBI}^I > u_{sep}^I$, hence, the high-type incumbent supports CBI. The low-type loses re-election, thus, her payoff under CBI is higher due to lack of inflation. Consequently, in this case, the low-type incumbent votes for CBI.

Note that the election results do not depend on whether there is CBI or not. As a result, the contender's probability of getting elected is not affected by that. The payoff of the contender is

$$u_{CBI}^C(\mu) = bE\mu + \beta(\rho b\mu_H + (1 - \rho)(b\mu + H)).$$

The payoff in the separating equilibrium without CBI is

$$u_{sep}^C(\mu) = -0.5b^2 + bE\mu + \beta(-0.5b^2 + \rho b\mu_H + (1 - \rho)(b\mu + H)).$$

Hence, $u_{CBI}^C(\mu) > u_{sep}^C(\mu)$ and the opposition prefers a more stable economy without inflation in this case.

As you can see, we obtained that the separating equilibrium in the subgame with permanent absence of CBI delivers separating equilibrium with CBI in the entire game. The only condition for the existence of this equilibrium is the existence of separating equilibrium in the discussed subgame, i.e.,

$$0.5\Delta\mu^2 + b(1 + \beta\rho)\Delta\mu - \beta H > 0.$$

Pooling equilibrium: Voters have a belief p about the probability of the high-type and the incumbent is re-elected with probability q. Consider three different cases.

Case 1: $p > \rho$, then the incumbent is always re-elected, hence, $q = 1$, implying that the contender is never elected. As a result, she prefers a CBI that would provide her with probability $(1 - \rho)$ of winning the election. This implies that the central bank stays dependent if and only if the incumbent is the low-type. The voters would update beliefs accordingly, i.e., $p = 0$, which leads to contradiction. Thus, this equilibrium does not exist.

Case 2: $p < \rho$, then the incumbent always loses the election. The pooling equilibrium does not exist in this case, because none of the types has incentives to choose the level of inflation different from b. If they both choose $\pi_1 = b$, then the equilibrium would be separating as it would produce different levels of output.

Case 3: $p = \rho$, then the incumbent wins re-election with some positive probability q. The pooling level of output is denoted y^p, and for simplicity, we specify that voters update their belief as follows.

$$p(y) = \begin{cases} \rho, & \text{if } y = y^p \\ 0, & \text{otherwise} \end{cases}.$$

In order to achieve y^p, the incumbent has to stimulate the economy with the following levels of inflation:

$$\pi_1^L = y^p + \pi^e - \mu_L \text{ and } \pi_1^H = y^p + \pi^e - \mu_H.$$

As a result, the voters will form the inflationary expectations

$$\pi_1^e = \rho\pi_1^H + (1 - \rho)\pi_1^L = y^p + \pi^e - (\rho\mu_H + (1 - \rho)\mu_L) \Rightarrow y^p = E\mu.$$

Hence, in this equilibrium only one level of output is possible, however, with different levels of inflation. We keep π^e as a parameter, then

$$\pi_1^L = \rho\mu_H + (1-\rho)\mu_L + \pi_1^e - \mu_L = \rho\Delta\mu + \pi_1^e$$

$$\pi_1^H = \rho\mu_H + (1-\rho)\mu_L + \pi_1^e - \mu_H = -(1-\rho)\Delta\mu + \pi_1^e.$$

Utility of the high-type is

$$u^I(\mu_H) = -0.5(-(1-\rho)\Delta\mu + \pi_1^e)^2 + bE\mu + H - 0.5\beta b^2 + q\beta(b\mu_H + H) + (1-q)\beta bE\mu.$$

If the high-type deviates to some other level of inflation, the most profitable level is b, however, any deviation results in no re-election. Thus, her utility in this case would be

$$u_{\pi=b}^I(\mu_H) = -0.5b^2 + b(b - \pi_1^e + \mu_H) + H + \beta(-0.5b^2 + bE\mu).$$

For equilibrium to exist, we must have $u^I(\mu_H) \geq u_{\pi=b}^I(\mu_H)$ (IC constraint for the high-type).

By analogy, utility of the low-type is

$$u^I(\mu_L) = -0.5(\rho\Delta\mu + \pi_1^e)^2 + bE\mu + H - 0.5\beta b^2 + q\beta(b\mu_L + H) + (1-q)\beta bE\mu.$$

Utility of the low-type under the deviation to b is

$$u_{\pi=b}^I(\mu_L) = -0.5b^2 + b(b - \pi_1^e + \mu_L) + H + \beta(-0.5b^2 + bE\mu).$$

IC constraint for the low-type is $u^I(\mu_L) \geq u_{\pi=b}^I(\mu_L)$, which simplifies to

$$-0.5(\rho\Delta\mu + \pi_1^e - b)^2 + q\beta(H - b\rho\Delta\mu) > 0,$$

and implies that IC for the high-type holds too.

Now notice the following. If $q \geq \rho$, then the contender prefers CBI as her probability of winning election $1 - \rho$ would be greater than $1 - q$ in the case of a pooling equilibrium. If $q \leq \rho$, then the contender votes against CBI to maximize her probability of election $1 - q$

versus $1 - \rho$. Note that when $q \geq \rho$, the central bank is not independent if and only if the incumbent is low-type, hence, the voters update their beliefs and $p = 0$, which contradicts $p = \rho$. Hence, only the situation with $q \leq \rho$ is possible. The central bank stays dependent because the contender prefers to hide the information about the type of the incumbent as it gives her better chances of winning the office. This equilibrium exists if the corresponding pooling equilibrium exists, i.e.,

$$-0.5(\rho\Delta\mu + \pi_1^e - b)^2 + q\beta(H - b\rho\Delta\mu) > 0.$$

Note that the preferences of the low-type incumbent do not matter in this case.