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# Central Bank Independence: Rules, Practices, and Outcomes

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CENTRAL BANK INDEPENDENCE: RULES, PRACTICES, AND OUTCOMES

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CENTRAL BANK INDEPENDENCE: RULES, PRACTICES, AND OUTCOMES

By

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## **Abstract**

In recent years interest has grown in central bank independence as research has shown that it may affect many important financial issues such as unemployment, inflation, and inflation variability, among others. However, empirical evidence regarding its effect has been inconclusive and there is low correlation among various legal central bank independence measures. In this thesis, I attempt to resolve these problems by generating a new measure of legal central bank independence that takes into account divergence between laws and practices. I then measure the impact that democracy and proportional electoral systems have on reducing this divergence and find that democracy appears to have no impact on divergence, or actually increases it. While the results are mixed for proportional electoral systems, it appears that there will be less divergence between de jure and de facto central bank independence in countries using proportional electoral systems than countries utilizing majoritarian electoral systems.

Using this information, I then test the impact that the new measure of legal central bank independence has on two key economic variables: inflation and inflation variability. I find that while it is a significant factor for explaining inflation in both developed and developing countries, it has less value in explaining inflation variability. I conclude, therefore, that while this new measure of legal independence provides a better indicator of a central bank's ability to pursue orthodox monetary policies over the long term, it is not foolproof. Consequently, in the future, model adjustments need to be made to better analyze the impact that the new model of legal central bank independence has on price stability. This will provide long-term stability regarding a country's economic policies for investors and individuals alike.

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## **Introduction**

What impact does an independent central bank have on monetary policies? In recent years interest in central bank independence has grown as research has shown that it may affect a variety of important financial issues including inflation, inflation variability, unemployment, and a country's budget deficit, among others (Eijffinger and de Haan 1996). However, while independent central banks, which are associated with orthodox monetary policies, are lauded by scholars and policymakers alike, measuring the level of independence is a controversial issue. Some researchers measure it based on legal factors such as appointment of board members, length of members' terms in office, and whether government officials sit on the bank's board (Alesina 1988; Cukierman 1992; Grilli, Masciandaro, and Tabellini 1991). Others, in contrast, argue that these measures do not capture the true level of independence since oftentimes there are broad divergences between legal obligations and actual practices, especially in developing countries. Consequently, they measure central bank independence using observable factors including a governor's turnover rate (Cukierman 1992; Cukierman, Webb, and Neyapti 1992; de Haan and Siermann 1994) and a governor's political vulnerability, which is defined as the percentage of political transitions followed within six months by the replacement of the central bank governor (Cukierman and Webb 1995).

The use of different measures of central bank independence has led to mixed evidence regarding the impact of central bank independence. Bade and Parkin (1988) created an index of legal central bank independence and examined 12 industrial countries between 1972 and 1986. Their findings showed a negative relationship between central bank independence and inflation but no relationship between central bank independence and inflation variability. Meanwhile, Cargill (1995) utilized Cukierman's (1992) weighted legal independence index for 20 industrial

countries between 1962 and 1991 and found no relationship between central bank independence and inflation.

These contradictory findings should not be surprising. Forder (1999) discovered that when Germany and Switzerland are removed from various measures of central bank independence, the correlation coefficient between several highly respected measures of legal central bank independence is extremely low. Likewise, other studies (Cukierman 1992; Cukierman, Webb, and Neyapti 1992) have shown that while legal independence reduces inflation and inflation variability in developed countries, it does not impact these variables in developing countries. Instead, a better indicator of monetary policies in these countries is the central bank governor's turnover rate.

The inconsistencies between various measures of legal central independence bank and their seeming inability to explain monetary policy in developing countries indicate the need for a better measure of central bank independence. In this thesis, I argue that *de jure* and *de facto* measures of central bank independence, by themselves, are incomplete. Therefore, I propose that a new measure of legal independence, which takes into account legal independence and how well actual practices coincide with these laws, will provide a more thorough picture of the central bank's independence in both developed and developing countries, and its ability to pursue orthodox monetary policies over the long term than either individual *de jure* or *de facto* measures of independence.

I then examine domestic political variables that reduce the gap. More specifically, I argue that an increase in the level of democracy in a state will increase the convergence between the two measures of central bank independence due to rule of law and stable property rights. However, even when countries have same level of democracy, there are often broad differences

among them. One feature in particular that distinguishes democracies is electoral systems. Scholars generally place electoral systems into three broad categories: majoritarian, proportional, and mixed. In a majoritarian electoral system the candidate or political party that wins the most votes wins while, as its name suggests, a proportional electoral system is designed to produce proportional outcomes between a party's vote share and the number of seats it is allocated. Finally, a mixed system combines both types of electoral formulas in their elections (Clark, Golder, and Golder 2009; 473-515). Due to the increased need for credible information and the greater number of partisan veto players in proportional electoral systems, I argue that countries employing a proportional electoral system will see greater convergence between *de jure* and *de facto* central bank independence than countries utilizing a majoritarian electoral system.

Proportional electoral systems are designed to increase continuity between the percentage of votes a political party and/or coalition receives, and the number of seats it is allocated in the legislature. Therefore, it reduces the surplus of votes, i.e. the number of votes over and above what is needed to win a seat in the legislature, for the winning candidate(s) and the number of votes spent on losing candidates. Together, surplus votes and votes for the losing candidates are referred to as "wasted votes."

In proportional electoral systems where fewer votes are "wasted", there tend to be more political parties each of which can be viewed as a partisan veto player. Additionally, research (e.g. Aldrich 1995; Downs 1957) has shown that different constituencies and electoral cycles cause political parties/coalitions to have divergent monetary policy preferences. However, due to the high costs of obtaining information, monetary policy is designated to a cabinet minister. Because the cabinet minister is given agenda control and discretion over monetary policy, there is an incentive for this individual to manipulate policy for his/her own benefit, at the expensive

of other party/coalition members. According to Bernhard (2002), an independent central bank can check this problem by providing credible information regarding the impact of the cabinet's monetary policies and by removing discretion in day to day monetary operations (Grilli, Masciandaro and Tabellini 1991; Havrilesky 1994). He also finds that an increase in legal central bank independence increases cabinet durability.

However, this same argument can be applied to the convergence of *de jure* and *de facto* independence. Tsebelis (1995; 2002) argues that an increase in the number of veto players leads to greater policy stability. Due to the greater number of political parties in proportional electoral systems, a wider variety of interests are represented. Therefore, when a political party/coalition takes power, there is an even greater need for individual legislatures/political parties to have the credible information on monetary policy that an independent central bank provides due to the increase in divergent preferences.

A potential critic of this hypothesis is that over time, general preferences regarding the level of autonomy afforded to a central bank may change. Due, however, to the large number of veto players in a proportional representation system, laws providing the central bank with legal autonomy may remain static (Tsebelis 1995; 2002). To respond to preference changes, the government may undermine or bolster *de facto* central bank autonomy, thus increasing the divergence between *de jure* and *de facto* central bank independence. However, literature on informal institutions (e.g. Lauth 2000; North 1990) indicates that they tend to be highly durable and when they do experience change it tends to be slow and incremental. Moreover, since central bank independence provides credible information on monetary policy that enables individual legislatures/coalition party members to ensure that monetary policies are not unfairly disadvantaging their electoral potential, regardless of whether a right-wing or left-wing

party/coalition is in power, they will value central bank independence. Therefore, it is unlikely that in a proportional representation system, the government will make broad changes to de facto central bank independence.

It is important to note that this thesis does not argue that a higher level of democracy and the presence of a proportional electoral system will increase legal or non-legal central bank independence. A higher level of democracy may cause politicians to reduce central bank independence so they can implement inflationary monetary policies to benefit their electoral interests. Likewise, because proportional electoral systems take into account a broader range of interests, governments may experience greater pressure from the lower class to reduce central bank independence so that it can conduct expansionary monetary policy that increases employment beyond its natural level.<sup>1</sup> This thesis, rather, is concerned with domestic political variable that decrease the gap between de jure and de facto independence since this will increase the credibility of the central bank at each level of independence.

Why is this important? Helmke and Levitsky (2004) argue that when making choices, political actors take into account both informal and formal incentives. For example, while Mexico's president is elected based on formal institutionalized rule, for many decades it was also a common practice for the outgoing president to hand-pick his successor in a process known as *dedazo*. As a result, it was impossible for an outsider to win the presidency (Langston 2003). If a researcher ignored this important practice, any analysis of Mexican politics would be faulty. Given, therefore, the importance of both types of incentives, institutional analysis should examine both formal rules as well as informal practices.

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<sup>1</sup> This is defined as "the rate that would occur in the absence of monetary disturbances" (Bernhard, Broz, and Clark 2001, 706).

For a central bank formal rules are seen in the level of de jure independence provided by the government, while informal rules can be seen in the government's adherence to these rules. However, as was previously noted, research (e.g. Cukierman 1992) indicates that although formal rules governing a central bank are a strong indicator of monetary policy in developed countries, they do not appear to have an impact in developing countries. Instead, the turnover rate and/or the political vulnerability of the central bank governor is a better predictor of monetary policies for these countries. If this is the case, then there is no need to grant the central bank formal independence in developing countries since this is often a politically contentious issue. Instead, countries can demonstrate their commitment to orthodox monetary policies simply by providing the central bank with broad operational autonomy (Hiroi 2009). Likewise, scholars and investors can predict monetary policies in developed countries by examining the laws governing a central bank's independence.

However, the contention of this thesis is that a new measure of central bank independence that takes into account legal independence and its divergence from actual practices governing the central bank will provide a better indicator of a central bank's ability to pursue orthodox monetary policies regardless of whether it is a developed or developing country. To test this hypothesis I will compare the impact that de jure, de facto, and the new model of legal central bank independence have on two key economic variables: inflation and inflation variability.

These variables were chosen since central bank independence is “not the independence to do anything that the CB pleases. It is rather the ability of the bank to stick to the price stability objective even at the cost of other short-term real objectives” (Cukierman 1992, 370). This is important because it will provide investors (both domestic and international) as well as individual citizens with greater confidence in a country's long term monetary policies. Wage



contracts and investments can then be made based on a better analysis of the impact they will have on the real value of individuals' money.

The thesis will be organized into seven chapters. The first chapter will examine the importance of central bank independence and the inadequacy of de jure and de facto measures of central bank independence isolated from one another. The second chapter will then examine factors that may influence the convergence of de jure and de facto central bank independence. The third chapter posits that the new measure of legal central bank independence will better account for inflation and inflation variability than each of de jure and de facto measures alone. In the fourth chapter I review of the hypotheses advocated in this thesis. The fifth chapter will then provide the research design and descriptive statistics for variables used in the analyses. The sixth chapter will examine the empirical evidence and its implications. Finally, the last chapter will provide a review of the thesis and concluding remarks.

## **Chapter 1**

### **Importance and Measurement of Central Bank Independence**

The central premise for creating an independent central bank is that it provides the country with a stable economic environment. Cukierman (1995) identifies five reasons why in recent years, countries have chosen to show their commitment to price stability by increasing central bank independence rather than by using other instruments. First, there was the breakdown of institutions, such as the Bretton Woods System, that were designed to maintain monetary stability. Second, the example of the Bundesbank, the German central bank, showed that an independent central bank could be instrumental in maintaining nominal stability. Third, for many countries in Europe, increased central bank independence was a precondition for entrance into the European Monetary Union. Fourth, stabilization of high inflation caused policymakers to search for institutions that could prevent this problem from reoccurring in the future. Finally, following the collapse of the Soviet Union, many former socialist countries saw an independent central bank as a necessary institutional device to enable the market economy to function in an orderly manner.

So how does an independent central bank help maintain price stability? Oatley (1999) argues that independent central banks prevent politicians from using monetary policy for political gain. Although macroeconomic stability is desirable, opportunistic politicians will pursue inflationary policies to improve their chances of being reelected (Nordhaus 1975; Boylan 1998). More specifically, Cukierman (1992) provides three potential motives for monetary expansion: the employment motive, the revenue motive, and the balance of payments motive.

The employment motive occurs when policymakers try to increase employment above its natural level, which they view as too low. There are two theories regarding this bias. The first,

which was developed by Barro and Gordon (1983), argues that politicians try to increase employment because taxes on labor have driven employment below socially optimal levels. Woolley (1984), on the other hand, advocates the belief that politicians try to use monetary policy to increase employment levels since an important part of their constituency are negatively impacted by higher unemployment.

Meanwhile, the revenue motive occurs when governments increase the money supply to raise revenues. This motive will be most prevalent in countries that have smaller capital markets where it is more difficult for the government to issue large amounts of debt to finance its budget. Finally, the balance of payment motive occurs when politicians inflate and devalue the currency to achieve better balance of payments. Cukierman indicates that currency devaluation benefits balance of payments issues in two ways. First, by reducing real wages it can stimulate employment and output, thus increasing resources available for exports and import substitutes. Second, devaluation of the currency reduces the real value of government obligations held by the public. Due to the lower buying power of their monetary resources, the public will, therefore, reduce its consumption.

However, these motives are plagued by dynamic inconsistency problems. Kydland and Prescott (1977) argue that when the government retains discretionary power over monetary policies, rational choices in the present period lead to suboptimal outcomes in future periods. More specifically, when the public knows that the government has the discretion to achieve one of these motives, it will embed beliefs regarding future inflation into the nominal wage and capital contracts thus reducing the effectiveness of the government's monetary “shock” policies (Cukierman 1995). Governments can avoid this problem by implementing orthodox monetary policies.

However, as long as they retain discretion over monetary policies, they are faced by the credible commitment problem; they may have future incentive to renege on their promise and they hold the power to enforce the promise (North and Weingast 1989). Governments can increase their credibility by creating rules (Kydland and Prescott 1977) and institutions (Acemoglu and Robinson 2006, 134) that limit the government's ability to influence policy. For monetary policy, this institution is an independent central bank that has an explicit mandate for price stability. However, money is politics. Consequently, conferring legal independence to the central bank is often a contentious issue.

Granting central banks with legal independence removes an important element of economic decision-making from the control of democratic governments and forces them to implement fiscally conservative policies that ensure macroeconomic stability (Boylan 1998). Politicians may object to this independence since it inhibits their ability to gain electoral support through economic policies that benefit their constituents. This is a problem that has long been cited in the literature on political-business cycles. Research (e.g. Nordhaus 1975) indicates that employment-inflation patterns in democratic countries are often based on election cycles. To gain electoral support, when there is an impending election, the government will implement inflationary policies that increase employment levels. Following the elections, however, increased pressure to reduce inflation forces a tightening of monetary policies that leads to higher unemployment and deflation. As this pattern becomes cyclical, it leads to boom and bust cycles that are suboptimal for the economy.

However, even when a government provides the central bank with legal autonomy, it does not necessarily guarantee that the central bank will be independent. If the rules governing its independence are not followed, the bank's ability to pursue orthodox monetary policies may

actually be much lower than what is legally stipulated. In Argentina, for example, the law provides the central bank governor with a four-year term. It is, however, a common practice for the governor to resign whenever a new government takes power or even when a new finance minister comes into office. As a result, the average term for Argentinean central bank governors in the 1980s was a mere 10 months (Cukierman 1992). If a legally independent central bank remains subservient to the government, then its credibility as an institution that checks the use of opportunistic policies by the government is greatly diminished and it will be less successful in obtaining price stability. Hence, during the 1980s, Argentina's average annual compound inflation was 319 percent and annual increases in the consumer price index ranged from a minimum of approximately 90 percent in 1986 to a maximum of 3080 percent in 1989.<sup>2</sup>

Another problem facing governments is that there may be broad opposition to providing the central bank with legal autonomy. This often occurs when there are broad political cleavages regarding the benefits of an independent central bank. Research (e.g. Taylor 1992; Mershon 1994) indicates that when it is difficult to create formal institutions, political actors may resort to informal institutions. The government, therefore, may grant the central bank broad informal autonomy (i.e. refrain from interfering in the central bank's operations) to implement orthodox monetary policies, yet withhold legal autonomy (Hiroi 2009). Although this independence increases the central bank's credibility, the lack of institutionalization leaves it vulnerable to political pressure and perceptions of forthcoming economic and/or political instability can trigger fears that negatively affect the country's finances (Hiroi and Block 2010).

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2 This information was calculated using data from the World Bank's (2005) "World Development Indicators 2005".

In Brazil, for example, President Cardoso (1995-2002) sought to provide the central bank with legal autonomy. However, opposition from leftist political parties prevented him from doing so. As a result, he was only able to provide the bank with informal operational autonomy. Following the 1997 financial crisis in Asia and the 1998 financial crisis in Russia, investors began to fear that Brazil's economy would be the next one to collapse. This caused capital flight that led to a 45 percent decline in the country's foreign reserves in less than five months and forced Brazil to negotiate an emergency loan from the International Monetary Fund.

This, however, was not the end of Brazil's financial problems. In 2002, as President Cardoso's term in office was coming to an end, it appeared that the leftist candidate, Luiz Inácio "Lula" da Silva, would become Brazil's next president. Because the central bank's autonomy was not cemented into law, many investors feared that Lula, a former labor union leader, would reduce the central bank's operational autonomy so that he could pursue policies that would benefit his constituents. This led to widespread capital flight, currency devaluation, and high inflation that only ended when Lula took office and demonstrated a strong commitment to orthodox monetary policies.

As this indicates, both de jure and de facto central bank independence are incomplete and neither one, by itself, will enable a country to solve its credible commitment problem. If laws are in place but not followed, a common practice in developing countries, then investors will have minimal confidence in the central bank's ability to implement fiscally conservative monetary policies. Likewise, informal independence will also leave investors (both domestic and international) wary since there is no guarantee that the central bank will retain its independence over the long term and high inflation may erode the value of their investments. Given these problems, a better overall measure of central bank independence is one that takes into account

legal central bank independence and the gap in actual practices. This new way of measuring central bank independence will provide a more thorough indicator of the central bank's ability to pursue orthodox monetary policies over the long term. It will also provide investors with greater confidence in the stability of a country's current economic policies, thus helping prevent problems such as the capital flight that Brazil experienced in the 1990s.

It is important to note that this thesis does not argue that a country that has minimal legal independence but a high level of continuity with actual practices will pursue orthodox monetary policies. Rather, it posits that analyzing legal measures of central bank independence together with the gap in actual practices will reduce uncertainty regarding a country's long term monetary policies. This is important because it will enable wage contracts and investments to be made based on the most accurate information available. Additionally, this new way of analyzing legal central bank independence will also enable scholars to better gauge the impact that each level of legal central bank independence has on monetary policies.

## **Chapter 2**

### **The Convergence of Measures**

Given the importance of measuring central bank independence based on legal obligations and the divergence from actual practices, what factors increase continuity between laws and practices? To date this question has not been examined. Because most quantitative studies of central bank independence have focused on either de jure or de facto independence, scholars have centered their efforts on identifying factors that influence de jure or de facto independence in isolation from each other. Maxfield (1997) argues that central bank independence in developing countries is dependent upon the whims of politicians who provide the central bank with greater independence when they want to increase international creditworthiness. Meanwhile, other scholars examine sectoral aspects including political party polarization (Alesina 1988; Bernhard 1997; 2002), the strength of the financial sector (Clark 1993), and the number of and polarization of veto players (Keefer and Stasavage 2003).

Although these studies have made important advances in understanding why countries choose to provide the central bank with more independence, this thesis is focused on the gap between formal and informal rules. In other words, what factors increase the willingness of institutional actors to abide by laws governing a central bank's independence? It is plausible to imagine that some elements that increase either de jure or de facto independence will also impact the convergence of the two types of independence. For example, if legal independence increases when countries want to demonstrate international credit worthiness (Maxfield 1997), then countries may also strictly follow these rules to bolster their reputation. Likewise, if the financial sector is a powerful actor, it may demand strict adherence to laws governing central bank independence to prevent expansionary monetary policies from eroding the value of its interests.



Another variable, whose impact on central bank independence has not been broadly analyzed by scholars, is democracy. One study (Bagheri and Habibi 1998) has shown that a higher level of political rights leads to more central bank independence in democratic and semi-democratic countries. Additionally, Hiroi and Block (2010) speculate that an increase in democracy will reduce the gap between the two measures in developing countries, but they do not test this idea or go into great detail regarding the logic behind this argument.

A central reason for this gap may be that literature on central bank independence places great emphasis on industrial countries (e.g. Bernhard 1998) where scholars may simply assume that a high level of democracy exists. Eijffinger and de Haan's (1996, Table B1) overview of studies on central bank independence show that 24 key studies examined central bank independence in industrial countries while only 5 looked at its impact in developing countries. This is an important gap in central bank literature that I hope to help fill. In particular, I argue that that an increase in the level of democracy will reduce the gap between a country's *de jure* and *de facto* central bank independence score in both developed and developing countries.

Scholars (North and Thomas 1973; North 1990) argue that democracies are characterized by rule of law and stable property rights. These aspects of democracy are likely to reduce the gap between a country's *de jure* and *de facto* central bank independence for two reasons. First, since countries with higher levels of democracy more closely follow the rule of law, when central banks are given legal independence, it is more likely that the government will abide by rules governing the bank's independence, thus increasing its credibility.

This contention is not without its critics. Barro (2000) agrees with the argument that rule of law is associated with stable property rights that lead to increases in economic growth. He found, however, that democracy is not necessarily associated with rule of law; many

nondemocratic countries closely follow the rule of law although these rules may be unfair. A country's level of democracy, therefore, may have no bearing on central bank independence, and in some cases, may actually have a negative impact on it. For example, as the level of democracy increases, the electorate may make greater demands for redistribution programs that require the government to reduce the central bank's independence to obtain more economic resources.

Second, property rights traditionally have been thought of as physical assets such as land and commodities. However, with the advent of fiat money and vast increases in foreign direct investment, monetary property rights, i.e. the purchasing power of a country's currency, have grown increasingly important. As was indicated in the beginning of this thesis, when governments retain control over monetary policy, it is difficult for them to assure stable monetary property rights due to the credible commitment problem.

One way to ensure stable monetary property rights is to provide the central bank with independence and a mandate for price stability. Broz (2002) argues that the greater transparency present in democratic regimes increases the credibility of legal central bank independence since opportunistic policies will have greater costs for political actors. Although this institutional remedy may work in a democracy where there are a broad variety of interest groups, it will have minimal impact in a dictatorship. Bagheri and Habibi (1998) argue that since there are no constitutional guarantees in a dictatorship, central bank independence is meaningless since the government holds all the power and can do as it pleases.

Critics, however, may argue that this lack of governmental restraint is beneficial for achieving the central bank's main goal-price stability. Research (Skidmore 1977) indicates that democratic countries have higher inflation than non-democratic countries and that authoritarian regimes' ability to minimize societal pressures may help them better achieve price stability

(O'Donnell 1973). An example of this is Chile. In 1973 a military junta, responding to vast economic instability, ousted the democratically-elected government led by president Salvador Allende. Slashing all government programs deemed unnecessary and following orthodox monetary policies, between 1973 and 1979, the dictatorship was able to reduce annual inflation from 361.5 percent to 33.4 percent (World Bank 2005).

There is, however, a flip side to this coin. While the government may be able to credibly commit to orthodox monetary policies that help maintain stable monetary property rights in the short term, there is no guarantee that these policies will be maintained over the long term. Since there are fewer checks and balances in authoritarian regimes, the government can rapidly implement drastic changes in monetary policy to suit its needs. Therefore, for every case like Chile, where a decrease in the level of democracy led to low and stable inflation, there is a case like Zimbabwe where the erosion of political rights and civil liberties coincided with hyperinflation that reached an astounding 11.2 million percent in August 2008 (Cable News Network 2008).

In contrast, in democratic regimes a wider range of interests must be represented since politicians can be voted out of office by the citizens. Research (e.g. Kramer 1971; Erikson 1989) shows that economic performance is a key issue influencing candidate support in both high-income (Chappell and Veiga 2000) and low-income democracies (Remmer 1991; Pacek 1994; Pacek and Radcliff 1995).<sup>3</sup> More specifically, positive economic performance increases candidate/political party support, while negative economic performance reduces it. Therefore, the government, which is made up of elected officials, may avoid vast changes to de jure and de

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<sup>3</sup> A broad overview of the literature on the relationship between economic performance and electoral support can be found in Lewis-Beck and Stegmaier's (2000) article.

facto central bank independence that erode monetary property rights since these actions may negatively affect the economy and result in their political demise.

In addition to holding government leaders accountable for monetary policy, democracy may also reduce the gap between legal central bank independence and actual practices by allowing changes to laws governing central bank independence to be challenged at different levels (i.e. judiciary, legislature, etc) of the government. In other words, there are a greater number of veto players Tsebelis (1995; 2002) argues that the greater number of veto players, the more static policy will remain. Likewise, Moser (1999) shows that the more checks-and-balances (veto players) that are prevalent in a country, the greater impact that a given level of central bank independence has on monetary policy. The increased difficulty of making policy changes will help increase the convergence between central bank laws and actual practices. In contrast, in dictatorships, there are fewer checks and balances, and thus there will be greater divergence between laws and practices over the long term.

Indicating the relationship between democracy and the convergence of legal and non-legal central bank independence is important. However, this is simply scratching the surface since there are broad variations among democracies. For example, while the United Kingdom and the United States both have highly democratic governments, a comparative analysis of their political systems would show vast differences in their institutions and the outcomes that they produce.

Underlying the difference between democratic countries is the vision of how democracy should be conducted. Clark, Golder, and Golder (2009, 379-384) note that as indicated by

Arrow's Theorem<sup>4</sup> countries can only have two of three desirable attributes: group transitivity, universal admissibility, and non-dictatorship. Consequently, they must choose between institutions that disperse or concentrate power. When democracies disperse power, Lijphart (1999) refers to them as consensus democracies, while democracies that concentrate power are referred to as majoritarian democracies.

In majoritarian democracies, policies are based on the opinions of the electoral majority, and minority opinions should not impact the policymaking process. In contrast, consensus democracies believe that policies should be determined by the largest number of citizens possible (Clark, Golder, and Golder 2009, 680). These differing viewpoints are vitally important since they determine a country's political institutions.

In particular, it is recognized that majoritarian democracies have majoritarian electoral systems where the candidate or party that receives the most votes wins. Meanwhile, consensus democracies tend to employ proportional electoral systems that try to ensure continuity between the percentage of votes won and the number of seats won. In other words, they produce proportional outcomes. To more clearly understand the impact of electoral systems, consider the case of the United Kingdom (Clark, Golder, and Golder 2009, 475-476).

This country employs a single-member district plurality system that is a type of majoritarian electoral system where each voter cast a vote for a candidate in a single-member district and the candidate in each district with the most votes wins. During the 1983 legislative election, the Alliance, a coalition between the Social Democratic Party and the Liberal Party, won 25.4 percent of the national vote but earned a mere 3.5 percent of legislative seats since

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4 Arrow's theorem and the logic underlying it can be found in his book *Social Choice and Individual Values* (1963).

their votes were spread across many districts. Meanwhile, the Conservative Party won 61.1 percent of legislative seats with only 42.4 percent of the national vote. If, however, the same election results had occurred in a proportional electoral system, the election results would have more closely mirrored actual vote percentages. Thus, the Alliance would have won approximately 25 percent of legislative seats, while the Conservative Party would have won 42 percent of legislative seats.

The question that remains is: how does the type of electoral system impacts the gap between laws and actual practices governing central bank independence? In theory, when a legislative body passes a law, it should retain the force of law regardless of which political party is in power. However, especially with regards to monetary policy, vast differences exist among the electorate. According to the partisan model of macroeconomic theory (Alesina and Sachs 1988; Hibbs 1977), governments pursue macroeconomic policies that benefit their core constituents' interests. More specifically, when left wing parties are in power, they pursue low unemployment since their supporters tend to come from wage workers who are more negatively affected by high unemployment. In contrast, right wing parties, whose supporters are more affluent, pursue low inflation at the cost of increased unemployment. Cameron (1978) tested this theory using a sample of 18 industrial countries and found that when left wing parties were in power, there were higher government expenditures than when right wing parties were in power. This indicates that depending on the ideology of the political party in power, there will be different pressures placed on the central bank.

Given these findings, we would assume that right wing governments would want to provide the central bank with more autonomy to pursue low inflation policies while left wing governments would be more interested in maintaining control over the bank. An example of this

is Chile. Two months prior to its first democratic elections in more than a decade, the right-wing authoritarian regime, ruled by General Pinochet, passed a constitutional act providing the central bank with extensive legal autonomy. A leading member of the military junta that controlled the country, Admiral Jose Toribio Merino, said that this action was taken to prevent the left-leaning opposition from introducing “a socialist economy” (Latin American Markets 1989). However, opposition members decried this action as a way for the dictatorship to tie the hands of the incoming democratic government in regards to monetary policy.

The electoral system, however, will influence how much independence a central bank is afforded. Under a majoritarian system a right wing government may decide to provide the central bank with broad legal independence to maintain low inflation, while a left wing party may grant it less independence so that it can pursue higher employment levels. However, oftentimes laws passed under a majoritarian electoral system represent the interests of a simple plurality of voters. Therefore, there may be widespread opposition to the level of independence given to the central bank. If a right wing government provides the central bank with broad autonomy, then when a left wing government comes into power, it may undermine laws governing central bank independence through policies such as replacing the central bank governor. On the other hand, if a left wing government provides the central bank with minimal independence, when a right wing government comes into power, it may give the central bank broader informal autonomy than what is stated in the laws. This will result in greater divergence between de jure and de facto independence.

A key question, however, remains. If in a majoritarian electoral system a political party has a plurality in the legislative branch, why would it not change the laws governing a central bank’s independence to a level that more closely matches its electoral interests? Similar to other

scholars, Boylan (1998) argues that an independent central bank is an important signaling device to international creditors and investors that the central bank will pursue orthodox monetary policy. Therefore, even if a political party is in disagreement with the level of autonomy afforded to the central bank, it will avoid reducing formal independence to prevent massive outflows of foreign capital that will negatively affect the economy and reduce their future electoral potential. Instead, it may choose to reduce de facto independence since this reduction is often more difficult to detect.

On the other hand, a political party that is committed to greater orthodox monetary policies may want to increase legal independence. However, a simple legislative majority does not guarantee that it has sufficient power to change the law. For example, in the United States the Republican Party may want to increase legal central bank independence. If, however, it has a simple majority in either the House or the Senate, the Democratic Party could block increased central bank independence through the use of filibusters and other institutional devices. Likewise, since changes in central bank independence have monetary distributional effects, they are often controversial. Therefore, the Republican Party may instead choose to provide the central bank with greater de facto autonomy which increases its ability to pursue orthodox monetary policies while also reducing controversy since it is less visible to the general public.

As noted earlier in this section, proportional electoral systems tend to “waste” fewer votes than majoritarian electoral systems by reducing the disparity between percentage of votes received and the distribution of legislative seats. In general, this leads to more political parties and the number of seats allocated to political parties more strongly mirrors voter preference. Logic would seem to indicate that countries using proportional electoral system would see increased divergence between de jure and de facto central bank independence since there are a



greater number of competing interests trying to manipulate monetary policy for their own benefit. However, due to the greater need for independent information on monetary policies and the increased number of partisan veto players in countries utilizing proportional electoral systems, I argue that in democracies, proportional electoral systems will lead to a larger reduction in the gap between de jure and de facto central bank independence than majoritarian electoral systems.

Bernhard (2002) indicates that research (e.g. Aldrich 1995; Downs 1957) has shown that within political parties and among coalition partners, there are divergent monetary policy preferences due to a variety of factors including different constituencies and varying electoral cycles, among others. Additionally, when a political party/coalition obtains power in a parliamentary democracy, it gives monetary policy responsibility to a cabinet minister since it is costly for individual legislators to develop expertise in this policy area. To provide the cabinet member incentive to develop expertise in monetary policy and its impact, he/she is given agenda control and discretion over monetary policy. These powers, along with asymmetric information regarding the impact of particular monetary policies, may tempt the cabinet minister to manipulate monetary policy for his/her electoral benefit to the detriment of other party/coalition members.

The creation of an independent central bank, however, can check this tendency. According to Bernhard (2002), an independent central bank reduces the cabinet's discretion in daily policy management (e.g. Grilli, Masciandaro and Tabellini 1991; Havrilesky 1994) and can also publicize disputes with cabinet members (Havrilesky 1994). This enables it to provide legislatures with credible information on the impact of the cabinet's monetary policies thus reducing the cabinet's tendency to manipulate monetary policy and interparty conflict. This is

important in parliamentary democracies since it increases cabinet durability, thus enabling the political party/coalition to retain power for a longer time period.

Although Bernard uses this argument to explain increases in legal central bank independence in the 1980s and 1990s, this same logic can be used to explain why there will be a smaller gap between de jure and de facto central bank independence in countries using proportional electoral systems than countries using majoritarian electoral systems. However, this requires delving into more nuanced aspects. More specifically, my argument rests on the number of veto players that are present in each type of electoral system.

Duverger's Hypothesis states that proportional electoral systems are more likely to have multiparty systems while Duverger's Law indicates that plurality systems lean more toward two party systems (Duverger 1954). According to Tsebelis (1995; 2002), each political party is a partisan veto player and the greater the number of veto players, whether they are institutional or partisan, the more difficult it is to change the status quo. Moser (1999) and Keefer and Stasavage (2002) have also shown that an increase in the number of veto players affords the central bank with greater independence to determine monetary policy.

Given the larger number of partisan veto players in a proportional electoral system, any attempt to change either de jure or de facto independence (i.e. altering the status quo) will run greater risk of opposition. Likewise, the increased number of political parties in proportional electoral systems will make the central bank's ability to provide credible information on the monetary policy even more important since there is a greater fractionalization of interests. Therefore, regardless of whether a right wing or a left wing political party/coalition controls the government, they will avoid tampering with the central bank's independence. As a result,

countries that utilize proportional electoral systems will have a smaller gap between de jure and de facto central bank independence than countries that have majoritarian electoral systems.

A criticism of this argument is that proportional electoral systems lead to greater redistribution of economic resources than majoritarian electoral systems. There are a number of possible explanations for this finding, including greater propensity of left wing parties to control the government (Clark, Golder, and Golder 2009), fewer wasted votes by left wing parties whose constituents tend to be concentrated in urban areas (Rodden 2005), and coalition governments (Persoon, Roland, and Tabellini 2007), among others. We should expect, therefore, to find lower levels of central bank independence in countries utilizing this type of electoral system. However, while there may be lower levels of central bank independence, there should still be more continuity between laws and practices. The logic surrounding this hypothesis, therefore, remains the same.

## Chapter 3

### The Impact on Key Economic Variables

A central contention of this thesis is that an increase in the level of democracy and the presence of a proportional electoral system will increase the convergence of de jure and de facto central bank independence. If these hypotheses are correct, what is their practical importance? As was noted earlier, the justification for providing the central bank with independence is that it will assure long-term monetary stability by helping countries overcome their credible commitment problems. In particular, two economic indicators that central bank scholars often use are inflation and inflation variability. These variables are examined since the justification for central bank independence rests on its ability to help maintain price stability even when it may negatively impact other economic variables (Cukierman 1992, 370).

There is an overall large body of evidence indicating that higher levels of central bank independence lead to lower inflation (e.g. Cukierman 1992; Havrilesky and Granato 1993; Alesina and Summers 1993).<sup>5</sup> This is important because inflation erodes the purchasing power of fiat money. Consequently, when the public believes that there will be high inflation in future periods, they will include this factor in their calculations regarding future economic decisions. For example, banks will charge higher interest rates on loans and workers will demand greater wages even if the government promises to follow orthodox monetary policies in future periods.

Central bank literature (e.g.; Alesina and Summers 1993; Cukierman, Webb, and Neyapti 1992; de Haan and Sturm 1992) has also shown that central bank independence leads to lower

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5 Note: An excellent summary of studies indicating the relationship between central bank independence and inflation and inflation variability can be found in Tables B1 and B2 in *The Political Economy of Central-Bank Independence* (Eijffinger and de Haan 1996).

inflation variability. This is also important for a country' economic environment. Consider the case of Bolivia. In 1981 there was a modest 32 percent increase in the consumer price index. However, in 1985 this jumped to 11,750 percent (World Bank Development Indicators 2005). When a country suffers from broad inflation variability, investors may be hesitant to invest in it since they are uncertain that their investment will retain its value over the long term. If, however, they still decide to invest in it, they will use the high risk level to justify charging exorbitant interest rates, thus hindering individuals from borrowing money to expand their businesses. Additionally, governments may be unable to meet the obligations on the loans they have taken out. This can lead to debt crises such as the ones that occurred in Mexico in 1994 and Argentina in 2001.

Past studies on the impact that central bank independence has on inflation and inflation variability have used de jure and de facto measure of independence separately. Additionally, Cukierman (1992) found that legal independence is relevant for explaining price stability only in developed countries. In contrast, in developing countries, legal independence does not matter. Instead, the turnover rate of central bank governors provided a better indicator of inflation and inflation variability. A central contention of this thesis, however, is that de jure and de facto central bank independence are important for ensuring price stability in both developed and developing countries. Therefore, I hypothesize that the new measure of central bank independence, which takes into account legal independence and the difference between it and actual practices, will yield more predictive power explaining inflation and inflation variability than indices using individual de jure or de facto measures.

This hypothesis is important because if it is correct, it will provide researchers with a new manner of measuring central bank independence using data that are already available. Moreover,

it will also show whether formal institutions (i.e. legally mandated central banks) matter in developing countries. If they do not, politicians can refrain from expending political capital to provide the central bank with legal independence. Instead they can show their commitment to price stability simply by following orthodox monetary policies. If, however, formal institutions are important, then politicians should try to increase the statutory independence of the central bank to help ensure the long term monetary health of the country.

## **Chapter 4**

### **Hypotheses**

Returning to the central ideas of this thesis, I posit the four following hypotheses.

H<sub>1</sub>: A higher level of democracy in a state will reduce the gap between de jure and de facto central bank independence.

H<sub>2</sub>: In democracies, countries that utilize proportional electoral systems will have a smaller gap between de jure and de facto central bank independence than countries that utilize majoritarian electoral systems.

H<sub>3</sub>: At each level of independence, the new measure of legal central bank independence, which takes into account legal independence and the gap between it and de facto independence, will lead to a better prediction of inflation than indices using individual de jure or de facto measures of central bank independence.

H<sub>4</sub>: At each level of independence, the new measure of legal independence, which takes into account legal central bank independence and the gap between it and de facto central bank independence, will lead to a better prediction of inflation variability than individual de jure or de facto measurements of central bank independence.

## Chapter 5

### Research Design

To test these four hypotheses, I use individual countries as my unit of analysis with a cross-sectional research design based on data from four decades: the 1960s, the 1970s, the 1980s and the 1990s. Since changes in central bank independence occur slowly, data measuring de jure and de facto central bank independence are based on decade averages. A notable disadvantage of measuring the variables in this manner is that it masks more nuanced changes in central bank independence. However, this is the most state of the art measure available at this time. In spite of this data limitation, there are still two factors that make these decades particularly interesting to analyze.

First, the 1971 devaluation of the U.S. Dollar relative to gold helped cause the collapse of the fixed exchange rate and increased the need for independent central banks to help maintain the stability of the international financial system (Maxfield 1997). By examining central bank independence during the 1960s, when a fixed exchange rate regime was in effect, and after the 1960s when it was not present, it is possible to see whether an independent central bank was an important institution under both monetary regime types. Second, since the collapse of the Soviet Union, more countries have implemented democratic practices. It is possible, therefore, to use a wider sample that includes more developing countries in Eastern Europe where an independent central bank may be an extremely important institutional device enabling a country to demonstrate its commitment to orthodox monetary policies.

In this study there are three dependent variables. The first variable, *Inflation*, indicates a country's annual inflation rate and is based on data from the World Bank's *World Development Indicators 2005* dataset. Although inflation can be measured in different ways, I define it as the



annual percentage increase in the consumer price index. To calculate the inflation rate, I used the compound annual percentage increase in the consumer price index rather than the simple annual percentage increase in for each decade.<sup>6</sup> This was done since the compound measure provides a more accurate indicator of increases in prices. A central concern, however, may be that missing data will skew this variable especially since many developing countries, which have high levels of inflation, may not provide data. To address this problem, if at least 5 years of data are available, I added the data and divide them by the number of years for which it is available. Otherwise, the variable was coded as missing.

**Table 1: Annual Inflation Rate**

	1960s	1970s	1980s	1990s
Mean	8.62	16.05	28.13	27.64
std.dev	21.34	21.20	59.43	69.63
Min	1.00	4.00	2.00	1.00
Max	149.00	130.00	365.00	634.00
N	52	61	105	137

In total there were 433 observations during the four decades. However, as indicated in Table 1, inflation data were only available for 355 observations indicating that approximately 18 percent of data are missing. As would be expected, given the increased sample size during the 1980s and the 1990s and the inclusion of more developing countries, there is a higher number of missing cases in these decades in comparison to the 1960s and the 1970s. However, in terms of the percentage of missing cases, the decades of the 1960s and 1980s have the two highest concentrations with 24 and 25 percent respectively. Also indicated in Table 1, within each decade

<sup>6</sup> Note: Data on legal central bank independence during the 1990s ended in the year 2003. Therefore, for all financial data in this thesis, the decade of the 1990s consists of data from 1990 to 2003.

inflation varies widely, from a minimum of 1 percent during the 1960s and 1990s, to a maximum of 634 percent in the 1990s. Given the vast differentials between the minimum and maximum inflation rates, I use the log of inflation to prevent extreme values from skewing my findings.

The second dependent variable, *Inflation Variability*, indicates the variability of the inflation rate and is also based on the World Bank's *World Development Indicators 2005* dataset. This variable is defined as the average number of standard deviations that each year's inflation rate in a decade is from the mean decade inflation rate. Table 2 indicates that the mean inflation variability rate was approximately .75 across the four decades. Meanwhile, values ranged from a minimum of 0.3 standard deviations in the 1990s, to a maximum of 1.01 standard deviations in the 1980s.

**Table 2: Annual Inflation Variability**

	1960s	1970s	1980s	1990s
Mean	.787	.775	.748	.722
Min	.490	.640	.380	.300
Max	.900	.900	1.01	.900
N	52	61	105	138

The third dependent variable measures the divergence between legal central independence and actual practices. Since this variable is based on de jure and de facto independence, it is first necessary to indicate how these variables are measured. As noted in the introduction, researchers (Eijffinger and de Haan 1996; Forder 1999) have found that the correlation coefficient between highly respected measures of legal central bank independence is extremely low. Eijffinger and de Haan (1996) attribute this problem to two factors. First, there are different interpretations of relevant bank laws that oftentimes depend on how familiar a researcher is with a particular country. For example, they argue that the Dutch Central Bank, the

Nederlandsche Bank, is more independent than Cukierman (1992) codes them. Second, legal measures focus on different aspects of independence. In particular, if a measure uses a large number of variables and gives them equal weight, it may dilute the most important aspects of central bank independence (Eijffinger and Schaling 1993). Given these problem, I use two measures of legal independence to increase the internal validity of my findings.

The first measure of legal central bank independence, *Cukierman Legal*, is based Alex Cukierman's (1992) data on 69 countries in both the developed and developing world between 1950 and 1989.<sup>7</sup> This measure of independence is based on 16 variables placed in four categories: CEO, policy formations, central bank objectives, and limitations on lending. Using the unweighted measure of central bank independence, each variable is given equal weight and is assigned a value from 0 to 1. The aggregate value of these variables is then divided by 16 to generate each country's average level of legal central bank independence for each decade; the higher the score, the more independent the central bank.

As indicated in Table 3, there was minimal change in legal independence between the 1960s and 1980s. In the 1960s the standard deviation was .01 points higher than it was during the 1970s and 1980s. Additionally, during the 1980s, the minimum level of independence increased .01 points over previous decades. However, the average level of independence remained constant across the three decades even though the sample size increased. This seems to indicate that formal institutions are stable structures. Therefore, if comprehensive central bank independence does reduce uncertainty regarding monetary policies, it should be a long term impact.

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<sup>7</sup> Note: I did not include central bank data from the 1950s in my analyses due to the dearth of other financial data for these decades.

**Table 3: Cukierman Measure of Legal Central Bank Independence**

	1960s	1970s	1980s
mean	.35	.35	.35
std.dev	.13	.12	.12
min	.09	.09	.10
max	.69	.69	.69
N	58	67	69

The second measure of legal independence, *GMT Legal*, is based on the measurement developed by Grilli, Masciandaro, and Tabellini (1991). These scholars divide central bank independence into two categories: political independence and economic independence. Political independence is “the capacity to choose the *final goal* of monetary policy” while economic independence is “the capacity to choose *the instruments* with which to pursue these goals” (1991; 366). To measure legal independence these authors rate each central bank on a scale ranging from 0 to 8 for political independence and 1 to 8 for economic independence and then add up the value of the two categories. Similar to the Cukierman measure, the higher the score the more independent the central bank.

Grilli, Masciandaro and Tabellini (GMT) examined central bank independence in only 18 industrial countries during the 1980s. The ability to use their data in large-scale cross-national analysis, therefore, is severely limited. More recently, however, researchers (Arnon, Laurens, Segalotto, and Sommer 2007) have expanded the GMT measure to include 68 countries during the 1980s and 163 countries in the period ending in 2003. Additionally, to make comparisons to Cukierman's (1992) measure of legal independence, they have also standardized the score for both political independence and economic independence on a scale ranging from zero to one for

each variable. This value is then divided by two to maintain the 0 to 1 scale.<sup>8</sup> Since one of the central goals of using two measures of legal independence is to increase internal validity of thesis findings, I will use this standardized GMT scale in my analyses.

**Table 4: GMT Measure of Legal Central Bank Independence**

	1980s <i>Political Independence</i>	<i>Economic Independence</i>	1990s <i>Political Independence</i>	<i>Economic Independence</i>
Mean	0.44	0.30	0.49	0.68
std.dev	0.23	0.19	0.30	0.18
Min	0.00	0.00	0.00	0.25
Max	1.00	0.88	1.00	1.00
N	68	68	157	157

Table 4 shows there was only a slight increase in political independence between the two decades. Economic independence, on the other hand, changed drastically. Between the 1980s and the 1990s it jumped more than 125 percent from .30 to .68. A potential reason for this change is that governments may have recognized that with vast increases in international investment in recent years, it is increasingly difficult for the central bank to maintain stable monetary policies. It is, therefore, necessary to provide them with more policy instruments to achieve their goals. This seems to verify previous research (e.g. Bernhard 2002; Cukierman 1995; Maxfield 1997) showing a surge in legal central bank independence in the 1990s.

The de facto measure of central bank independence is measured based on the annual number of changes in the central bank governor during the decade. Cukierman (1992) argues that the higher the turnover rate, the lower the central bank's autonomy. For example, if a country had a single central bank governor for the entire decade, its de facto central bank autonomy score

<sup>8</sup> Note: The questions used to determine political independence and economic independence, along with the conversion scale for the standardization of these scores, is provided in Appendix 1.

would be 0. In contrast, if the country changed central bank governors every year, its de facto independence score would be 1.

Data for this variable came from two sources. The first source is Cukierman's (1992) book covering 69 countries in both the developed and the developing world between 1960 and 1989. The second source, Sturm and de Haan (2001), covers 80 developing countries during two time periods: the 1980s and the 1990s. It is important to note that although both datasets cover the same concept, during the 1980s there are differences in their measures of the turnover rate for the same country. Therefore, I will divide them into two separate variables. The first variable, *Turnover Rate*, will utilize Cukierman's data while the second variable, *Turnover Rate 2*, will use Sturm and de Haan's data. An additional advantage of measuring the data separately is that it will better indicate whether the hypotheses proposed in this thesis are valid across all countries or only in developed or developing countries.

**Table 5: Central Bank Governor's Turnover Rate**

	1960s <i>Turnover Rate</i>	1970s <i>Turnover Rate</i>	1980s <i>Turnover Rate</i>	<i>Turnover Rate 2</i>	1990s <i>Turnover Rate 2</i>
mean	0.24	0.22	0.24	0.28	0.19
std.dev	0.22	0.18	0.19	0.22	0.19
min	0.00	0.00	0.00	0.00	0.00
max	1.08	0.88	1.00	1.10	0.75
N	62	67	69	75	74

As indicated in Table 5, the average tenure of central bank governors ranged from a minimum of 3.6 years in the 1980s, to a maximum of 5.2 years during the 1990s. This indicates a trend toward greater de facto central bank independence in recent years. Another important indicator is that the maximum turnover rate has declined from 1.10 in the 1980s to .75 in the 1990s showing a tenure increase for the least independent central bank governor from

approximately 11 months to 16 months. Similar to the average turnover rate, this lower turnover rate also indicates increasing de facto independence of central bank governors.

Since a higher turnover rate of the central bank governor indicates less independence whereas a higher de jure score indicates more independence, I transformed both measurements of legal central bank (*GMT Legal* and *Cukierman Legal*) by using the following equation: **1-country score**. Additionally, both variables measuring the turnover rate were rescaled by dividing each country's central bank governor's turnover rate by the maximum turnover rate in the dataset so that values range from a minimum of 0 to a maximum of 1. This was done so that I could more accurately measure the divergence between de jure and de facto central bank. An example may better illustrate the logic of this point. Country A provides the central bank with perfect legal independence and as a result, its de jure independence score is 1. However, it replaces the central bank governor every year. Therefore, its de facto score is also 1. If de jure independence was subtracted from de facto independence it would indicate no difference between the two measures when there were actually broad differences between them.

*Divergence*, the variable indicating the gap between the laws and practices, is defined as the difference between legal central bank independence and the turnover rate of the central bank governor. I calculated the divergence between the two types of central bank independence using the following formulas: (*Cukierman Legal-TOR*) and (*GMT Legal-TOR2*). The variable *Divergence* then indicates the difference between *Turnover Rate* and *Cukierman Legal* while the variable *Divergence 2* measures the difference between *Turnover Rate 2* and *GMT Legal*.

**Table 6: Divergence Between de Jure and de Facto CBI**

	1960s <i>Divergence</i>	1970s <i>Divergence</i>	1980s <i>Divergence</i>	<i>Divergence 2</i>	1990s <i>Divergence 2</i>
mean	.439	.455	.434	.398	.319
std.dev	.202	.229	.209	.250	.253
min	-.225	-.27	-.309	-.369	-.622
max	.777	.86	.8	.829	.81
N	57	66	69	39	74

As indicated in Table 6, there are vast differences between legal obligations and actual practices. Across all decades, the average divergence between de jure and de facto independence ranges from a minimum of .319 in the 1990s to a maximum of .455 during the 1970s. This shows that many governments are providing the central bank with a higher level of de facto than de jure autonomy. It may also reflect the difficulty that governments face when trying to modify laws providing the central bank with a level of autonomy.

Finally, the new measure of legal central bank independence is measured by interacting each of the legal measures of independence, *Cukierman Legal* and *GMT Legal*, with the variables measuring the divergence between actual practices and legal obligations. I defined the variable this manner since the impact of each level of legal central bank independence is based on how well the laws are actually followed. If there is absolute adherence to the laws governing central bank independence (i.e. there is no difference between de jure and de facto independence), then the impact of an independent central bank can be measured simply by using the legal index of independence.

However, oftentimes central banks are given either greater or less de facto independence than de jure independence. If the de facto measure of independence indicates greater independence than is offered by the law, it is likely that this increased independence will enable



the central bank to pursue stronger orthodox monetary policies. On the other hand, if the turnover rate of the central bank governor indicates lower central bank independence then is afforded by the law, a given level of legal independence will have a smaller impact on inflation and inflation variability.

To measure democracy I use data from Freedom House and take a country's average civil rights and political liberties score across the decade. There are other well-respected measures of democracy, including Polity IV and Przeworski, Alvarez, Cheibub, and Limongi (PACL). However, the Freedom House measure is used since the hypothesis regarding the convergence between de jure and de facto measures of central bank independence rests on the assumption that democracy increases rule of law and stable property rights. Because Freedom House ratings include political rights and civil liberties rather than political rights only, it is more appropriate than either the Polity IV or the PACL measures that focus only on political rights.

Freedom House codes a country's civil rights and political liberties on a scale from 1, indicating the most democratic, to 7, which indicates the least democratic. It also provides three categorical measures of democracy: free, partial free, and not free. However, I chose to use the continuous measure to be able to identify the impact that more subtle changes in democracy have on central bank independence. Measuring democracy as a continuous variable will also enable me to examine the direct impact that changes in its level have on inflation and inflation variability. This is important since some critics argue that authoritarian regimes are better able to commit to orthodox monetary policies.

To create each country's democracy score, researchers rate ten equally weighted political rights questions and fifteen equally weighted civil liberties questions from sources that include newspapers, think tanks, and visits to the regions, among others. Political rights are based on the

electoral process, political pluralism and participation, and the functioning of government. Meanwhile, civil liberties consist of freedom of expression and belief, associational and organizational rights, rule of law, personal autonomy, and individual rights. An important limitation is that Freedom House did not begin its index of freedom until 1972. Therefore, I am unable to measure the impact that democracy had on the convergence of measures of central bank independence in the 1960s.

**Table 7: Democracy**

	1970s		1980s		1990s	
	Political Rights	Civil Liberties	Political Rights	Civil Liberties	Political Rights	Civil Liberties
mean	3.49	3.35	3.94	4.09	3.50	3.65
std.dev	2.11	1.86	2.13	1.97	2.10	1.77
min	1.00	1.00	1.00	1.00	1.00	1.00
max	7.00	6.88	7.00	7.00	7.00	7.00
N	69	69	128	128	151	151

As indicated in Table 7, the average level of political rights and civil liberties remained steady between the 1970s and 1990s. However, during the 1980s there was more than a half point increase (i.e. a reduction) in both aspects of democracy. The blip in the data may be due in part to an increase in the sample size that includes a larger number of developing countries. Apart from this anomaly, it appears that across the three decades, most countries have civil rights and political rights score that range from 1.5 to 6.0.

To code the electoral system variables, I use Matt Golder's "Democratic Systems Around the World, 1946-2000" (2004) dataset. This dataset contains information on 177 countries' electoral systems between the year 1946, or the year of independence, and the year 2000. It is important, however, to note that if a country is not democratic, the data are coded as missing. More specifically, the following factors classify a regime as non-democratic: the chief executive

is not elected, there is no more than one party, or there has been no alteration in power. Using this criterion, out of 433 observations in the sample, 280, or approximately 65 percent, were coded as missing.

*Majoritarian*, which indicates that the presence of a majoritarian electoral system, are all countries that use plurality rule as well as those that use qualified voting majority. *Mixed*, meanwhile, indicates a mixed electoral system where there is a mixture of majoritarian and proportional rules. Finally, *Proportional* indicates the presence of a proportional representation system that uses a proportional representation formula with a single electoral tier.

There, however, may be cases where electoral reforms caused a change in a country's type of electoral system. When this occurs, I look at the year when the change occurred. If it occurred more than halfway through the decade, I code the country as having the previous electoral system. On the other, if the change occurred before the halfway point of the decade I code it as having the new electoral system. As indicated in Table 8, the sample uses a fairly even distribution of countries using majoritarian and proportional electoral systems. However, between the 1960s and the 1980s only Germany uses a mixed electoral system.

**Table 8: Electoral System Type**

	1960s	1970s	1980s	1990s
<i>Majoritarian</i>	11	10	17	24
<i>Mixed</i>	1	1	1	15
<i>Proportional</i>	16	11	20	26
N	28	22	38	65

From the World Bank's *World Development Indicators 2005* dataset, I also use the 10 year averages of GDP and GDP per capita as control variables. These variables which are designated *GDP* and *GDP per Capita*, respectively, are based on constant 2000 US Dollars.

Studies (e.g. Diamond 1999; Barro 2000; Hadenius 2001) indicate that there is a high degree of correlation between democracy and economic development. If there is a high GDP per capita, there may be a larger group of individuals who are inflation averse. Likewise, the overall size of the economy (i.e. its GDP) may influence the convergence of de jure and de facto central bank independence since governments may have smaller revenue bases and capital markets. In particular, this last factor has been identified by Cukierman (1995) as a key factor influencing inflation. Therefore, using these variables will help ensure that the convergence between de jure and de facto measures of central bank independence is due to democracy, as opposed to an increase in economic development. Hence, my findings will have more internal validity.

**Table 9: GDP<sup>9</sup> and GDP per Capita**

	1960s		1970s		1980s		1990s	
	GDP	CAPITA	GDP	CAPITA	GDP	CAPITA	GDP	CAPITA
mean	131	\$5,138	222	\$7,066	163	\$5,880	188	\$6,082
std.dev	428	\$5,296	640	\$6,958	643	\$7,769	820	\$8,824
min	.17	\$86	.62	\$132	.11	\$99	.04	\$95
max	3120	\$21,816	4390	\$26,646	5900	\$33,089	8560	\$37,849
N	60	59	61	61	116	117	148	149

As indicated in Table 9, there is broad variation in the values for GDP and GDP per capita. The difference between GDP per capita in all four decades is so great that the minimum GDP per capita is less than one half of 1 percent of the maximum GDP per capita. In the 1980s, for example, while the mean GDP per capita was approximately \$5880, Ethiopia's GDP per capita was a paltry \$99, while the United Arab Emirates had the highest at \$33,089. Likewise, during the 1960s, the minimum GDP is .00005 percent of the maximum GDP. To prevent these

<sup>9</sup> Note: GDP values in Table 6 are indicated in billions of Dollars.

values from skewing my empirical findings, I utilize the natural log of both GDP and GDP per capita.

The final control variable, *Protest*, is a measure of the average annual number of strikes, riots, and anti-government demonstrations in each decade as indicated by Bank's (2006) database “Cross-National Time-Series Data Archive”. Although not broadly studied in central bank literature, some recent research (De Haan and Sierman 1996; Dreher, Sturm, and de Haan 2008) has shown that increased political instability causes higher inflation. Rising political protest may force the government to use monetary resources to reduce tensions which in turn provokes higher inflation and inflation variability. This also has the potential to increase divergence between de jure and de facto central bank independence as the government takes away power from the central bank to pacify the public. It is, therefore, necessary to control for this variable in all regression analyses in this thesis.

**Table 10: Political Protest**

	1960s	1970s	1980s	1990s
mean	2.08	1.72	1.60	1.30
std.dev	5.34	2.39	3.16	1.81
min	0.00	0.00	0.00	0.00
max	41.10	10.30	21.20	7.75
N	64	65	117	136

As indicated in Table 10, the average number of political protests declined continually from the 1960s to the 1990s. Likewise, the maximum number of political protests declined more than 80 percent from 41.10 annual incidents during the 1960s to 7.75 annual incidents during the 1990s. Additionally, while not linear, the standard deviation also declined during this same time period. These data indicates an overall general decline in political protests in recent years.

Given each of these variables, the general equations to test the four hypotheses posited in this thesis are as follows:

$$\text{Equation 1: Divergence} = \beta_0 + \text{Log\_GDP} + \text{Log\_GDP per Capita} + \text{Democracy} + \text{Mixed} + \text{Proportional} + \text{Protest} + e_i$$

$$\text{Equation 2: Log of Inflation} = \beta_0 + \text{Legal Independence} * \text{Divergence} + \text{Legal Independence} + \text{Divergence} + \text{Log\_GDP} + \text{Log\_GDP per Capita} + \text{Democracy} + \text{Protest} + e_i$$

$$\text{Equation 3: Inflation Variability} = \beta_0 + \text{Legal Independence} * \text{Divergence} + \text{Legal Independence} + \text{Divergence} + \text{Log\_GDP} + \text{Log\_GDP per Capita} + \text{Democracy} + e_i$$

More specifically, Equation 1 states that the gap between de jure and de facto central bank independence is a function of the log of GDP, the log of GDP per Capita, the level of democracy, whether a country employs a mixed electoral system or a proportional electoral system, and the level of political unrest. Meanwhile, Equation 2 indicates that the inflation rate is a product of the new measure of legal independence, which is a function of legal independence and the divergence between de jure and de facto independence, the log of GDP, the log of GDP per Capita, and the level of democracy and political protest. Finally, Equation 3 indicates that inflation variability is conditioned upon the new measure of legal independence, which is a function of legal independence and the divergence between de jure and de facto independence, the log of GDP, the log of GDP per Capita, and the level of democracy and political protest.

## Chapter 6

### Results

I first tested the impact that democracy and proportional electoral systems have on the divergence between de jure and de facto central bank independence. There was, however, a high level of collinearity (close to .7) between *GDP per Capita* and *Democracy*. To deal with this problem, I ran three models for the 1970s, the 1980s and 1990s.<sup>10</sup> The first model includes both *GDP per Capita* and *Democracy*, the second model includes *GDP per Capita* but not *Democracy*, and the third model includes *Democracy* but not *GDP per Capita*.

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<sup>10</sup> This was not done for the 1960s since the Freedom House measure of democracy was unavailable for those years.

**Table 11: Divergence Between Cukierman Legal CBI and the Central Bank Governor's Turnover Rate in Developed and Developing Countries, 1960s-1980s**

	1960s	1970s			1980s		
	model 1	model 1	model 2	model 3	model 1	model 2	model 3
<i>Democracy</i>	----	.011	-.018	----	-.011	-.034*	----
	----	(-.2)	(-.37)	----	(-.26)	(-1.48)	----
<i>GDP</i>	.052*	.015	.048	.015	-.028	-.019	-.03
	(-1.64)	(-.33)	(-1.19)	(-.33)	(-.95)	(-.75)	(-1.07)
<i>GDP per Capita</i>	.047	.102*	----	.095*	.043	----	.059*
	(-1.17)	(-1.34)	----	(-1.41)	(-.6)	----	(-1.59)
<i>Mixed</i>	----	-.313	-.396*	-.312	-.257	-.243	-.265
	----	(-1.13)	(-1.44)	(-1.15)	(-1.09)	(-1.05)	(-1.15)
<i>Proportional</i>	-.033	.035	.033	.039	-.137*	-.127*	-.142**
	(-.38)	(-.31)	(-.28)	(-.36)	(-1.67)	(-1.6)	(-1.8)
<i>Protest</i>	-.007	.001	-.022	.002	.004	-.001	.005
	(-1.18)	(-.03)	(-.85)	(-.07)	(-.29)	(-.06)	(-.42)
<i>Constant</i>	-1.215**	-.914	-.684	-.823	.849	1.086*	.72
	(-1.74)	(-.86)	(-.64)	(-.88)	-1.08	(-1.62)	(-1.21)
Adjusted R <sup>2</sup>	.18	-.02	-.06	.03	.02	.04	.05
N	30	26	26	26	35	35	35

\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: Higher *Democracy* score indicates a lower level of democracy



**Table 12: Divergence Between GMT Legal CBI and the Central Bank  
Governor's Turnover Rate in Developing Countries, 1980s-1990s**

	1980s			1990s		
	model 1	model 2	model 3	model 1	model 2	model 3
<i>Democracy</i>	-.043 (-.48)	---- ----	.021 (-.49)	.016 (-.4)	---- ----	.005 (-.19)
<i>GDP</i>	.054 (-.51)	.018 (-.25)	-.023 (-.42)	-.065* (-1.48)	-.059* (-1.46)	-.055* (-1.6)
<i>GDP per Capita</i>	-.185 (-.83)	-.091 (-.88)	---- ----	.03 (-.38)	.007 (-.13)	---- ----
<i>Mixed</i>	---- ----	---- ----	---- ----	-.024 (-.13)	-.01 (-.06)	-.009 (-.05)
<i>Proportional</i>	-.312* (-1.82)	-.321** (-1.99)	-.336** (-2.03)	-.063 (-.55)	-.063 (-.56)	-.062 (-.55)
<i>Protest</i>	-.032 (-.96)	-.02 (-.98)	-.008 (-.5)	.04 (-1.3)	.037 (-1.27)	.034 (-1.29)
<i>Constant</i>	.735 (-.52)	.672 (-.51)	.86 (-.63)	1.359* (-1.6)	1.487** (-1.93)	1.421** (-1.74)
$R^2$	.07	.17	.11	-.05	-.02	-.02
N	12	12	12	31	31	31

\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: Higher *Democracy* score indicates a lower level of democracy

A central contention of this thesis is that an increase in the level of democracy reduces the gap between legal central bank independence and the central bank's governor's turnover rate. This, in turn, is important because it reduces uncertainty regarding the central bank's ability to pursue orthodox monetary policies over the long term. However, as indicated in Table 11, the

level of democracy had no impact on the divergence between legal central bank independence and the central bank governor's turnover rate in the 1960s and the 1970s using the Cukierman legal independence measure with a sample of developed and developing countries. Likewise, Table 12 shows that democracy was had no effect on the gap between the GMT measure of legal independence and the turnover rate of the central bank governor using a sample of developing countries during the 1980s and 1990s.

The only time that democracy had a statistically significant impact on the gap between the two types of central bank independence was in model 2, which did not include GDP per capita as a control variable, using the Cukierman legal independence measure in the 1980s. Contrary to my hypothesis, however, a decline in democracy actually reduced the divergence between legal central bank independence and the central bank governor's turnover rate in this decade.<sup>11</sup> A potential reason for this finding is that in democratic countries, as the level of democracy increases, politicians feel stronger pressure from their constituents regarding monetary policy. This pressure may cause them to reduce or increase de facto central bank independence in response to the pressures that are placed on them by the general public, thus increasing divergence between de jure and de facto central bank independence. In any event, evidence does not support my argument that an increase in the level of democracy reduces the gap between de jure and de facto central bank independence. It is, therefore, necessary to reject the hypothesis that a higher level of democracy in a state will reduce the gap between de jure and de facto central bank independence.

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<sup>11</sup> As mentioned in the research design, the Freedom House measure of democracy, which I use in this thesis, ranks the most democratic countries with a lower score.

I also argued that the greater number of political parties present in countries using proportional electoral systems, in comparison to countries using majoritarian electoral systems, increases the need for credible information on monetary policies that the central bank provides. Consequently, I hypothesized that in democracies, countries utilizing proportional electoral systems will have a smaller gap between de jure and de facto central bank independence than countries utilizing majoritarian electoral systems. The empirical evidence for this hypothesis is mixed.

As Table 11 and Table 12 indicate, proportional electoral systems had no impact on the divergence between de jure and de facto central bank independence in the 1960s, the 1970s, and the 1990s. However, in agreement with my hypothesis, using both the Cukierman and the GMT legal independence measures, proportional electoral systems reduced the gap between the two types of central bank independence in the 1980s. It is interesting to note that democracy and proportional electoral systems are only important in the 1980s. This may indicate that there are unique decade factors, such as the debt crisis in Latin America, influencing the convergence of de jure and de facto central bank independence.

Among the control variables, the level of political protest had no impact on the gap between legal independence and the turnover rate of the central bank governor. The presence of a mixed electoral system, however, reduced the gap between the two measures by almost .4 points in the 1970s, but since only one country in the sample, Germany, had a mixed electoral system, the practical importance of this finding is very minimal. Meanwhile, the log of GDP was statistically significant in the 1960s for the Cukierman model and in the 1990s for the GMT model. Its impact, however, is difficult to assess since it increased the gap between legal independence and the turnover rate the 1960s but reduced it during the 1990s.

Finally, in the Cukierman model, GDP per capita led to greater divergence in the 1970s and the 1980s. Since the model only looks at the divergence between the two types of central bank independence and not whether it is positive or negative (i.e. whether the central bank is given greater or less de facto independence), it is impossible to determine whether the populous is making demands that the central bank be afforded more or less independence. However, I speculate that as GDP per capita increases, the middle and upper social classes desire greater central bank independence to protect their income, thus leading to greater de facto independence.

Table 13 and Table 14 then analyze the impact that legal central bank independence and the central bank governor's turnover rate have on the log of inflation.<sup>12</sup> In general, it is believed that a central bank that has more legal independence and a lower turnover rate will have lower inflation. A central contention of this thesis, however, is that my new measure of legal independence, which takes into account legal independence and the gap between it and de facto independence, will lead to a better prediction of inflation than indices using individual de jure or de facto measures of central bank independence. Testing the impact that individual measures of de jure and de facto central bank independence have on inflation will better indicate the comparative benefits of using the new model of legal independence.

In Table 13 and Table 14, model 1 indicates that the turnover rate of the central bank governor was a key indicator of the log of inflation in the 1960s, the 1970s, and the 1980s in both developed and developing countries. As expected, an increase in the turnover rate led to higher inflation. For example, in contrast to a country that has no turnover in the central bank governor during the decade, a country that changes its governor every year during a decade would have a log of inflation value that was between 1.56 and 3.47 points higher.

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<sup>12</sup> Note: I used robust standard errors to correct for heteroscedasticity problems.

Meanwhile, for these same three decades, both measures of legal central bank independence, *Cukierman Legal* and *GMT Legal*, did not impact the log of inflation. However, this changed in the 1990s when the central bank governor's turnover rate was insignificant while GMT legal independence was statistically significant. Contrary to expectations, a reduction in legal independence actually reduced the log of inflation in this decade.<sup>13</sup> A potential reason for this finding is that developing countries may have viewed legal central bank independence as an institutional device to combat excessively high inflation. Therefore, they increased legal central bank independence in this decade. However, beneath the surface, they were experiencing strong pressures to follow inflationary policies due to factors such as high unemployment and low government revenues, thus undermining the effectiveness of legal independence.

In model 2, I ran a regression with the same variables from model 1 but also interacted the variables measuring legal independence, *Cukierman Legal* and *GMT Legal*, with the turnover rate of the central bank governors. This shows whether the effect of legal independence is contingent upon de facto independence. Graph 1 indicates that Cukierman legal central bank independence in the 1960s is significant when the turnover rate is less than .02 or greater than 0.2. When the turnover rate is below .02, legal central bank leads to a reduction in the log of inflation although its impact declines as the turnover rate increases from zero. In contrast, as the governor's turnover rate increases above .2, legal independence leads to a higher log of inflation. This seems to indicate that the benefits of legal independence are strongly conditioned upon the turnover rate in this decade.

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<sup>13</sup> As indicated in the research design, both measures of legal independence were transformed so that a lower score indicates more independence.

Graph 2 then shows that during the 1970s, legal independence is significant only when the turnover rate is below .04. Similar to the 1960s, in this small area, legal central bank independence leads to a reduction in the log of inflation although its impact declines as the turnover rate increases. It is also important to note that only 12 out of 53 countries in the sample had a turnover rate below .04. The practical importance of legal independence in this decade, therefore, is muted.

In the 1980s, Cukierman legal independence had no impact on the log of inflation. Graph 3 and Graph 4, however, show that the GMT legal central bank independence measure was significant in the 1980s and 1990s using a sample of developing countries when the turnover rate was greater than approximately 0.35 in the 1980s and .1 in the 1990s. Contrary to expectations, an increase in the turnover rate above these thresholds actually increased the effectiveness of legal central bank independence in reducing the log of inflation. Moreover, in both decades, more than 60 percent of countries had a turnover rate in the range of statistical significance, indicating that this finding can be applied to a large number of developing countries.

Finally, among the control variables, *Protest* was significant in the 1960s. Its impact, however, was opposite from what I predicted with each additional protest action in the 1960s leading to a .026 point reduction in the log of inflation. Meanwhile, both *Democracy* and *GDP per Capita* were significant in the 1970s and the 1990s. In the 1970s, both a decline in the level of democracy and an increase in the log of GDP per capita led to a higher log of inflation while during the 1990s a decrease in democracy and an increase in the log of GDP per capita caused a decline in the log of inflation. This is particularly interesting since the impact that these two variables have on inflation moves in opposite directions from one decade to the next.

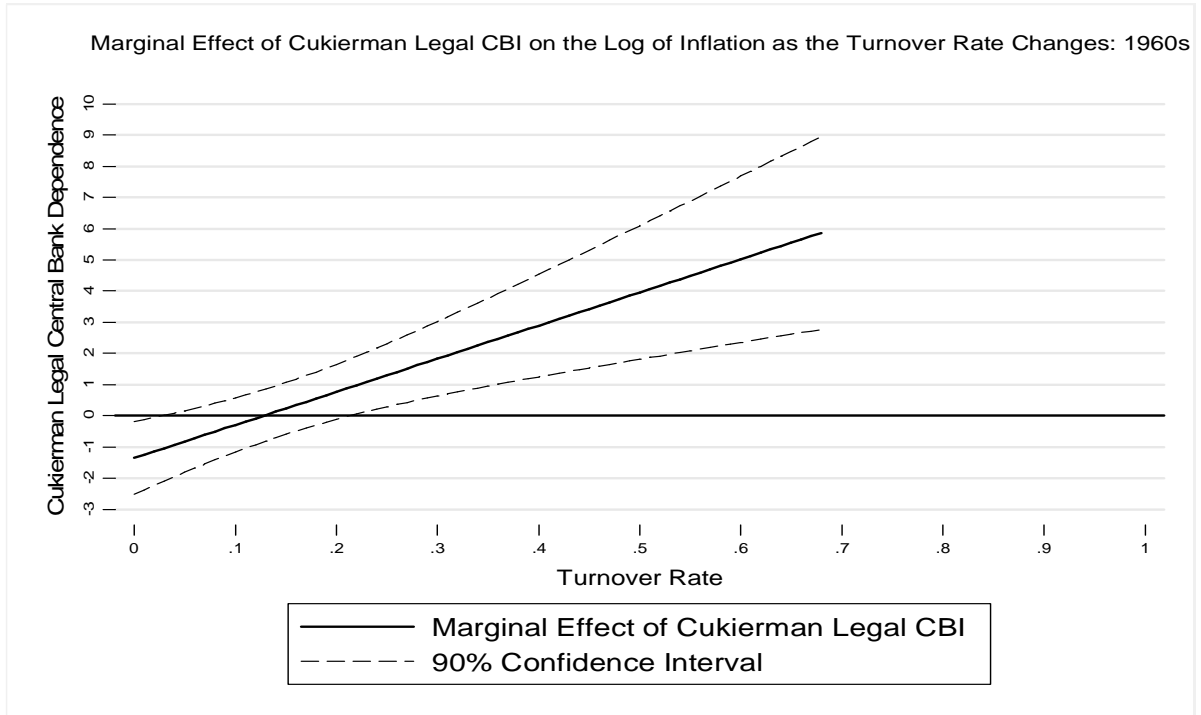
**Table 13: Effect of Cukierman Legal Central Bank Independence and the CB Governor's Turnover Rate on the Log of Inflation**

	1960s		1970s		1980s	
	model 1	model 2	model 1	model 2	model 1	model 2
<i>Cukierman Legal</i>	.755 (1.01)	-1.353* (-1.53)	-.363 (-.59)	-1.323* (-1.37)	-.822 (-.73)	.191 (-.1)
<i>Turnover Rate</i>	1.809* (1.58)	-5.454** (-2.01)	1.56** (2.24)	-2.052 (-0.59)	3.355*** (3.51)	5.403 (.79)
<i>Cukierman Legal</i> <i>*Turnover Rate</i>	---- ----	10.615*** (2.49)	---- ----	6.026 (1.1)	---- ----	-3.188 (-.29)
<i>Democracy</i>	---- ----	---- ----	.092** (1.94)	.096** (2.06)	-.054 (-.71)	-.054 (-.71)
<i>GDP</i>	.153 (.96)	.161 (.99)	-.078 (-.84)	-.084 (-.9)	-.096 (-.79)	-.089 (-.72)
<i>GDP per Capita</i>	-.097 (-.5)	-.119 (-.62)	.192* (1.67)	.212** (1.86)	-.203 (-1.03)	-.205 (-1.04)
<i>Protest</i>	-.026** (-1.68)	-.032** (-1.93)	.048 (1.15)	.041 (.93)	-.014 (-.34)	-.014 (-.36)
<i>Constant</i>	-6.915** (-2.7)	-5.53** (-2.1)	-2.502 (-1.14)	-1.931 (-.87)	2.196 (.79)	1.639 (.54)
R <sup>2</sup>	.15	.20	.33	.35	.31	.32
N	44	44	53	53	57	57

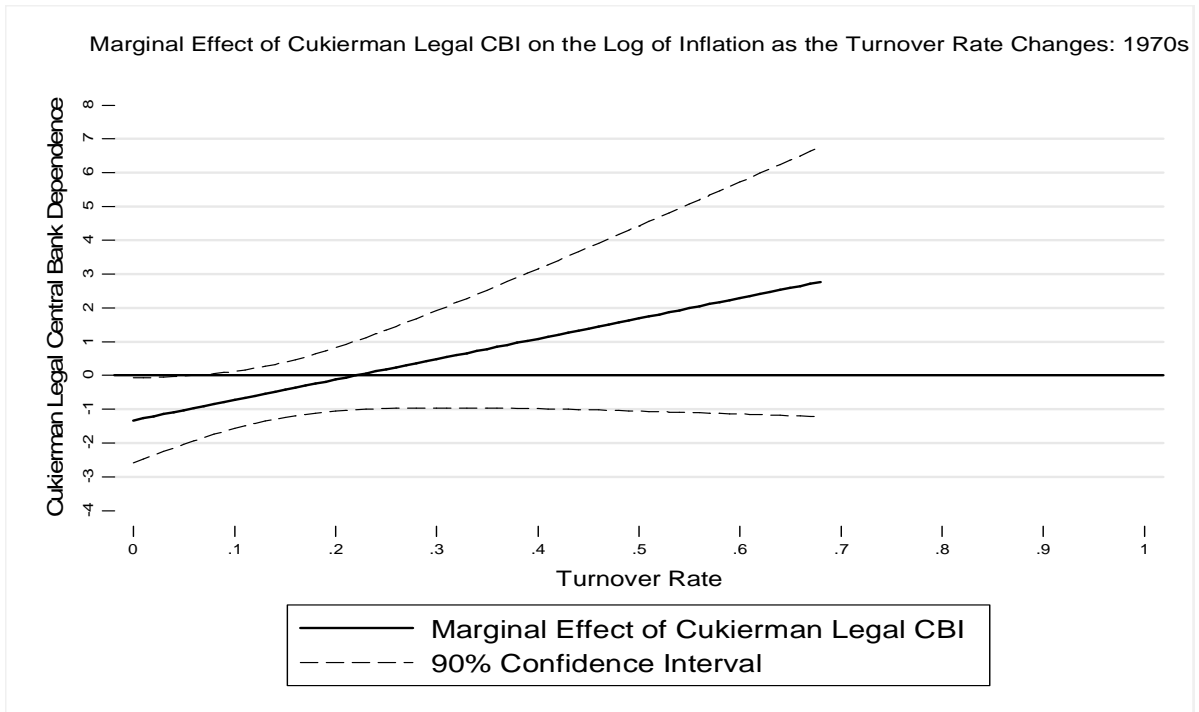
\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

Note: A higher *Legal* score indicates less legal independence



**Graph 1: Effect of Cukierman Legal Central Bank Independence on the Log of Inflation as the Turnover Rate Changes, 1960s**



**Graph 2: Effect of Cukierman Legal Central Bank Independence on the Log of Inflation as the Turnover Rate Changes, 1970s**



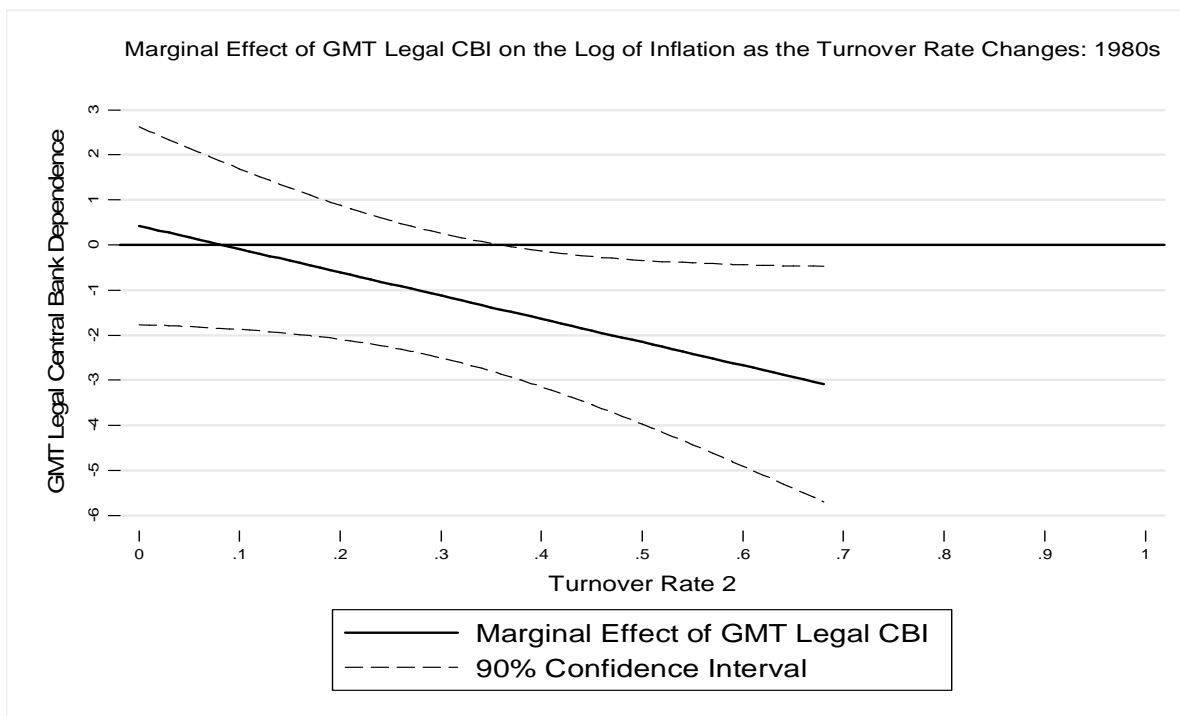
**Table 14: Effect of GMT Legal Central Bank Independence and the CB Governor's Turnover Rate on the Log of Inflation in Developing Countries**

	1980s		1990s	
	model 1	model 2	model 1	model 2
<i>GMT Legal</i>	-1.367 (-1.03)	.427 (.17)	-1.783** (-1.86)	-1.262 (-.89)
<i>Turnover Rate 2</i>	3.477*** (3.27)	7.184* (1.61)	.593 (.79)	1.487 (.77)
<i>GMT Legal*Turnover Rate 2</i>	---- ----	-5.163 (-.86)	---- ----	-2.082 (-.5)
<i>Democracy</i>	.01 (.11)	.0003 (0)	-.089* (-1.6)	-.094** (-1.65)
<i>GDP</i>	-.039 (-.22)	-.003 (-.01)	.061 (.57)	.072 (.65)
<i>GDP per Capita</i>	.071 (.32)	.016 (.07)	-.403*** (-3.15)	-.412** (-3.17)
<i>Protest</i>	-.039 (-.84)	-.05 (-1.04)	-.038 (-.46)	-.049 (-.57)
<i>Constant</i>	-1.147 (-.3)	-2.77 (-.64)	.88 (.4)	.523 (.22)
R <sup>2</sup>	.23	.22	.20	.19
N	32	32	59	59

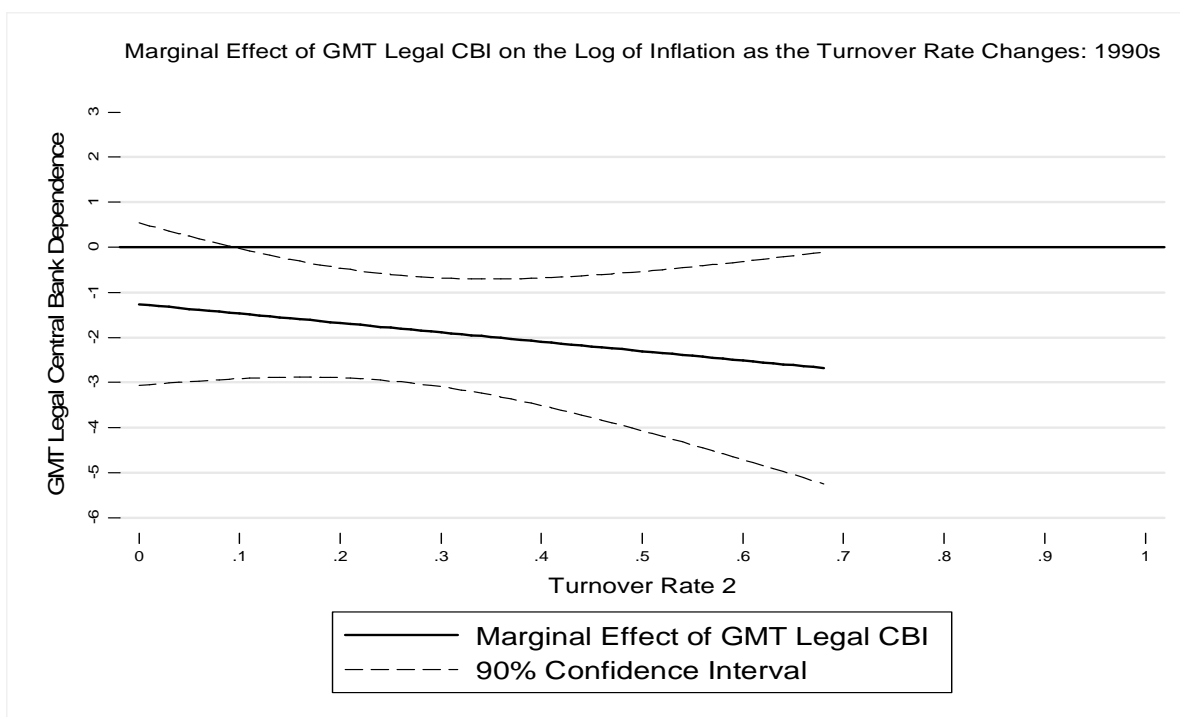
\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

Note: A higher *GMT* score indicates less legal independence



**Graph 3: Effect of GMT Legal Central Bank Independence on the Log of Inflation in Developing Countries as the Turnover Rate Changes, 1990s**



**Graph 4: Effect of GMT Legal Central Bank Independence on the Log of Inflation in Developing Countries as the Turnover Rate Changes, 1990s**

The final inflation model uses the new measure of legal central bank independence that I propose in this thesis. It was created by interacting each measure of legal central bank independence, *Cukierman Legal* and *GMT Legal*, with divergence from de facto central bank independence, which is measured by the turnover rate of the central bank governor. The central premise behind using this new measure is that it will provide a better indicator of a central bank's ability to pursue orthodox monetary policies over the long term than either de jure or de facto measures by themselves.

Graphs 5 to 7 indicate that *Cukierman Legal* is significant in all three decades when the variable *Divergence* is below .55. In the sample, 67 percent, 60 percent, and 70 percent of countries had *Divergence* values that were within this threshold during the 1960s, the 1970s, and the 1980s, respectively. This implies that the new model of legal independence has broad application for explaining the log value of inflation.

Since *Divergence* was created using the formula (*Cukierman Legal-Turnover Rate*), the graphs also demonstrate that when the central bank has more de facto independence (i.e. a lower turnover rate) than de jure (i.e. legal) independence, the country will experience a lower log inflation value than it would if the value of the turnover rate was exactly the same or higher than the legal independence score. This finding challenges the commonly accepted belief in central bank literature that the central bank governor's turnover rate has no impact on inflation in developed countries. It is also interesting to note that within the area of statistical significance, the regression line is always positive which indicates that regardless of the level of legal central bank independence, there will always be inflation.

I then tested the impact that the new GMT legal model had on the log of inflation and found that it was not significant during the 1990s. In contrast, as shown in Graph 8, during the

1980s the GMT measure of legal central bank independence is statistically significant when *divergence* is above .22. More specifically, the model indicates that when the central bank is given more de facto independence than de jure independence, there will be a higher log inflation value. I speculate that the contradictory evidence between the analyses done using the Cukierman legal independence measure and the GMT legal independence measure in the 1980s may be due to differences in the samples used. Whereas, the Cukierman legal model includes both developed and developing countries, the GMT legal model includes only developing countries that are already prone to higher levels of inflation.

These findings have two important implications. First, in agreement with my expectations, the new measure of legal central bank independence, which takes into account legal independence and the gap between laws and practices, is an important indicator of a central bank's ability to pursue low inflationary policies in every decade except for the 1990s. Its impact, however, is contingent upon the case selection and the measure of legal central bank independence used. More specifically, it appears that the impact of legal independence differs between a sample composed of developed and developing countries versus a sample of only developing countries. It may be necessary, therefore, to design models of central bank independence that focus exclusively on either developed or developing countries. Second, the lack of continuity between the two measures of legal independence once again shows the need for a more concrete definition of legal central bank independence. This, however, is a task that must be completed at another time.

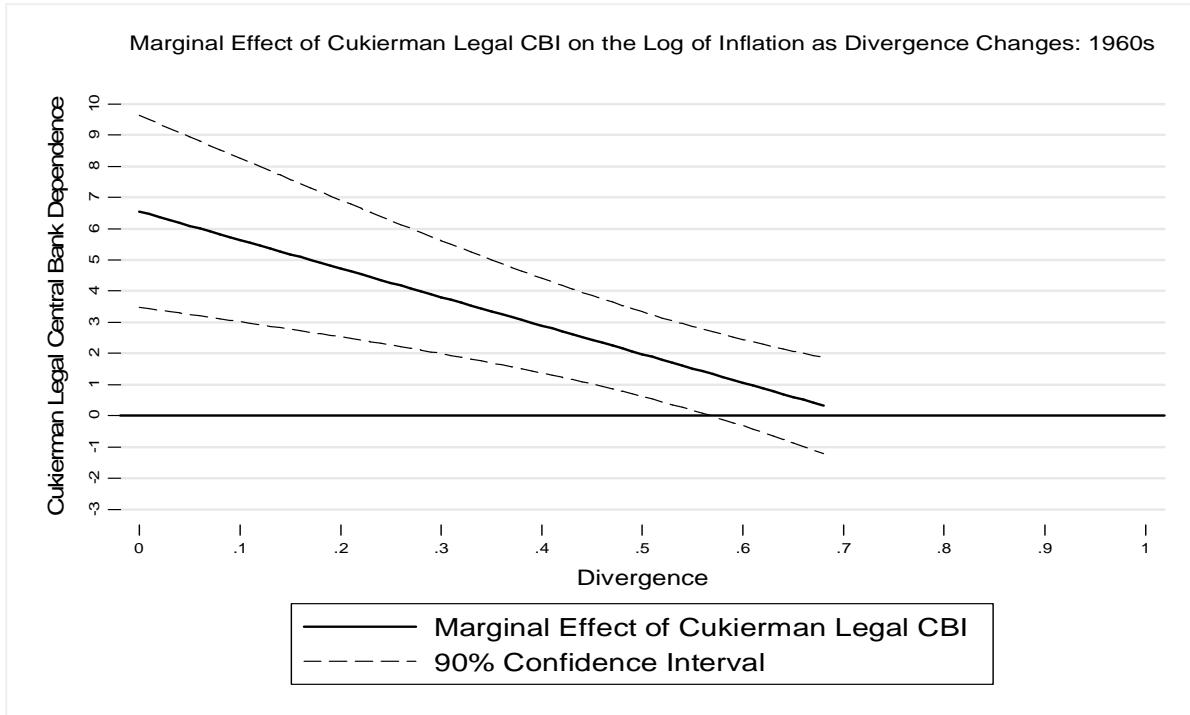
**Table 15: Effect of Cukierman Legal Central Bank Independence on the Log of Inflation in Developed and Developing Countries as Divergences Increases, 1960s-1980s**

	1960s	1970s	1980s
<i>Cukierman Legal*Divergence</i>	-9.151** (-2.32)	-7.705** (-2.46)	-6.062 (-.9)
<i>Cukierman Legal</i>	6.553** (2.79)	5.448** (2.86)	5.126* (1.38)
<i>Divergence</i>	4.359* (1.68)	3.072* (1.53)	.586 (.14)
<i>Democracy</i>	---- ----	.097** (2.13)	-.053 (-.67)
<i>GDP</i>	.17 (1.09)	-.086 (-.99)	-.101 (-.83)
<i>GDP per Capita</i>	-.099 (-.53)	.237** (2.09)	-.191 (-.95)
<i>Protest</i>	-.033** (-2.04)	.044 (1.09)	-.015 (-.38)
<i>Constant</i>	-9.866*** (-3.67)	-5.136** (-2.26)	.631 (.19)
R <sup>2</sup>	.22	.39	.32
N	44	53	57

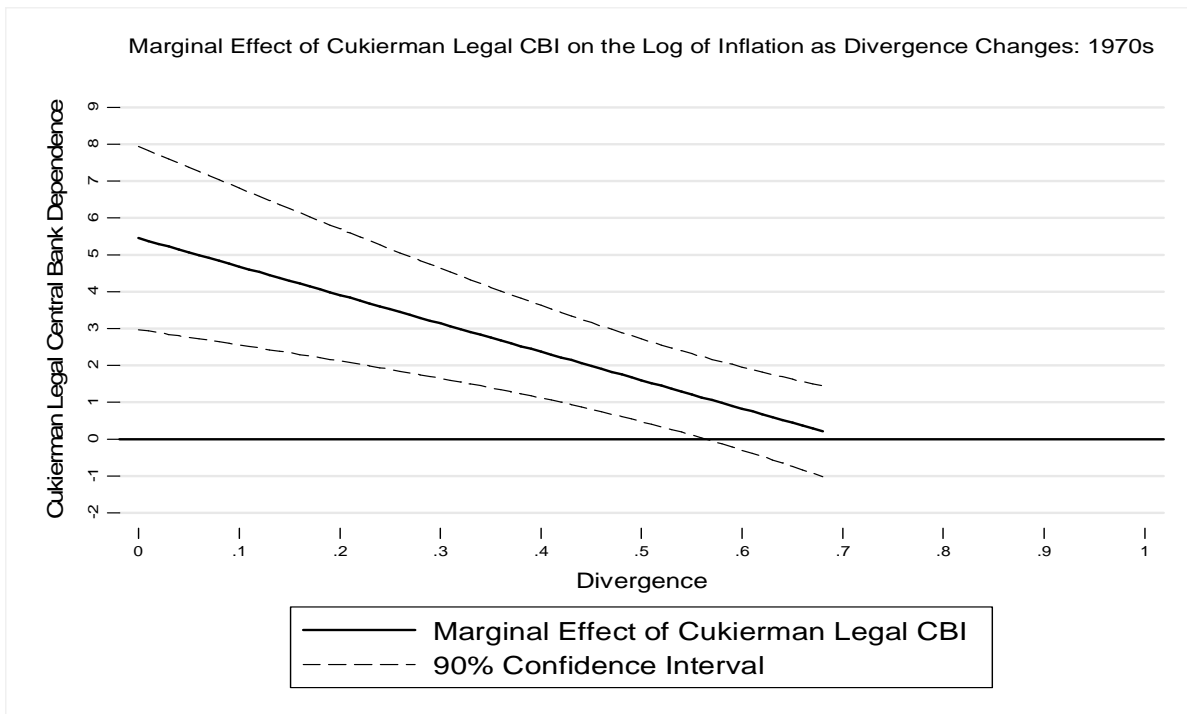
\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

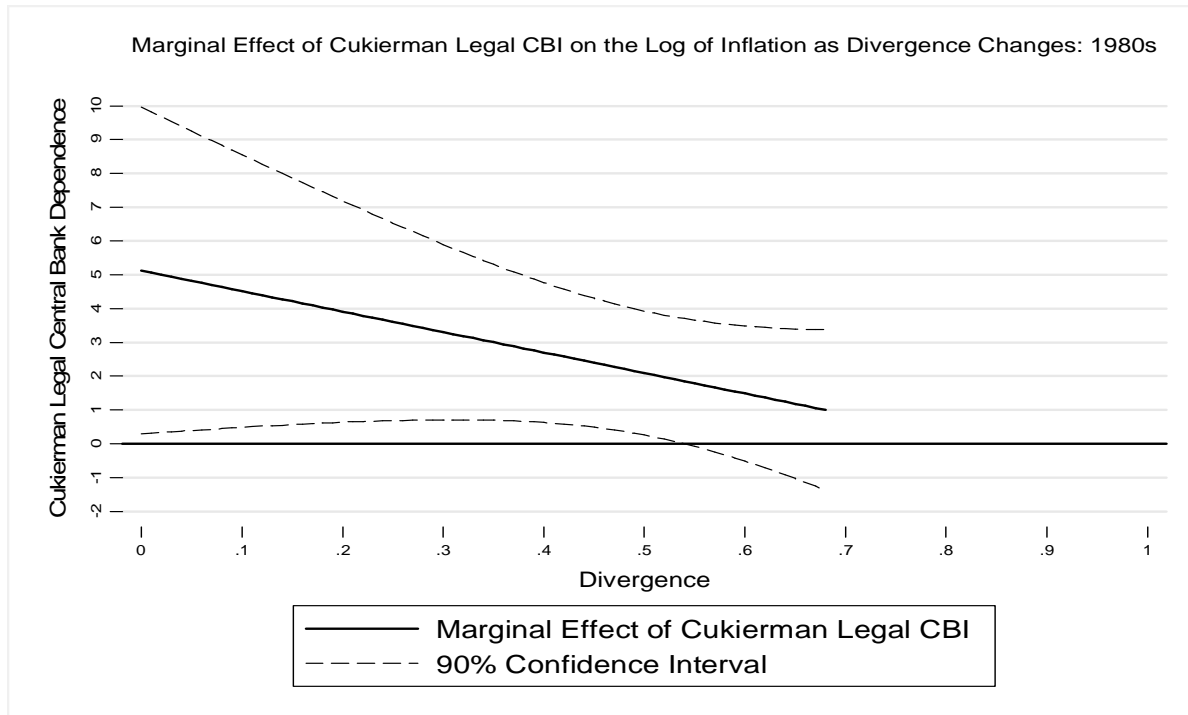
Note: A higher *Legal* score indicates less legal independence



**Graph 5: Effect of Cukierman Legal Central Bank Independence on the Log of Inflation as Divergence Changes, 1960s**



**Graph 6: Effect of Cukierman Legal Central Bank Independence on the Log of Inflation as Divergence Changes, 1970s**



**Graph 7: Effect of Cukierman Legal Central Bank Independence on the Log of Inflation as Divergence Changes, 1980s**

**Table 16: Effect of GMT Legal Central Bank Independence on the Log of Inflation in Developing Countries as Divergences Increases, 1980s-1990s**

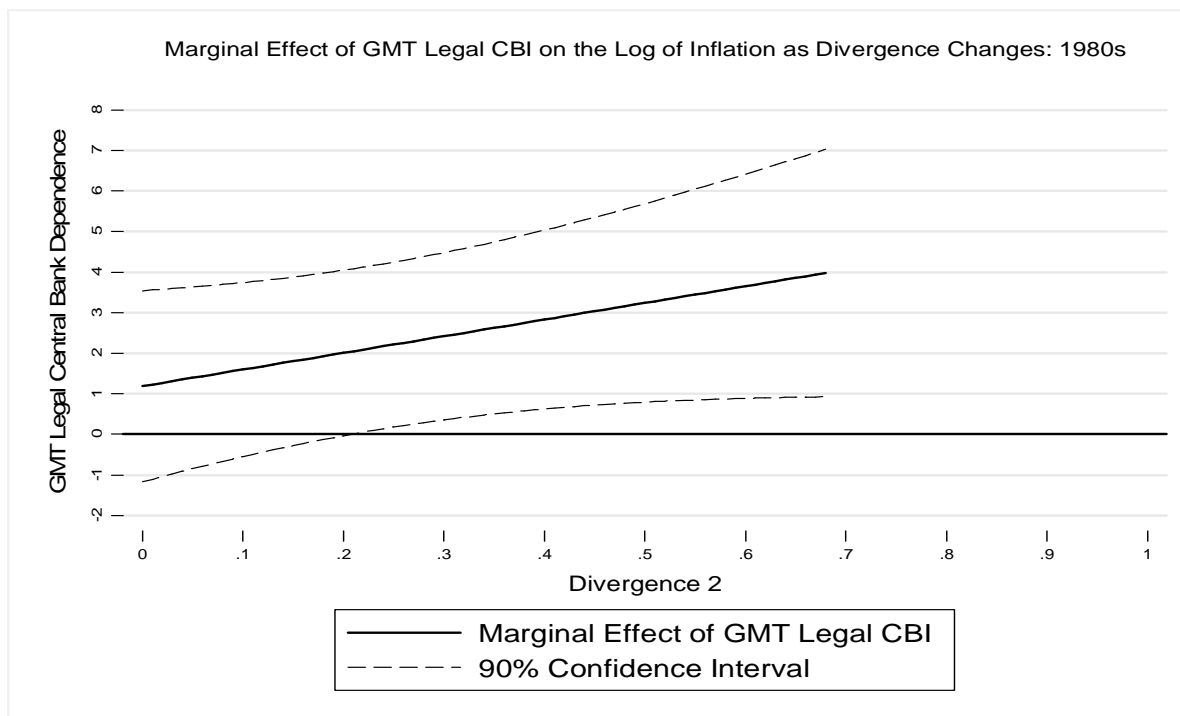
	1980s	1990s
<i>GMT Legal*Divergence 2</i>	4.102 (.83)	1.702 (.66)
<i>GMT Legal</i>	1.188 (.59)	-1.619 (-1.14)
<i>Divergence 2</i>	-6.277** (-1.77)	-1.268 (-1)
<i>Democracy</i>	.017 (.18)	-.096** (-1.68)
<i>GDP</i>	.003 (.15)	.078 (.7)
<i>GDP per Capita</i>	-.005 (-.02)	-.423*** (-3.2)
<i>Protest</i>	-.054 (-1.08)	-.058 (-.66)
<i>Constant</i>	-1.722 (-.44)	.846 (.38)
$R^2$	.22	.19
N	32	59

\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

Note: A higher *GMT* score indicates less legal independence





**Graph 8: Effect of GMT Legal Central Bank Independence on the Log of Inflation as Divergence Changes, 1980s**

I then changed the dependent variable to *Inflation Variability* and reran the regression models. Similar to inflation, it is believed that when a central bank that has more legal independence and a lower turnover rate, a country will experience less inflation variability. Likewise, I hypothesize that my new measure of legal independence, which takes into account legal independence and the gap between it and de facto independence, will lead to a better prediction of inflation variability than indices using individual de jure or de facto measures of central bank independence.

Table 17 shows that using Cukierman's measure, legal central bank independence by itself had no impact on inflation variability in any decade, while an increase in the central bank governor's turnover rate actually reduced inflation variability in the 1980s. In contrast, as shown in Table 18, the GMT measure of legal central bank independence was statistically significant in both the 1980s and the 1990s, while the turnover rate was significant in the 1980s. In line with

my expectations, Table 18 shows that a decline in legal central bank independence causes an increase in inflation variability in both decades. It is also interesting to note that the marginal effect of GMT legal independence increased by more than 35 percent in the 1990s. This may indicate that developing countries are recognizing that legal central bank independence is only beneficial when laws are actually followed. They are, therefore, interfering less in the central bank's operations.

Contrary to expectations, an increase in the central bank governor's turnover rate in the 1980s, led to lower inflation variability. Since evidence from both developed and developing countries (i.e. the sample for the Cukierman and the GMT legal models) indicates that an increase in the governor's turnover rate leads to higher inflation variability, this appears to be an excellent indicator of inflation variability in this decade. Once again, this points to the idea that the effect of central bank independence in the 1980s is unique from other decades. However, it is also important to remember that inflation variability is measured based on average number of standard deviations that each decade's inflation rate is from the mean decade inflation rate. Therefore, while a higher turnover rate may provide lower inflation variability, the country may still experience high overall levels of inflation.

In model 2, I then interacted *Cukierman Legal* and *Turnover Rate* and found that Cukierman's measure of legal independence was statistically insignificant in the 1960s and the 1980s. However, Graph 9 shows that when the turnover rate is below .1 in the 1970s, legal central bank independence reduces inflation variability. However, its effect declines as the turnover rate approaches .1. Since a mere 18 percent of countries have a turnover rate below .1, this model has minimal applicability.

The results, however, become more uncertain when using the interactive model containing *GMT Legal* and *Turnover Rate 2*. Graph 10, which examines the 1980s, shows that the GMT measure of legal central bank independence is significant when the turnover rate is above .23, which is an area that includes 30 percent of countries in the sample. It also indicates that as the turnover rate increases, legal central bank independence leads to higher inflation variability. However, in Graph 11, which uses this same interactive model in the 1990s, legal central bank independence is also statistically significant when the turnover rate is below .42, but as the turnover rate increases, legal central bank independence leads to lower inflation variability.

Finally, among control variables, the level of political protest and democracy were insignificant across all decades and models. Meanwhile, in the model using Cukierman's measure of legal independence, a higher GDP per capita increased inflation variability in the 1980s, while GDP increased it in the GMT model. Once again, this seems to indicate that the size of the economy is an important factor influencing the central bank's ability to pursue orthodox monetary policies. However, the importance of these variables one again depends on the model used and the decade examined.

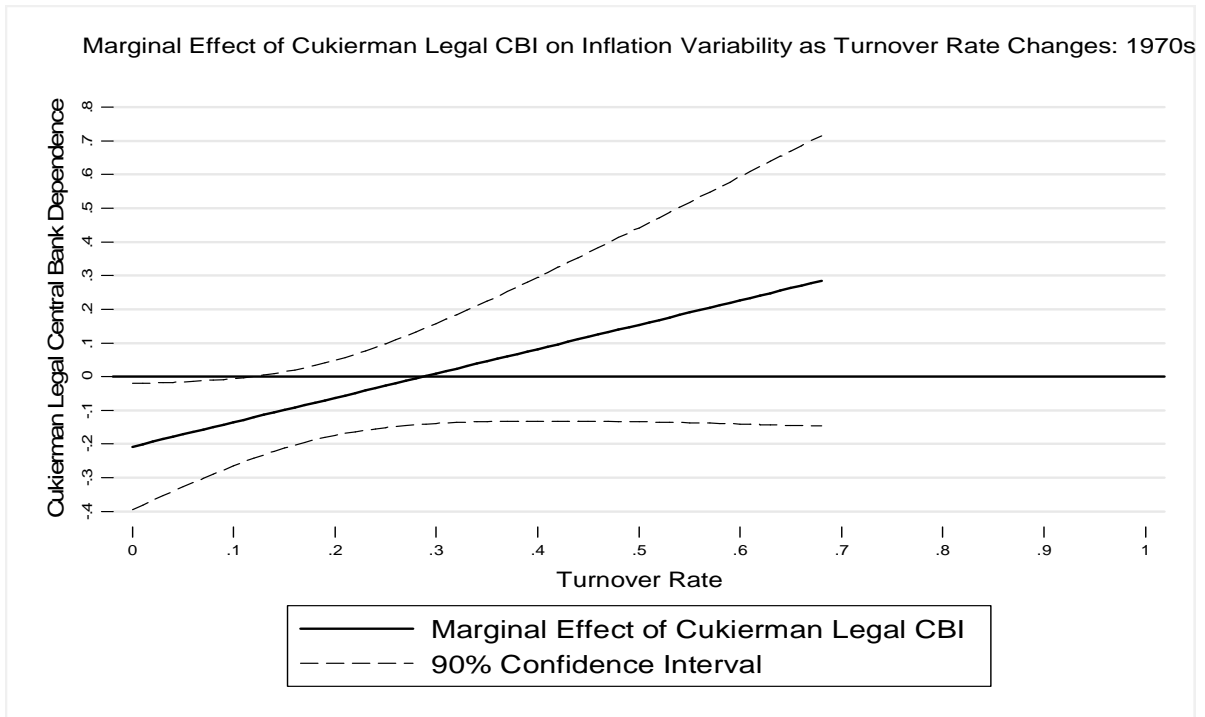
**Table 17: Effect of Cukierman Legal Central Bank Independence and the CB Governor's Turnover Rate on Inflation Variability**

	1960s		1970s		1980s	
	model 1	model 2	model 1	model 2	model 1	model 2
<i>Cukierman Legal</i>	----	.009	----	.723	----	.322
<i>*Turnover Rate</i>	----	(.33)	----	(1.13)	----	(.44)
<i>Cukierman Legal</i>	-.047	-.065	-.092	-.207*	.086	.022
	(-.67)	(-.73)	(-1.06)	(-1.44)	(.92)	(.15)
<i>Turnover Rate</i>	-.013	-.074	-.05	-.484	-.263***	-.471
	(-.36)	(-.39)	(-.91)	(-1.25)	(-4.22)	(-.96)
<i>Democracy</i>	----	----	-.002	-.001	.001	.001
	----	----	(-.39)	(-.3)	(.28)	(.28)
<i>GDP</i>	-.001	.001	-.004	-.005	-.003	-.003
	(-.12)	(-.12)	(-.45)	(-.51)	(-.4)	(-.51)
<i>GDP per Capita</i>	.008	.008	.011	.013	.018*	.018*
	(.54)	(.52)	(.9)	(1.14)	(1.56)	(1.57)
<i>Protest</i>	.001	.001	.003	.002	.001	.001
	(.82)	(.77)	(.6)	(.43)	(.43)	(.46)
<i>Constant</i>	.78***	.792***	.865***	.933***	.657***	.713***
	(4.65)	(4.64)	(3.69)	(3.51)	(3.44)	(3.25)
$R^2$	.06	.06	.12	.14	.32	.32
N	44	44	53	53	57	57

\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

Note: A higher *Legal* score indicates less legal independence



**Graph 9: Effect of Cukierman Legal Central Bank Independence on Inflation Variability as the Turnover Rate Changes, 1970s**

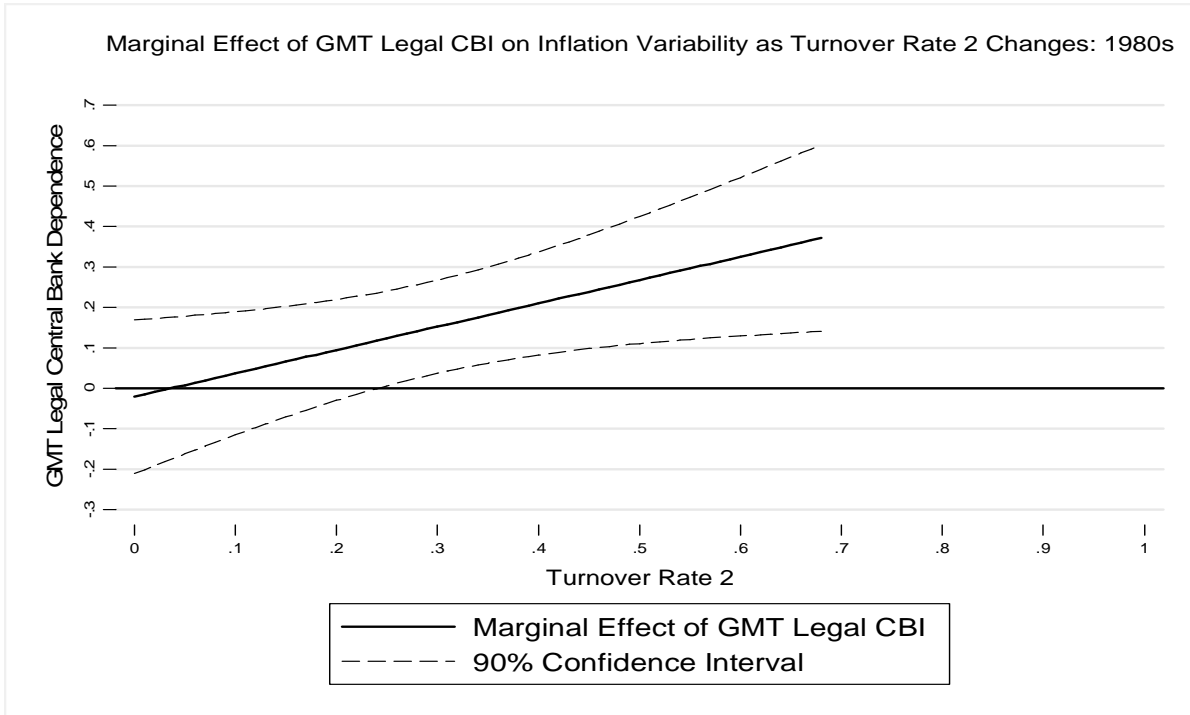
**Table 18: Effect of GMT Legal Central Bank Independence and the CB Governor's Turnover Rate on Inflation Variability**

	<b>1980s</b>		<b>1990s</b>	
	model 1	model 2	model 1	model 2
<i>GMT Legal*Turnover Rate 2</i>	----	.577*	----	-.337
	----	(-1.47)	----	(-.68)
<i>GMT Legal</i>	.18**	-.021	.25**	.334*
	(1.86)	(-.14)	(1.94)	(-1.5)
<i>Turnover Rate 2</i>	-.311***	.725**	.003	.148
	(-5.71)	(-2.45)	(.03)	-0.57
<i>Democracy</i>	-.002	-.001	-.002	-.003
	(-.38)	(-.18)	(-.41)	(-.53)
<i>GDP</i>	.009	.005	.017*	.019*
	(.89)	(-.5)	(1.37)	(1.46)
<i>GDP per Capita</i>	-.007	-.001	-.012	-.014
	(-.55)	(-.08)	(-.89)	(-.98)
<i>Protest</i>	.001	.002	-.013	-.015
	(.32)	(-.83)	(-1.12)	(-1.22)
<i>Constant</i>	.52**	.701***	.342*	.284
	(2.05)	(-2.65)	(1.36)	(-1)
R <sup>2</sup>	.47	.51	.10	.11
N	32	32	59	59

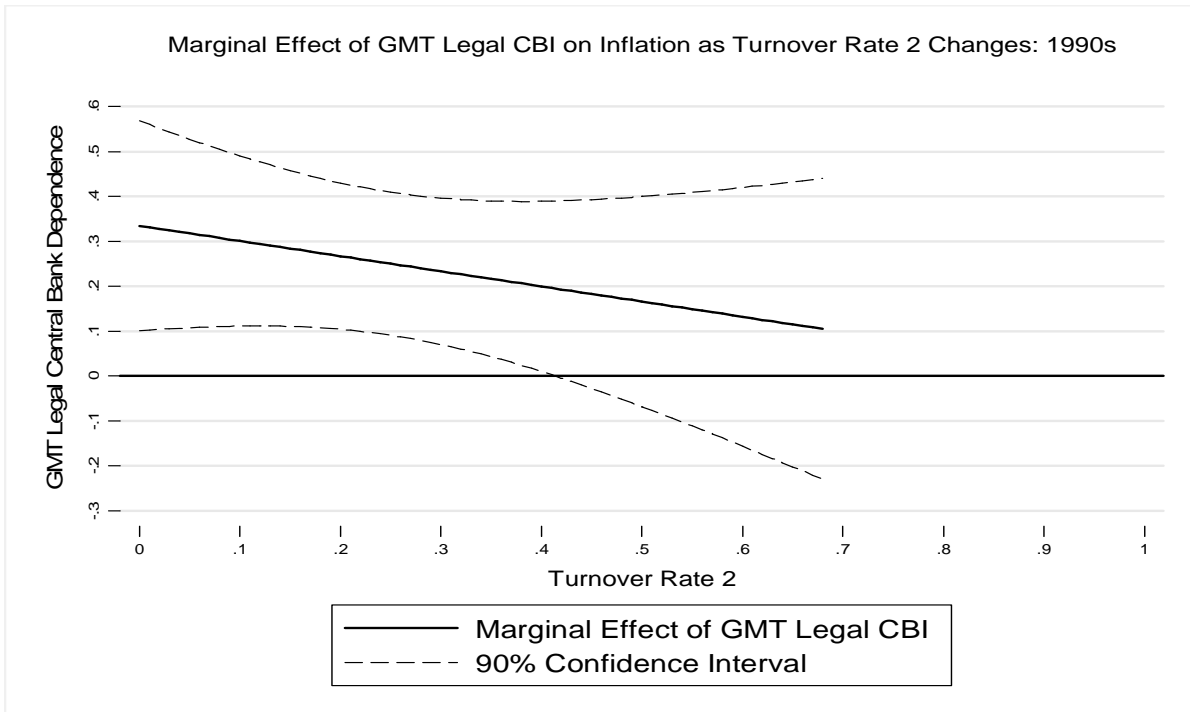
\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

Note: A higher *GMT* score indicates less legal independence



**Graph 10: Effect of GMT Legal Central Bank Independence on Inflation Variability as the Turnover Rate Changes, 1980s**



**Graph 11: Effect of GMT Legal Central Bank Independence on Inflation Variability as the Turnover Rate Changes, 1990s**

I then ran regressions to gauge the impact that my new legal central bank independence measure, which was made by interacting legal independence with the divergence between it and the central bank governor's turnover, had on inflation variability. As indicated in Graph 12 and Graph 13, this new measure had no impact on inflation variability in the 1960s and the 1970s. Meanwhile, Graph 14 shows that new Cukierman legal central bank independence measure is a statistically significant indicator of inflation variability in the 1980s when *Divergence* is above .27 and below .6; this is a category in which more than 59 percent of countries are located. However, the slope in this area changes less than .05 standard deviations, which shows that while Cukierman legal central bank independence reduces inflation variability in this decade, changes in *Divergence* have minimal impact on its importance.

Meanwhile, Graphs 15 and 16 show that GMT legal central bank independence had a statistically significant in the 1980s when *Divergence* was above .22, and in the 1990s when it was above .18. In both decades, this accounts for more than 75 percent of the cases. This, however, is where the similarity ends. In the 1980s, legal central bank independence caused a decline in inflation variability and as divergence increased, it declined more sharply. Overall, this shows that when a country has a higher level of de facto central bank independence, legal independence will have a stronger effect in reducing inflation variability. In contrast, during the 1990s, at a given level of legal independence, an increase in divergence led to higher inflation variability. This indicates that providing the central bank with greater de facto independence in this decade led to lower price stability.

Together these results show the new Cukierman and GMT measures of legal central bank independence reduced inflation variability in the 1980s, while in the 1990s, the GMT measure increased it. Meanwhile, during the 1960s and the 1970s, Cukierman legal independence had no



impact on inflation variability. So what explains these divergent findings? For the inability of central bank independence to influence inflation variability during the 1960s and 1970s, a possible explanation is the lack of sample variance which makes it difficult to find statistical significance. For the 1960s and the 1970s, respectively, 95 percent of the cases had an inflation variability rate that fell between .65 and .92, and .65 and .9 standard deviations. This problem may have been exacerbated by measuring inflation variability based on the number of standard deviations from the mean inflation. Although this is a commonly used measure, extremely outlier values have the potential of creating a standard deviation that is larger than what we would expect for most values in the decade.

In regards to the 1990s, evidence showing that as divergence increased, legal central bank independence led to higher inflation variability may be either a decade or sample specific finding. For example, in developing countries where oftentimes there is greater income inequality, it may be more difficult for the government to justify providing the central bank with broad legal independence. Therefore, the government may provide it with more de facto independence to pursue low inflation variability. However, as indicated in the example of Brazil that was provided in Chapter 1, this may reduce investor confidence and cause large swings in monetary policy that increase inflation variability. In the future, it would be interesting to test this idea by expand the Cukierman legal independence measure to include the 1990s so that a comparative analysis could be made between samples of developed and developing countries, and between the two measures of legal independence.

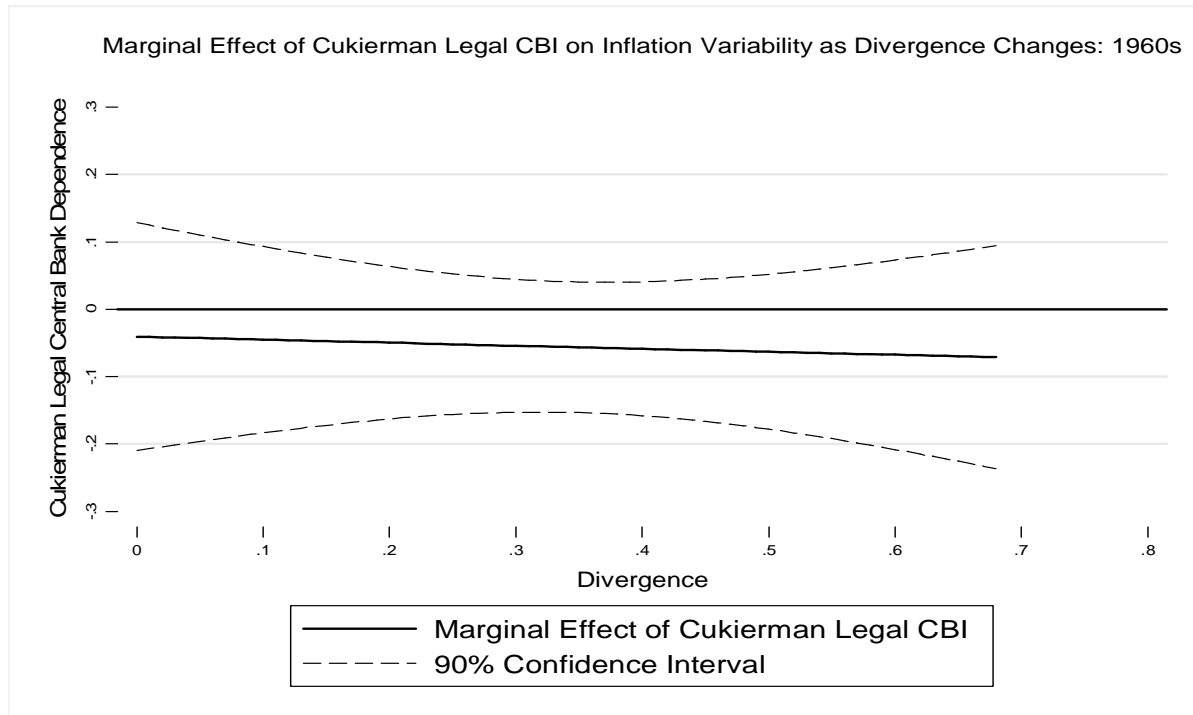
**Table 19: Effect of Cukierman Legal Central Bank Independence on Inflation Variability in Developed and Developing Countries as Divergence Increases, 1960s-1980s**

	1960s	1970s	1980s
<i>Cukierman Legal</i>	-4.5	16.5	-2
<i>*Divergence</i>	(-.15)	(.78)	(-.04)
<i>Cukierman Legal</i>	-.041	-.037	-.169
	(-.31)	(-.14)	(-.77)
<i>Divergence</i>	.043	.165	.276
	(.21)	(.78)	(.86)
<i>Democracy</i>	----	-.002	.001
	----	(-.36)	(.28)
<i>GDP</i>	-.001	-.004	-.003
	(-.11)	(-.47)	(-.41)
<i>GDP per Capita</i>	.008	.012	.018*
	(.53)	(1)	(1.58)
<i>Protest</i>	.001	.003	.001
	(.76)	(.57)	(.42)
<i>Constant</i>	.766***	.799***	.652**
	(3.89)	(3.3)	(2.95)
$R^2$	.06	.12	.32
N	44	53	57

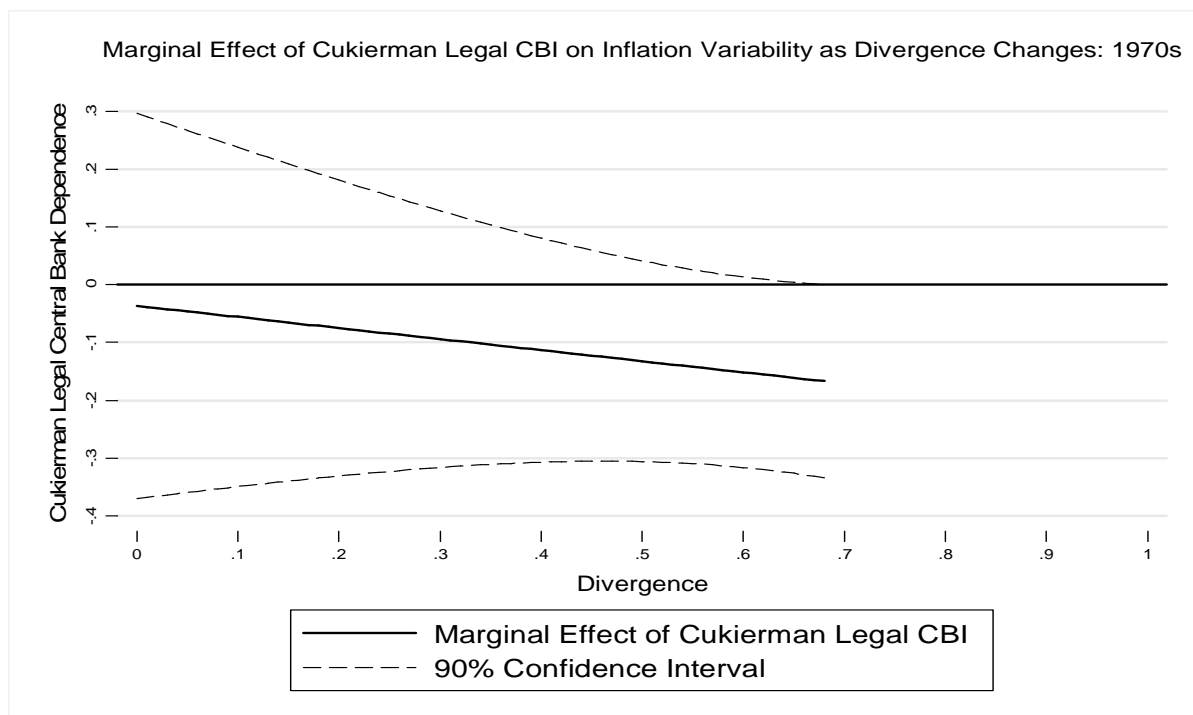
\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

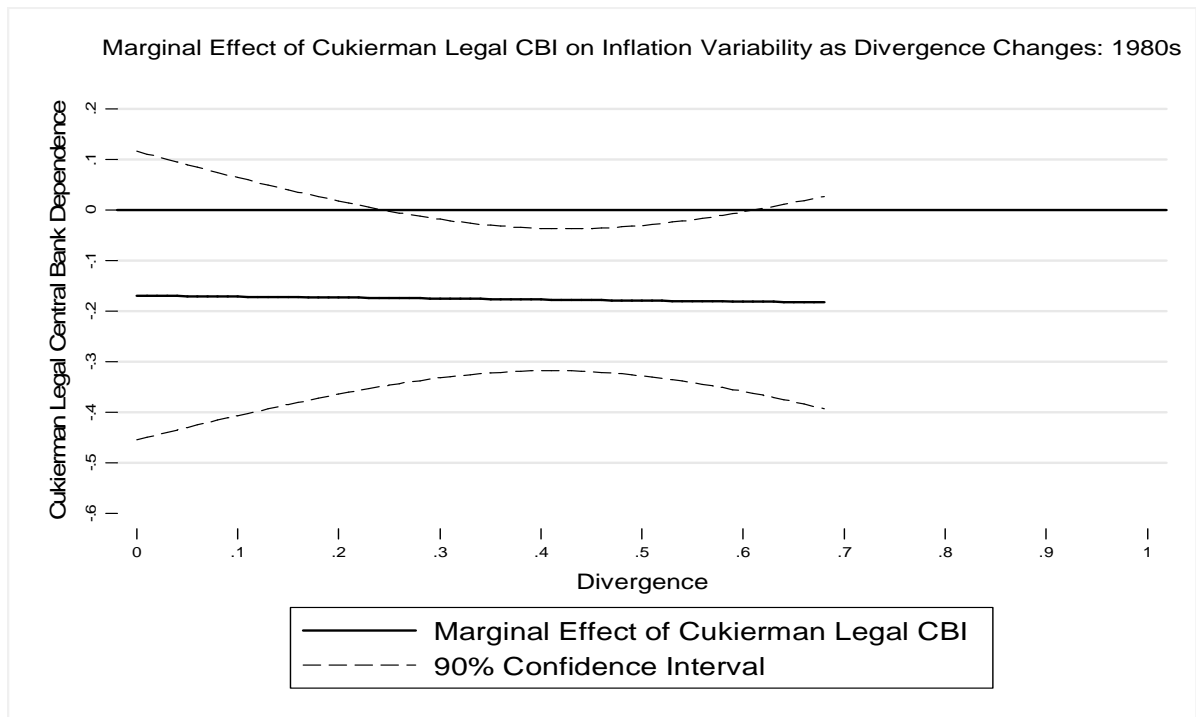
Note: A higher *Legal* score indicates less legal independence



**Graph 12: Effect of Cukierman Legal Central Bank Independence on Inflation Variability as Divergence Changes, 1960s**



**Graph 13: Effect of Cukierman Legal Central Bank Independence on Inflation Variability as Divergence Changes, 1970s**



**Graph 14: Effect of Cukierman Legal Central Bank Independence on Inflation Variability as Divergence Changes, 1980s**

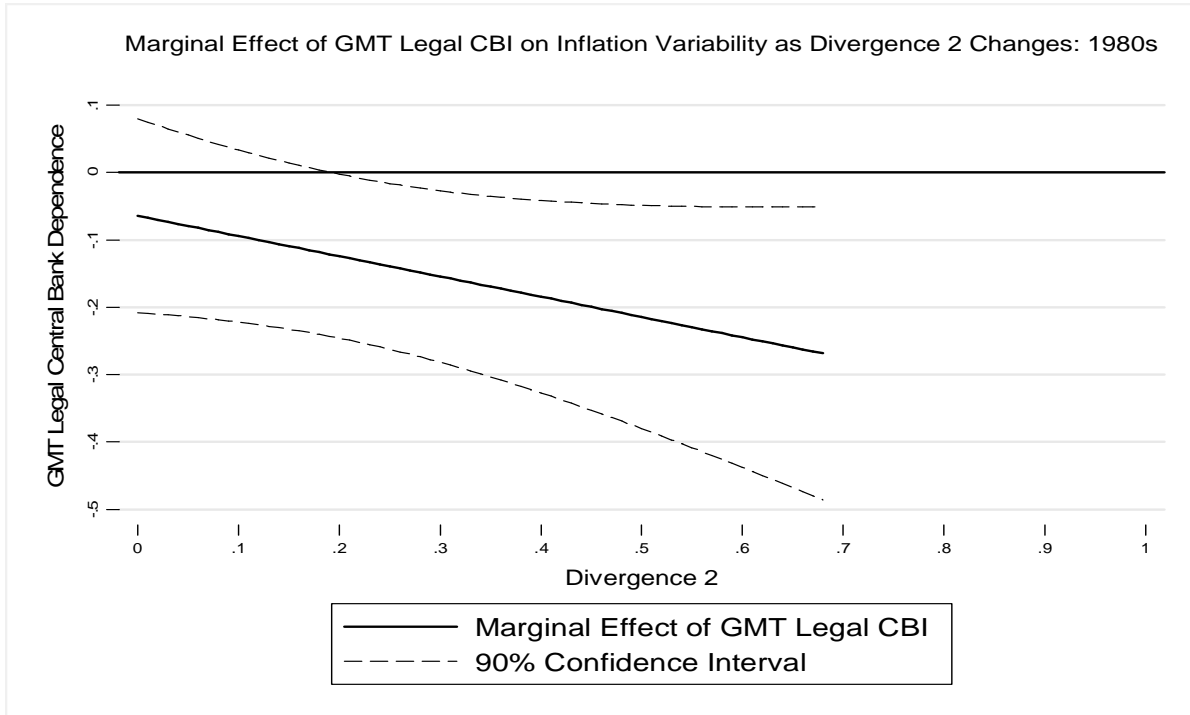
**Table 20: Effect of GMT Legal Central Bank Independence on Inflation Variability in Developing Countries as Divergence Increases, 1980s-1990s**

	1980s model 1	1990s model 1
<i>GMT Legal*Divergence 2</i>	-.30 (-1.05)	.263 (1.08)
<i>GMT Legal</i>	-.064 (-.59)	.187 (1.1)
<i>Divergence 2</i>	.516** (2.46)	-.107 (-.77)
<i>Democracy</i>	-.002 (-.48)	-.003 (-.57)
<i>GDP</i>	.004 (.33)	.02* (1.51)
<i>GDP per Capita</i>	-.002 (-.12)	-.015 (-1.07)
<i>Protest</i>	.002 (.77)	-.016 (-1.24)
<i>Constant</i>	.562** (2.14)	.336* (1.34)
R <sup>2</sup>	.49	.59
N	32	.11

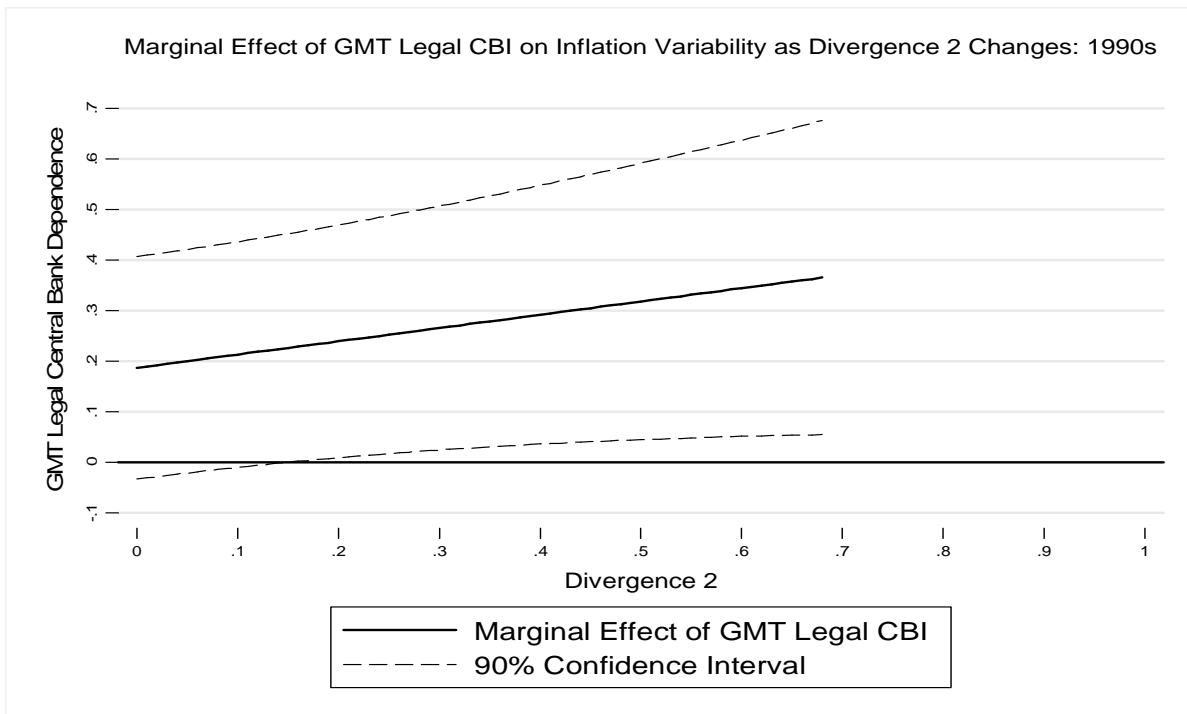
\*=p≤.1 \*\*=p≤.05 \*\*\*=p≤.001 1-tailed t-test (t-scores are indicated below coefficient)

Note: A higher *Democracy* score indicates a lower level of democracy

Note: A higher *GMT* score indicates less legal independence



**Graph 15: Effect of GMT Legal Central Bank Independence on Inflation Variability as Divergence Changes**



**Graph 16: Effect of GMT Legal Central Bank Independence on Inflation Variability as Divergence Changes, 1990s**

## **Chapter 7**

### **Conclusion**

This thesis began with a simple question: What impact does an independent central bank have on monetary policy? After explaining the inadequacies of current measures of central bank independence, I proposed a new measure of legal independence. This was created by interacting existing measures of legal independence with the gap between them and de facto central bank independence, which is based on the turnover rate of the central bank governor. Then I examined domestic political factors influencing the level of divergence to better indicate the interaction between monetary policy and politics.

Contrary to expectations, a decline in the level of democracy reduced the gap between de jure and de facto central bank independence in the 1980s. I speculate that this may have occurred since an increase in the level of democracy enables citizens to apply greater pressure to politicians with regards to monetary policy. Therefore, politicians, who are rational actors, will seek to satisfy their constituents so that they remain in power. Meanwhile, in agreement with my argument, the presence of a proportional electoral system reduced divergence, but only in the 1980s.

I then tested this new measure of legal central bank independence and found that it had broad predictive power in explaining inflation. Its effect, however, varies depending on the decade examined, the measure of legal independence used, and the level of divergence between de jure and de facto central bank independence. Even so, this is an important finding that contradicts commonly-accepted scholarly research (e.g. Cukierman 1992) which argues that legal central bank independence does not matter in developing countries. In more practical terms, it indicates to politicians in all types of countries that it is worth expending the necessary

political capital to provide the central bank with more legal independence since this can help reduce inflation over the long term.

Meanwhile, the new legal independence measure was able to explain inflation variability in developed and developing countries in the 1980s and the 1990s but not during the 1960s and the 1970s. In what appears to be contrary evidence, it reduced inflation variability in the 1980s, but increased it in the 1990s. I hypothesize that the lack of evidence in the earlier two decades and the contradictory evidence between the 1980s and the 1990s may be due to the lack of variance in inflation variability. As shown in Chapter 6, inflation variability tends to cluster in the .6 to .9 standard deviations range which makes it difficult to detect the impact that legal central bank independence has on this variable.

Another possible reason for the lack of evidence in regards to inflation variability is that inflation and inflation variability may be affected by different factors. This would not be surprising since several studies (e.g. Bade and Park 1988; De Haan and Eijffinger 1994) have shown that while legal independence reduces inflation, it has either no effect or a mixed effect on inflation variability. If this is case, however, then the situation becomes even more complicated for countries that are trying to achieve low inflation and inflation variability. Additionally, scholars must develop separate models that show which aspects of legal central bank independence are most important for reducing inflation variability.

It is also important to note that across all models and decades examined in this thesis, during the 1980s, many variables that were insignificant in other decades became statistically significant. Additionally, the impact of the new legal central bank independence measure seemed to change. This may point to unique decade factors, such as the debt crisis in Latin America, that are influencing a country's ability to pursue price stability. Future research may want to



reanalyze the data using a panel research design that controls for the effects of the 1980s. This will better indicate the impact that the new measure of legal central bank independence has across a broader swath of time.

In closing, an independent central bank will not solve all of a country's price stability issues. Oftentimes, these problems have deep historical roots that require many years to correct. It does appear, however, that legal central bank independence can have at least a moderate effect in helping countries achieve price stability. It should be used, therefore, as a tool to help provide countries with long term economic health. However, given the broad impact of the current economic crisis on both developed and developing countries, it would not be surprising to see a general decline in central bank independence as politicians try to reduce unemployment by expanding the monetary supply.

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## **Appendix 1**

### Grilli, Masciandaro, and Tabellini (GMT) Measure of Legal CB Independence

#### Political Independence

1. Central bank governor appointed without government involvement
2. Central bank governor is appointed for more than five years
3. Central bank board appointed without government involvement
4. Central bank board appointed for more than five years
5. No mandatory participation of government representatives in the central bank board
6. No government approval is required for formulation of monetary policymakers
7. central bank is legally obliged to pursue stability as one of its primary objectives
8. There are legal protections that strengthen the central bank's position in the event of a conflict with the government

#### Economic Independence

1. No automatic procedure for the government to obtain direct credit from the central bank
2. When available, credit is extended to the government at market interest rates
3. When available, credit is temporary
4. When available, credit is for a limited amount
5. The central bank does not participate in the primary market for public debt
6. The central bank is responsible for setting policy rate
7. The central bank has no responsibility to oversee banking sector (two points) or shares responsibility with other institutions (one point)

## **Curriculum Vita**

Douglas Block was born in Durham, North Carolina. The third son of Edith and Gene Block, he graduated from Block Academy in Durham, North Carolina in 2004 and then entered the University of North Carolina at Chapel Hill. While pursuing a double major in Latin American Studies and Political Science, he honed his knowledge of Latin America by participating in student exchanges programs for 4 semesters in Mexico and Peru. After graduation in spring 2008, he worked as an intern at the U.S. Embassy in Mexico City before entering the University of Texas at El Paso to pursue a Master of Arts in Political Science. During his two years at UTEP he worked as both a research and teaching assistant, presented research at the Southwestern Political Science Association Conference, and coauthored a book chapter on central bank independence. He graduated from UTEP in spring 2010 with the Thomas E Cook award for outstanding graduate student in Political Science and plans on pursuing a doctorate in political science in fall 2011.

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