8-12-2014

Institutional Development and Monetary Policy Transmission

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ABSTRACT

INSTITUTIONAL DEVELOPMENT AND MONETARY POLICY TRANSMISSION

By

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AUGUST, 2014

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This dissertation states that the behavior of banks and investors varies according to the rules of the game and demonstrates that the level of institutional development may have an important role on the effectiveness of monetary policies. The level of institutional development is measured by the quality of contract enforcement, the level of corruption, the extent of political stability, the level of government's transparency and accountability and the quality of the implemented policies and regulations. This research presents a framework to explain how the traditional channels of monetary policy transmission are altered by the level of institutional development, allowing the construction of three hypotheses. The first hypothesis is that institutional development matters for the effects of monetary policies on output. The second hypothesis is that contractionary policies have more adverse effects on output in countries with low institutional development than in countries with high institutional development. The third hypothesis is that expansionary

policies are more effective in terms of output promotion in countries with high institutional development than in countries with low institutional development. To the best of our knowledge, this is the first time that research has established a relationship between the level of institutional development and the asymmetric effects of monetary policies on output. Two country examples are presented: the case of Nigeria illustrates the third hypothesis and the case of Brazil illustrates the second hypothesis. Several econometric models and six institutional development indicators are used to evaluate the three hypotheses. This dissertation provides strong empirical support for the hypotheses 1 and 2, sustaining the argument that the asymmetric effects of monetary policies on output may have deep institutional causes. Rule of law and government effectiveness are the indicators that matter most for the effectiveness of monetary policies. Particular consideration should be given to the rule of law indicator because of its clear connection with the theoretical arguments and country examples, suggesting that fundamental institutional improvements should be focused on the efficiency of the judiciary system and the quality of law enforcement.

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A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree
of
Doctor of Philosophy
in the
Andrew Young School of Policy Studies
of
Georgia State University

GEORGIA STATE UNIVERSITY
2014

ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

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1 Introduction

This research evaluates whether the effects of monetary policies on real output are dependent upon institutional development. The level of institutional development in a country depends on the quality of contract enforcement, the protection of property rights, the protection against the use of public power for private gains, the government's capability to implement sound policies and regulations, the citizens' participation in selecting the government, the government's transparency and accountability, and political stability.

The agents involved in the transmission of monetary policies to real output will respond to changes in central bank interest rates in different ways, depending on the incentives and constraints imposed by the set of institutions. Banks and investors, the main agents participating in the transmission of monetary policies, will make choices to maximize profits and these choices will be shaped by the opportunities offered by the institutional environment. As a result, institutions may affect economic performance through their impact on the effectiveness of monetary policies.

Section 2 describes the objectives of this dissertation. Section 3 highlights the importance of this study and its main policy implications. Section 4 reviews the associated literature and identifies the contributions of this research. Section 5 presents a theoretical framework that allows the development of three hypotheses. The first hypothesis is that the effect of changes in central bank discount rates on real output is altered by the institutional quality. The second hypothesis is that positive changes in interest rates have a greater negative impact on output in low institutional development countries than in high institutional development countries. The third hypothesis is that negative changes in

interest rates are more effective in terms of output promotion in countries with high institutional development than in countries with low institutional development. Section 6 presents two case studies that illustrate institutional quality as a factor that changes the behavior of the agents and the effectiveness of monetary policies. Section 7 describes the data that will be used in the empirical part of this research. We use quarterly real GDP growth rates and central bank discount rates from the International Financial Statistics (IFS) of the International Monetary Fund for the years 2002 to 2011. The Worldwide Governance Indicators from The World Bank are used as measures of institutional development. Our sample is composed of 52 countries and comprises a wide variety of institutional development levels. Section 8 focuses on the empirical evaluation of hypothesis 1. Section 9 empirically evaluates the three hypotheses developed in this dissertation through a series of panel linear models using fixed-effects and Prais-Winsten assumptions. Section 10 presents an alternative methodology to deal with the endogeneity of discount rates with respect to the real GDP growth. Section 11 presents the conclusions.

2 Objectives

First, this research aims to understand how the traditional monetary policy transmission channels are altered by the level of institutional development found in each country. This understanding will provide the rationale for the development of the hypotheses that will be tested in this study. The first hypothesis is that the effect of changes in central bank discount rates on real output is altered by a country's institutional quality. In addition, we treat expansionary and contractionary monetary policies as two different phenomena. This is due to the fact that some monetary policy transmission channels work only for positive changes in interest rates or for negative changes in interest rates. Or, some channels work for both cases but have qualitatively different effects for negative changes in interest rates and for positive changes in interest rates. The second hypothesis is that positive changes in interest rates have a greater negative impact on output in low institutional development countries than in high institutional development countries. The reason is that banks constrain the supply of loans and increase interest rates with more intensity and investors are more bank-dependent in low institutional development countries compared to high institutional development countries. We present institutional development as the deepest explanation for the development of capital markets. The third hypothesis is that negative changes in interest rates are more effective in terms of output promotion in countries with high institutional development than in countries with low institutional development. The reason is that banks transmit less of the reduction in central bank discount rates to the public and investors have a less willingness to invest in low institutional development countries compared to high institutional development countries.

Second, this study aims to illustrate these hypotheses with some case studies. The

objective is the presentation of examples that demonstrate that institutional quality can work as a factor that changes the behavior of the agents and the effectiveness of monetary policies.

Third, this research aims to empirically test whether institutional development matters for the transmission of monetary policies from central bank discount rates to real output. More specifically, the third objective of this study is to empirically evaluate the first hypothesis developed in the subsection 5.4 of this research. The arguments presented in subsection 5.2 indicate that the transmission does seem to be dependent on the institutional development. However, this dependence may be important or unimportant. Therefore, this becomes an empirical question to be answered by this dissertation.

Fourth, this research aims to empirically test whether institutional development matters for the transmission of monetary policies when positive and negative changes in central bank discount rates are treated as two different phenomena that interact in different ways with the institutional environment. More specifically, this research aims to empirically evaluate the second and third hypotheses developed in the subsection 5.4 of this research.

Finally, this research aims to empirically determine which aspects of institutional development are more relevant for the effectiveness of monetary policies. A set of features determines the quality of the incentives and constraints in a country: the political stability, the government's accountability and transparency, the level of corruption, the protection of property rights, among others. The empirical tests will shed some light on the importance of each one of these characteristics for the outcome of monetary policies, indicating the specific institutional improvements that would be more relevant. In

addition, the use of a variety of indicators may also be a way of feeding a nascent theory that associates monetary policies and institutional development.

3 Importance of this Study and Policy Implications

Empirical and theoretical works have demonstrated that institutions matter for economic performance. This research tests one of the channels through which institutions may affect economic performance: changing the effectiveness of monetary policies. Also, the theoretical arguments and the case studies shed some light on how institutions may affect the results of monetary policies on output. This study investigates the interactions between institutions and an economic variable; therefore, this study offers a contribution to the institutional economics literature. In the next section, we will detail our contributions and show how this research will extend the existing literature.

This study also offers a contribution to the literature on monetary policy transmission. The fact that institutions may matter for the results of monetary policies on output has important implications, especially for developing countries. This means that the goals of monetary policy in these countries should include increasing the quality of regulations, improving contract enforcement, among other institutional improvements. Alternatively, this means that making monetary policy in these countries means accepting the weakness of the institutional environment as a given and incorporating its effects. All this means that the economic science of monetary policy transmission is not easily imported from developed to developing countries.

This study has policy implications. First, the empirical results will show whether central bankers should care about their institutional environment while determining policy rates. As a first example, suppose that the research provides empirical evidence that an expansionary monetary policy is more effective in terms of output promotion in countries with high institutional development than in countries with low institutional development.

This result can be interpreted as evidence that the effectiveness of expansionary monetary policies will be partially reduced by a poor institutional environment. Consequently, central bankers will have to decrease interest rates even more to compensate the negative effects that come from the institutional environment; otherwise, they will not achieve the desired output level. We should mention, however, that this solution is limited due to the central banks' price-stabilization objective.

It is important to emphasize the relevance of this first policy implication because it means that institutions may be the key to understanding some monetary policy failures. Rodrik and Subramanian (2009) argues that financial globalization did not promote growth in many developing countries because these economies are investment-constrained due to the poor institutional environment. Thus, an expansionary monetary policy in these economies has a potential to be a failure in terms of output promotion due to the same reasons mentioned by Rodrik. Also, a decrease in central bank discount rates may be a failure in terms of output promotion simply because banks are allowed to operate in non-competitive ways and will not necessarily transmit the interest rate reduction to the public.

Suppose now, as a second example, that the research provides empirical evidence that a contractionary monetary policy has more negative effects on output in countries with low institutional development than in countries with high institutional development. This result can be interpreted as evidence that the adverse effects of contractionary policies are exacerbated by a poor institutional environment. Consequently, central bankers in countries with low institutional development should avoid excessively tight policies due to the relative severity of these policies on real output. Avoiding excessively tight policies,

however, may not be in accordance with the central banks' price-stabilization objective.

In fact, if there is empirical support for our hypotheses, the main policy implication for central bankers is the necessity of understanding the distortions caused by the specific set of incentives and constraints that is present in each country. Central bankers should understand the impact that these distortions have on the outcome of monetary policies, accepting and incorporating them in policy decisions and actions. It seems that there is not a macroeconomic response, in terms of changes in interest rates, for an institutional development issue. Apparently, institutional weaknesses can only be addressed by improvements in the set of incentives and constraints that shapes the behavior of the economic agents and characterizes the country's institutional environment.

Second, the research has broad policy implications, which are not limited to central banks' actions. If the results indicate that institutional development does not matter for monetary policy transmission, monetary policymakers should not care about banking competition, quality of law enforcement and other institutional questions, even though they may be important for other reasons. On the other hand, if the results indicate that institutional development matters for monetary policy transmission, policymakers should care about those institutional questions. Therefore, policymakers should work to stimulate competition in the banking sector, increase the willingness of agents to invest after a decrease in interest rates, stimulate the development of capital markets and mitigate moral hazard problems in lending activities. The terminology used in Acemoglu, Johnson, Robinson, and Thaicharoen (2003) seems to apply to this research as well because we can realize that all the mentioned things that the government should care about are actually symptoms of a weak institutional development. Consequently, policymakers should act on

the institutional causes of these symptoms.

4 Literature Review and Contributions

The purpose of this section is to review the literature associated with the objectives of this research and identify the main contributions of this dissertation.

4.1 Institutional Development and Economic Performance

The argument that economic performance depends on institutional development has been presented in several studies. Acemoglu, Johnson, and Robinson (2005) presents a theory of institutions and economic growth. A series of historical examples illustrates the proposed theoretical framework. North (1990) states that institutions, as constraints that shape human interactions and determine the set of incentives in a society, change the costs of transformation and exchange and, as a result, change the economic performance.

There is also a literature providing empirical evidence on the subject. Acemoglu, Johnson, and Robinson (2001) uses settler's mortality rates in European colonies as an instrument for current institutions and estimates significant effects of institutions on income per capita. The idea is that colonizers were more likely to set up extractive institutions in places where they could not stay due to the high mortality rates. Thus, there is a negative relationship between settler's mortality rates and the quality of current institutions. As settler's mortality rates do not lead to changes in current income per capita, except indirectly via current institutions, the variable solves the endogeneity of institutions with respect to the income per capita. Keefer and Knack (1997) provides empirical evidence that poor countries do not catch up to richer countries as expected by early neoclassical theory due to, in large part, their institutional weakness. Redek and Susjan (2005) shows that the legal system quality, the property rights protection, among

other institutional factors, have an important role on economic growth for a set of 24 transition economies. Kagundu and Martinez-Vazquez (2011) uses a broader sample of 89 countries and also provides evidence that institutional quality matters for GDP per capita growth.

4.2 Institutions as the Cause of Policies

Macroeconomic policies and institutional economics are put together in Acemoglu et al. (2003). The paper presents the idea that macroeconomic variables are symptoms instead of causes of poor economic performance. Slow growth in countries with high inflation, large budget deficits and misaligned exchange rates is not caused by these macroeconomic issues. Actually, these macroeconomic issues are produced by the poor institutional environment found in these countries. As a result, what ultimately causes the reduced growth is the poor institutional development and not the mentioned macroeconomic variables. In a panel of countries with growth rate of GDP per capita as the dependent variable, the variables representing macroeconomic policies (government consumption, average inflation rates and real exchange rate overvaluation) lose their significance once a measure of institutional quality is included in the models. The authors reinforce the notion that the empirical findings do not imply that macroeconomic policies are unimportant. Macroeconomic policies matter for economic performance; however, they have deep institutional causes.

Persson and Tabellini (2005) and Bernhard and Leblang (2002) also associate institutions with macroeconomics. Persson and Tabellini (2005) study the effects of electoral rules and forms of government on state spending and budget deficits. Among

many other interesting empirical results, they found that presidential systems are associated with smaller government spending as a fraction of GDP and smaller budget deficits than parliamentary systems. Presidential regimes have a stronger separation of powers between the executive and the legislative branches than parliamentary regimes. It seems that this separation of powers intensifies the checks and balances between the two branches, increasing accountability, constraining politicians from abusing their powers and justifying the estimated results. Finally, Bernhard and Leblang (2002) provides empirical evidence that fixed exchange rates and central bank independence are caused by the level of economic openness, but also by the configuration of domestic political institutions. While, in general, single-party majority governments do not benefit from the choice of these policies, coalition governments, on the other hand, can benefit from it[1]. Thus, fixed exchange rates and central bank independence will emerge as the choices that maximize cabinet durability under specific institutional configurations.

4.3 Institutions as a Factor that Changes the Effectiveness of Policies

As in this research, in Acemoglu, Johnson, Querubin, and Robinson (2008) and Gollwitzer and Quintyn (2010) institutions appear as a factor that can change the effectiveness of other variables. Acemoglu et al. (2008) presents evidence that the effectiveness of central bank independence reforms is related to the overall institutional development of a country. More specifically, central bank independence reforms are ineffective in countries with weak and strong constraints on the executive, which is the

[1]The idea is that fixed exchange rates and central bank independence, as monetary commitments, remove a potential source of conflict over monetary policy and facilitate the management of intra-coalition conflicts, helping political parties to remain in office. The benefit of solving conflicts seems to overcome the losses that come from these monetary commitments (the party loses the ability to manipulate policy for short-term electoral or partisan gain).

main measure of institutional quality used in the research. Reforms work better in countries with medium constraints on the executive, that is, medium institutional quality levels[2]. The effectiveness of the reforms is measured in terms of the reduction in inflation rates. Inflation rates are regressed on lagged inflation and multiplicative terms composed by the interaction between the central bank independence measure and dummies for weak, medium and strong constraints on the executive. Gollwitzer and Quintyn (2010) also tests whether the effect of central bank independence on inflation rates is differential by institutions. The paper provides evidence that central bank independence reduces inflation irrespective of the overall institutional environment. None of the interaction terms between institutional quality and central bank independence are significant. The analyses included a sample of low and middle income countries.

4.4 Institutional Development and Monetary Policy

There is relatively little work relating monetary policy to institutional development. Mihal (2009) presents a theoretical model that includes the fiscal authority setting tax levels, government spending and debt levels, the monetary authority setting the actual level of inflation and the private sector setting the expected inflation. The government uses taxes, seigniorage and newly issued debt to finance itself. A parameter for the degree of tax leakage due to corruption is included in the model as the measure of institutional quality. The model predicts that an increase in corruption leads to higher inflation rates, meaning that the revenue that comes from seigniorage depends on the institutional quality. Another result is that, for countries with low institutional quality, a decrease in corruption leads to

[2]The authors explain that the result that central bank independence reforms are ineffective in countries with high institutional development may be due to level effects, that is, inflation rates are already very reduced in these countries.

an increase in taxes, because now taxes are collected more efficiently, and a decrease in output[3]. And finally, for countries with moderate to high institutional quality, a decrease in corruption leads to a decrease in taxes and an increase in output[4]. The paper also presents a VAR analysis for Chile, Colombia, Indonesia and Philippines including industrial production, inflation, exchange rates, interest rates and a measure of institutional quality. The author concludes that a monetary policy shock has only a significant impact on output for countries with low institutional quality. Also, a positive institutional quality shock[5] stimulates more the output in countries with low institutional quality than in countries with high institutional quality[6]. The idea presented in the paper is that institutions affect output through its effect on seigniorage and taxes, that is, institutions may affect monetary policies through seigniorage. This research focuses on the relationship between monetary policies and institutions in a different way because here the objective is to test whether the effectiveness of monetary policies is differential by the level of institutions. Another difference is that this research aims to explain the interactions between monetary policies and institutions through multiple channels and multiple institutional variables rather than focusing on corruption and its effect on seigniorage.

Another research linking institutions and monetary policy is presented in Duncan (2011). The paper argues that the positive correlations between output and interest rates found in developed countries and the negative correlations between output and interest rates found in developing countries are explained by institutional quality differences

[3]The author explains that central banks are not truly independent in countries with low institutional development. Thus, when there is an increase in corruption in these countries, the government will shift the burden to the monetary authority, increasing seignorage and decreasing taxes. Alternatively, when there is a decrease in corruption, the government will increase tax collection due to smaller tax leakages.

[4]The author explains that a larger percent of the tax revenues will be transmitted to the government because the tax leakage was reduced. This fact will allow a reduction in tax rates.

[5]An institutional quality shock is a change in the exogenous component of institutional quality.

[6]This empirical result is unexpected, considering the predictions derived from the theoretical model.

between developed and developing countries. Empirical evidence on these associations is provided by regressions including interest rates as the dependent variable and output as the independent variable that interacts with institutional quality. The explanation for the mentioned correlations is that positive external demand shocks of home goods increase the output and are inflationary in countries with high institutional quality and increase the output and are deflationary in countries with low institutional quality. Also, central banks increase interest rates when inflation goes up and decrease interest rates when inflation goes down.[7]. These explanations were predicted by a DSGE model calibrated for Indonesia and Switzerland. The paper is about how institutions affect the response of monetary policies. Again, this dissertation has a different objective. The goal of this research is to study how and whether institutions affect the effectiveness or the transmission of monetary policies, instead of how institutions cause the monetary policies.

Despite not being papers about monetary policy transmission, Rodrik and Subramanian (2009) and Burnside and Dollar (2000) present a rationale that is closely associated with the ideas presented in this dissertation. Rodrik and Subramanian (2009) examines the effects of financial globalization on output growth and Burnside and Dollar (2000) evaluates the effects of foreign aid on output growth. The institutional development of the country plays a central role in both papers, explaining the final impact of the mentioned policies on economic performance. The liberalization of capital accounts

[7]The author explains that the positive external demand shock causes a real appreciation. The real appreciation will have two opposite effects. On one hand, the nominal appreciation reduces the consumer price level and generates a higher opportunity cost of leisure, creating an incentive to increase the supply of labor. On the other hand, it reduces the value of debt in foreign currency, stimulating consumption and leisure and reducing the supply of labor. Economies with weak institutional quality will attract fewer loans and the first effect will be bigger than the second, increasing the labor supply and decreasing inflation rates. Institutional quality will affect foreign investors and lending in foreign currency. For economies with stronger institutional quality, the second effect will be bigger than the first, the labor supply will decrease and inflation will go up.

and the receipt of foreign aid, like an expansionary monetary policy, inject money into the system. Thus, the two mentioned works and this research are closely associated because all of them analyze the effects of money injections on output under different levels of institutional development. Rodrik and Subramanian (2009) argues that the liberalization of capital accounts and the consequent reduction in domestic interest rates have not been contributing to output growth because many countries do not have an adequate demand for investments. These economies are investment-constrained mainly because of poor property-rights, weak contract enforcement, and fear of expropriation. Burnside and Dollar (2000) presents evidence that foreign aid has a positive impact on output growth under good fiscal, monetary and trade policies. Aid has little effect under poor policies. However, Easterly, Levine, and Roodman (2004) update Burnside and Dollar's dataset and claim that their results are not robust to the use of an extended period of time.

Also, this research has a strong relationship with the ideas presented in Mishra, Montiel, and Spilimbergo (2010). The paper studies the monetary policy transmission in low income countries and provides empirical evidence that central bank discount rates are less transmitted to bank lending rates in countries with a more concentrated banking sector and smaller scores in a transparency index. According to the authors, the traditional channels of monetary policy transmission are impaired in these countries mainly due to the weak institutional frameworks and the imperfect competition in the banking sector. An important consideration is that Mishra et al. (2010) does not investigate whether the effectiveness of monetary policies on real output is dependent upon institutions. This research will answer this question because we focus on the effects of monetary policies on real output rather than on bank lending rates. In addition, this research expands the

arguments used in Mishra et al. (2010) because we claim that institutions are also important for the transmission of monetary policies from bank lending rates to the real output. We add to the arguments found in Mishra et al. (2010) the idea that investors have a smaller willingness to invest in countries with low institutional development, as presented in Rodrik and Subramanian (2009). This is important because we highlight that not only the financial sector's agents, but also the investors, behave in different ways depending on the constraints and incentives imposed by the institutional environment. It is also relevant to mention that Mishra et al. (2010) is essentially a monetary policy research, without a clear association with the institutional economics literature and its main authors (North, Acemoglu, Rodrik, among others). This research, on the contrary, brings together the two strains of the literature, institutional economics and monetary policy, making a contribution to both of them. Finally, this research will treat positive and negative changes in interest rates as two different phenomena. Such treatment is important since expansionary and contractionary policies produce different behavioral changes, and consequently, asymmetrical effects on output (Cover (1992) and Garibaldi (1997)). This important differentiation is not presented in Mishra et al. (2010).

Hardt (2011) is another paper that studies how institutions affect the transmission or the effectiveness of monetary policies. The author argues that the most significant way institutions impact the transmission of monetary policies is through their effect on the elasticity of investment demand to changes in interest rates. Economies with low institutional quality tend to be more investment constrained than economies with high institutional quality. As a consequence, the elasticity of the investment demand with respect to interest rates is more elastic in countries with good institutional quality than in

countries with low institutional quality. The paper provides some examples on how an institutional change can affect the transmission of monetary policies to output, however, the paper does not provide any empirical evaluation and also does not mention the other channels presented in this paper through which institutions may affect monetary policies' outcomes.

Aysun, Brady, and Honig (2013) describe themselves as the first attempt at examining the relationship between financial frictions and the strength of monetary policy across a broad group of countries. Financial frictions are measured by bankruptcy recovery rates, the proportion of a firm's value creditors can recover from a defaulting firm. The sample used in the study is composed of 56 developed and developing countries. First, SVAR models are used to estimate the output response to monetary policies for each country. Second, the absolute value of the measure of monetary policy impact[8] generated in the first step is regressed on the measure of financial frictions, the bankruptcy recovery rates. There is one observation per country and the model is estimated using OLS with robust standard errors. The results indicate that recovery rates have a negative and statistically significant effect on the impact of monetary policies, that is monetary policies are less effective under higher recovery rates. As control variables, dummies for the countries' legal origin (German, English, Scandinavian and Socialist) are included in the regression. The results indicate that the legal origin can impact the effectiveness of monetary policies. Countries with German legal origin, which has stronger creditor rights, have significantly weaker monetary policy transmission than countries with French legal origin. A measure of overall institutional quality was also included in the investigation.

[8]The monetary policy impact measure is the maximum amplitude of output responses to an exogenous increase in interest rates, in absolute value.

The institutional quality variable was built as an average of law and order, corruption and bureaucratic quality. The regression of monetary policy impact on institutional quality provided evidence that institutional quality has a negative and statistically significant effect on the strength of monetary policies, meaning that the effectiveness of monetary policies diminishes with increases in institutional quality. However, institutional quality becomes insignificant after the inclusion of recovery rates, meaning that institutional quality does not have an independent impact on the effectiveness of monetary policies. According to the authors, this can be interpreted as evidence that an improvement in institutional quality may reduce the effectiveness of monetary policies only if this improvement centers on increasing recovery rates. Despite including institutional quality in the empirical tests, the study is based on a theoretical framework that describes the effects of monetary policies on real variables in the presence of financial frictions. Financial frictions, such as the cost of monitoring borrowers, affect the premium for external funds and may have an impact on the effects of monetary policies. In this research, institutional quality, and not financial frictions, is the ultimate explanation for different degrees of monetary policy effectiveness. Another important difference is that Aysun et al. (2013) does not differentiate between money expansions and money contractions, as proposed by this dissertation.

Finally, Cecchetti (1999) provides empirical evidence that the transmission to output of a positive interest rate shock is stronger in countries with less developed financial structures than in countries with more developed financial structures, using the quality of the legal system as an instrument for the financial structure variable. The author builds a theory stating that the quality of the legal system determines the quality of

investors' protection and, consequently, the development of the financial system. Weaker legal rules produce smaller capital markets and reduce the financial structure quality (measured by the concentration and health of national banking systems). As a result, a positive shock in interest rates will have a more negative effect on output in countries with weaker legal systems because investors are more limited in terms of findings alternative sources for funding investments and because the financial structure has less quality in these countries than in countries with stronger legal systems. Using a sample of eleven developed countries, the author estimates SVAR models including output, inflation, interest rates and exchange rates. Impulse response functions are estimated to extract the impact of a positive shock in interest rates on output. Finally, these impact measures are regressed on a measure of financial structure quality, using three measures of legal quality (shareholder rights, creditor rights and law enforcement) as instruments for financial structure quality. One difference between Cecchetti (1999) and this research is that the sample used in the first includes only developed countries and this research aims to use a broader sample, including developing countries. The use of a broad sample is essential because this study seems to be especially important for developing countries. Another difference is that in this research the focus is on institutional quality, which includes also the quality of the legal system but is not limited to it. Also, in this research poor institutions may affect the effectiveness of monetary policies through more channels than the ones mentioned in Cecchetti (1999), including the demand for investment, which will reflect a reduced willingness to invest. Finally, in this research we make the fundamental differentiation between money expansions and money contractions, a separation that does not appear in Cecchetti (1999).

4.5 Contributions of this Study

The previous subsection demonstrated that there is a theoretical and empirical literature providing evidence that institutional development has a positive impact on economic performance. In addition, there is a literature showing that institutions determine macroeconomic variables as government spending, inflation and exchange rates. In Mihal (2009) and Duncan (2011) institutions determine monetary policies. In the first, corruption determines seigniorage and taxes. In the second paper, output movements interact with institutional quality determining central bank discount rates.

This research has a strong association with the literature that poses institutional development as a factor that changes the effectiveness of monetary policies. This is the case of Hardt (2011), who claims that economies with low institutional development tend to be investment constrained, a characteristic that alters the effectiveness of monetary policies. However, the paper does not present any empirical evaluation. Mishra et al. (2010) is another paper included in that literature. However, they investigate only whether the transmission from central bank discount rates to bank lending rates is dependent upon institutions. They do not investigate the effects on output and they do not study positive and negative changes in interest rates separately.

Cecchetti (1999) and Aysun et al. (2013) are the only papers that somehow test whether the effectiveness of monetary policies on output is dependent upon a measure of institutional development. However, there are many reasons to believe that this research will certainly move our understanding of the role played by institutional development in the transmission of monetary policies forward.

First, as the most important contribution, we will test whether the effectiveness of

monetary policies on output is dependent upon institutional development, considering positive and negative changes in interest rates as two different phenomena. This discrimination was never used in the literature on monetary policy and institutions and can enhance the quality of our empirical results, given the evidence that monetary policies have asymmetrical effects on output (Cover (1992), Rhee and Rich (1995), Garibaldi (1997), Karras and Stokes (1999), among others), meaning that expansionary policies have smaller and less statistically significant effects on output than contractionary policies. This fundamental differentiation also appears in the motivational theory presented in this research, which provides a unique perception of the role played by institutional development in the transmission of expansionary and contractionary policies.

Hypothesis 2 of this dissertation states that monetary contractions have more adverse effects on output in countries with low institutional development than in countries with high institutional development. Hypothesis 3 of this dissertation states that monetary expansions are more effective in terms of output promotion in countries with high institutional development than in countries with low institutional development. These hypotheses imply that the degree of asymmetry of monetary policies on output increases with the worsening of the institutional development. Thus, as a very relevant contribution, this dissertation provides a potential explanation for the asymmetric effects of monetary policies on output: the degree of institutional development.

Second, we propose a panel methodology, which is appropriate for comparative analysis across countries and for understanding the effects of common monetary policies, as opposed to monetary shocks. In Cecchetti (1999) and Aysun et al. (2013) the empirical tests are based on impulse response functions, being more appropriate to test the impact of

monetary policy shocks rather than the impact of common monetary policies. In addition, the time series methodology used in these two papers is also not very suitable for comparative analysis across countries.

Third, we will test whether the effectiveness of monetary policies on output is dependent upon institutional development using a larger sample of countries than the one presented in Cecchetti (1999). Cecchetti's paper studies only developed countries (Belgium, France, Germany, Ireland, Italy, Portugal, Spain, Denmark, Sweden, United Kingdom and United States). This contribution is valuable because the question proposed in this research is especially important for developing countries, where the lack of institutional development may explain some monetary policy failures, for example. Thus, the presence of emerging and developing economies in our sample is an important feature of this research.

Fourth, a larger set of institutional development indicators is used in our empirical analysis than in Aysun et al. (2013) and Cecchetti (1999). Aysun et al. (2013) uses in the empirical analysis the countries' legal origin and a measure of institutional quality built as an average of law and order, corruption and bureaucratic quality and Cecchetti (1999) focuses on the quality of the legal system. In this research, we will investigate separately the effect on the strength of monetary policies of six aspects that characterize institutional development: quality of the legal system, level of corruption, political stability, government's accountability and transparency, regulatory quality and government effectiveness. This is an important contribution because it will indicate the specific features of the institutional development that matter most for the effectiveness of monetary policies.

Fifth, we propose the development of a comprehensive theoretical framework. The literature review showed that the theoretical framework presented in Cecchetti (1999) to support his empirical evaluation is based on the idea that institutions determine the financial structure quality, thus determining the effectiveness of monetary policies. His theoretical framework is limited to explain how institutions affect the supply of financial resources, not including the fact that low institutional development countries may be investment constrained, as proposed by Rodrik and Subramanian (2009). On the contrary, the theoretical framework presented in Hardt (2011) is limited to explain how institutions affect the demand for financial resources. Finally, the theoretical framework presented in Mishra et al. (2010) is the only one also expressed in terms of mathematical equations with banks maximizing a profit function. The model shows that the optimal response in bank lending rates after a change in central bank discount rates is a function of institutional quality. However, the theoretical framework presented in Mishra et al. (2010) is limited to explain how institutions affect the supply of financial resources. The theoretical framework presented in Aysun et al. (2013) is focused on the role of financial frictions rather than on the role of institutional development. We can realize that the papers about monetary policy transmission and institutional development focus only on the supply of financial resources or on the demand for financial resources, that is, they focus on the financial constraints (Cecchetti (1999) and Mishra et al. (2010)) or on the demand for investments (Hardt (2011)). These non-competing explanations will be put together for the first time in a more complete theoretical framework proposed by this research, that is, in this research we consider that institutions affect the supply and the demand for financial resources.

And finally, it is also relevant to mention that Cecchetti (1999) and Aysun et al. (2013) are essentially monetary policy papers, without a clear association with the institutional economics literature and its main authors (North, Acemoglu, Rodrik, among others). This research, on the contrary, brings together the two strains of the literature, institutional economics and monetary policy, making a contribution to both of them. In Cecchetti (1999), a measure of monetary policy impact is regressed on a measure of financial structure quality, using three measures of legal quality (shareholder rights, creditor rights and law enforcement) as instruments for financial structure quality. According to Rodrik (2004), a good econometric instrument does not provide a good explanation, meaning that it is not appropriate to build a theory stating that the differences in the dependent variable are explained by the differences in the instrumental variable. This means the empirical analysis in Cecchetti (1999) does not evaluate the relationship between institutions and monetary policies, being limited to evaluate the relationship between the exogenous component of the financial structure and monetary policies. And in Aysun et al. (2013), the theoretical focus is on the financial frictions (the cost of monitoring borrowers or the bankruptcy recovery rate - the percentage of the value of a loan that banks can recover when there is default) rather than on institutional development.

5 Theoretical Framework

In this section we explain how some of the traditional channels of monetary policy transmission can be altered by the level of institutional development. We present some important definitions and detail which aspects of the institutional development matter for monetary policy diffusion. Finally, we develop the three hypotheses that will be tested in the following sections.

5.1 Some Definitions

First, we will follow North (1990) and define institutions as the formal and informal rules that determine the incentives and constraints in a society, shaping human economic behavior.

Second, institutional development is a measure that evaluates the quality of the rules or the quality of incentives and constraints in a society. We will follow Kaufmann, Kraay, and Mastruzzi (2010) and argue that the quality of the institutions in a society depends on the following characteristics: the respect of citizens and the state for the institutions that govern economic and social interactions, the capacity of government to effectively formulate and implement sound policies, and how governments are selected, monitored and replaced.

Thus, the level of institutional development increases with: the quality of contract enforcement, the protection of property rights, the level of protection against the use of public power for private gains, the government's capability to implement sound policies and regulations that promote private sector development, the citizens' participation in selecting the government, the government's transparency and accountability, and the

government's stability.

Finally, in this study monetary policies will be represented by central bank discount rates and, as a consequence, monetary policy transmission refers to the process through which changes in central bank discount rates influence the real output.

The choice of an interest rate over some monetary aggregate as the instrument of monetary policy finds support in the literature on monetary economics. According to Friedman and Kuttner (2011), the idea that central banks make monetary policy through the set of some interest rate is clear enough and broadly accepted. First, most central banks abandoned the money growth targets, which were used mostly during the 1980s. Second, differently from what is presented in conventional economics textbooks, Friedman and Kuttner (2011) demonstrates that, currently, the practical set of short-term interest rates by central banks involves little or no variation in the supply of reserves. This means that it is the announcement effect and not the liquidity effect that matters most for the set of central bank interest rates. In addition, Bernanke and Blinder (1992) concludes that the federal funds rate is a better indicator of monetary policy and a better forecaster of real variables than money growth rates for the United States. Finally, Ball (2011) states that most central banks in emerging and advanced economies pay little attention to monetary aggregates.

The central bank discount rate is the rate at which the central banks lend or discount eligible paper for deposit money banks. We select the central bank discount rate as the relevant monetary policy instrument because, in general, the monetary authority has direct control over this rate. The selection of the central bank discount rate as the appropriate instrument of monetary policy applies both to the theoretical motivation in this section and to the data choice in the empirical sections that follow.

5.2 Institutional Development and the Channels of Monetary Policy Transmission

The institutional development of a country may change the effectiveness of monetary policies due to its effect on the behavior of the agents involved in the macro economy. These agents are mainly banks and investors and they respond in different ways to the same policy, depending on the constraints imposed by the institutional environment. The traditional channels of monetary transmission are described in Boivin, Kiley, and Mishkin (2010). In this subsection, we identify which channels have a potential to be altered by the institutional environment.

The *interest-rate channel* is the main channel of monetary policy transmission. Interest rates affect the cost of capital and, as a consequence, investment spending. The institutional environment may affect this channel because the investors' responses to changes in interest rates depend on the constraints imposed by the institutional environment. Rodrik and Subramanian (2009) argues that the liberalization of capital accounts and the consequent reduction in domestic interest rates have not been contributing to output growth because many economies do not have an adequate demand for investments. The authors claim that the low investment demand found in many countries is the result of low private appropriability or low social returns. Poor property-rights, weak contract enforcement, and fear of expropriation are among the causes of low perceived returns of private investments by investors. As a consequence, the expansion of financial resources does not promote an increase in investments and economic growth.

Rodrik and Subramanian (2009) presents the case of El Salvador. The remittances

received from abroad increased by 4 percent of GDP from 1994 to 2004. However, investment declined 16 percent over the same period. The explanation proposed by the authors is that El Salvador clearly was not a saving-constrained economy. On the contrary, banks had to expand internationally in order to find clients to lend the excess of liquidity. The country was an investment-constrained economy because the capital flows and the decrease in interest rates did not stimulate the investment demand. Defining poor institutions as rules whose outcomes are mainly weak contract enforcement and protection of property rights, corruption, policies and regulations that do not promote private sector development and government instability, thus, we can say that the low investment demand in El Salvador was caused by the poor institutions found in this country.

An expansionary monetary policy, like an increase in the flow of capital that comes from abroad, also raises the quantity of financial resources available in the economy. In this research, we use Rodrik's argument and claim that an expansionary monetary policy will be less effective in terms of output promotion in countries with poor institutions than in countries with better institutions. Nations with low institutional development, like El Salvador, tend to be investment-constrained due to the low perceived returns of private investments, thus an expansionary monetary policy will not necessarily increase the demand for investments and the output.

The *bank lending channel* is also subject to institutional development interference. According to this mechanism, an expansionary monetary policy increases the supply of bank loans, increasing investment spending and output. A potential impact of the institutional environment on this channel can be found in Mishra et al. (2010). The authors explain that imperfect competition in the banking sector can change the

effectiveness of this channel. The poor institutional development of a country may be associated with poor regulatory quality, which can result in poor protection of markets' competition. As a result, the market power of banks tends to be stimulated by weak institutional environments, producing constraints in the supply of loans and higher interest rates. The transmission of monetary policies through the bank lending channel will depend on the institutional environment. A reduction in central bank discount rates may be not effective in terms of growth promotion because this stimulus can be converted to greater interest margins for the banking sector instead of being transmitted to the public.

The case of Guyana illustrates the potential role played by institutions in the bank lending channel. Khemraj (2008) argues that the financial liberalization that started in Guyana in 1989 did not produce growth because the banking sector operates in a non-competitive way in that country, constraining investments. Guyana's regulatory quality indicator for the year 1996, the first year for which Kaufmann et al. (2010) released The Worldwide Governance Indicators, is -0.19, in a scale that goes from -2.5 for the weakest regulatory quality to 2.5 for the strongest regulatory quality. Thus, we claim that there may exist a relationship between the relatively weak regulatory quality in Guyana and the banking sector non-competitive behavior found in the country. As a consequence, an expansionary monetary policy, as the financial liberalization that took place in Guyana, may also not have the expected effects on growth due to the poor institutions and the non-competitive banking sector behavior.

The *balance sheet channel* comes from the presence of asymmetric information in credit markets. A contractionary monetary policy reduces the agents' net worth, increasing adverse selection and moral hazard problems in credit markets. The increase in

policy rates will be transmitted to the real economy through this channel because lenders will be more reluctant to supply funds, increasing interest rates or reducing the supply of loans. Mishra et al. (2010) explain that banks can constrain the supply of loans or set higher lending interest rates due to the poor contract enforcement found in some countries. As a result, we can say that the balance sheet channel may have different intensities depending on the institutional environment.

Finally, La Porta, Silanes, Shleifer, and Vishny (1997) provides evidence that countries with poorer investor protection, due to the character of legal rules and the quality of contract enforcement, have smaller *capital markets* (equity and debt markets) than countries with stronger investor protection. According to the authors, French civil law countries (Argentina, Brazil, Egypt, France, Greece, Italy, and Turkey, for example) have the weakest investor protection and the least developed capital markets. English common law countries (Australia, Canada, US, UK, South Africa, Singapore, and Malaysia, for example) have the strongest investor protection and the most developed capital markets. In addition, Cecchetti (1999) shows that an increase in interest rates has the smallest impact on output in English common law countries and the biggest impact on output in French and German civil law countries, establishing a relationship between the quality of legal rules, the development of capital markets and the effectiveness of monetary policies. As a result, we can say that an increase in central bank discount rates tends to have more negative effects on output in countries with weaker institutional development because firms are more bank-dependent in these countries, that is, they are more limited in terms of finding alternative ways for capturing funds. Low institutional development seems to be the ultimate explanation for the reduced development of capital markets.

There is empirical support for the argument that, in general, countries with more institutional development tend to rely relatively less on bank loans. Demirgüç-Kunt, Feyen, and Levine (2011) suggests the financial structure ratio as the appropriate measure to assess the relative importance of banks and securities markets in a country. The financial structure ratio equals the private credit by deposit money banks divided by the stock value traded[9]. We calculate the financial structure ratio proposed by Demirgüç-Kunt et al. (2011) using the Financial Development and Structure Dataset from the World Bank (Beck, Demirgüç-Kunt, and Levine (2000)). The variables private credit by deposit money banks divided by GDP and stock market total value traded divided by GDP were used for the year 2006. Data availability allows the calculation of the financial structure ratio for 105 countries. Finally, we calculate the correlation between the financial structure ratio and the rule of law indicator (see table A.1 for a detailed description of this indicator) provided by the Worldwide Governance Indicators from the World Bank for the year 2006. We find a correlation of -0.1254[10] between the two indicators, meaning that, in general, the relative importance of banks with respect to securities decreases as the quality of the legal framework increases[11].

In addition, Roxburgh, Lund, and Piotrowski (2011) highlights that the absence of private bond markets in developing countries is one of the reasons for the lower financial

[9] According to Demirgüç-Kunt et al. (2011), their empirical results suggest that the demand for the services provided by securities markets increases relative to the demand for those provided by banks as economies develop (economic development is measured by the real GDP per capita).

[10] This correlation was also calculated for the years 2007, 2008, 2009 and 2010: -0.0496 (year 2007, sample of 95 countries), -0.0730 (year 2008, sample of 94 countries), -0.1074 (year 2009, sample of 90 countries) and -0.1704 (year 2010, sample of 86 countries).

[11] The correlation between rule of law and private credit by deposit money banks divided by GDP is 0.7659 for the year 2006, including a sample of 171 countries. The correlation between rule of law and stock market total value traded divided by GDP is 0.5098 for the year 2006, including a sample of 106 countries. This means that both the private credit provided by banks and the securities markets increase relative to the overall size of the economy as institutional development increases, even though, securities market increases faster than banks market.

depth found in these countries compared to developed countries. We use the Financial Development and Structure Dataset from the World Bank (Beck et al. (2000)) to calculate the ratio of private credit by deposit money banks to private bond market capitalization for the year 2006, using the data available for 45 countries. Then, we calculate that the correlation between this ratio and the rule of law indicator is -0.4171[12], meaning that, in general, the relative importance of private bonds compared to bank loans increases with institutional development[13].

5.3 Which Aspects of the Institutional Development Matter for the Transmission of Monetary Policies?

In the previous subsection we presented the channels of monetary policy transmission that may be altered by the level of institutional development. After presenting a precise definition of institutional development in the subsection 5.1, we are now able to specify which institutions or which aspects of the institutional development affect monetary policy diffusion.

First, the interest-rate channel is potentially altered by all aspects of the institutional development. Weak contract enforcement and protection of property rights, high levels of corruption, low government's capability to implement sound policies, reduced government's transparency and accountability, and lack of political stability are institutional characteristics that have a potential to reduce the willingness to invest,

[12]This correlation was also calculated for the years 2007, 2008, 2009 and 2010: -0.1809 (year 2007, sample of 44 countries), -0.1926 (year 2008, sample of 43 countries), -0.1588 (year 2009, sample of 38 countries) and -0.1516 (year 2010, sample of 39 countries).

[13]The correlation between private bond market capitalization divided by GDP and rule of law for a sample of 45 countries for the year 2006 is 0.4554, meaning that private bond markets become larger relative to the overall size of the economy as institutions develop.

producing a more constrained demand for investments in countries with low institutional development than in countries with high institutional development, as stated by Rodrik and Subramanian (2009).

Second, the bank lending channel has a potential to be altered by the presence of imperfect competition in the banking sector, which may be associated with poor regulations, corruption and lack of government's accountability and transparency. A weak regulatory quality does not restrict the non-competitive behavior in the banking sector, thus a decrease in central bank discount rates may not be transmitted to the lending rates. If the weak regulatory quality is not a technical or administrative problem, then, corruption can explain the poor regulatory quality and the prevalence of non-competitive behavior. In this case, if the use of public power for private gains is favored by the lack of government's accountability and transparency, thus, these institutional features will also play a role in the effectiveness of the bank lending channel.

Third, the intensity of the balance sheet channel depends on the respect of citizens and the state for the rules that govern economic interactions. Low quality of contract enforcement and weak protection of property rights will exacerbate adverse selection and moral hazard problems in credit markets, pressuring bank lending rates up or constraining the supply of loans after a contractionary monetary policy more than what would be expected under a higher quality contract enforcement.

Finally, the development of capital markets will also depend on the respect of citizens and the state for the rules that govern economic interactions. Weak property rights or weak contract enforcement will shrink the development of these markets, reducing the number of substitutes for bank loans and increasing the negative effects on output

produced by an increase in interest rates.

In sum, all aspects of the institutional development may matter for the transmission of monetary policies to real output.

5.4 Developing Hypotheses 1, 2 and 3

In this subsection we develop the three hypotheses that will be tested in the following sections.

First, suppose there is an increase in central bank discount rates, which will be transmitted to bank lending rates and then to the real output. Banks and investors are involved in this process and will behave according to the constraints and incentives imposed by institutions. In a first step, the increase in interest rates will increase adverse selection and moral hazard problems in credit markets in low institutional development countries and in high institutional development countries; however, these problems will be exacerbated in low institutional development countries due to the weak contract enforcement. As a consequence, banks will restrict the supply of credit or increase interest rates more in these countries than would be expected under a stronger contract enforcement[14]. The second step in the analysis of the transmission of contractionary policies will incorporate the behavior of borrowers or investors. The lending rate set by banks will now be transmitted to the public. Investors in countries with low institutional development will have fewer substitutes for the banking loans due to the reduced development of capital markets caused by weaknesses in the legal framework (La Porta et

[14]In addition, as explained in subsection 5.2, banks tend to have a non-competitive behavior in countries with low institutional development. However, while banks with non-competitive behavior will not transmit a decrease in central bank discount rates they will transmit an increase in central bank discount rates. Thus, it is not clear that we can distinguish the behavior of banks in non-competitive environments from the behavior of banks in more competitive environments for the case of an increase in discount rates.

al. (1997)), being more affected by the increase in interest rates than investors in countries with high institutional development. The two steps in the analysis of the transmission of policy rates indicate that an increase in central bank discount rates will reduce the output more in countries with low institutional development than in countries with high institutional development.

Now, suppose there is a decrease in central bank discount rates. In the first step, the decrease in central bank discount rates will be less transmitted to the bank lending rates in a country with poor institutions than in a country with good regulatory quality and a more competitive banking sector[15]. In the second step of the transmission, the decrease in bank lending rates will be transmitted to the public. Investors tend to have a smaller willingness to invest in low institutional development countries, thus the effectiveness of a decrease in bank lending rates in terms of output promotion will be reduced in these countries[16]. The

[15] In theory, a decrease in interest rates reduces adverse selection and moral hazard problems and should make banks reduce interest rates even more or increase the supply of loans. However, we will follow Garibaldi (1997) and argue that in reality this simply does not happen. Banks will restrict the supply of loans and increase interest rates when asymmetric information problems increase but they will not reduce interest rates and expand the supply of loans when asymmetric information problems decrease. This idea is associated with the phenomenon that prices exhibit downward rigidity. Then, banks have a higher willingness to increase interest rates in response to an increase in adverse selection and moral hazard problems. However, they do not have the same willingness to decrease interest rates in response to a reduction in these problems. In sum, the balance sheet channel simply does not have a counterpart for negative changes in interest rates, as explained by Garibaldi (1997) without differentiating countries by the level of institutional development. Since the channel does not exist for a negative change in interest rates, does not make sense to discuss whether it works in different ways for countries with different levels of institutional development.

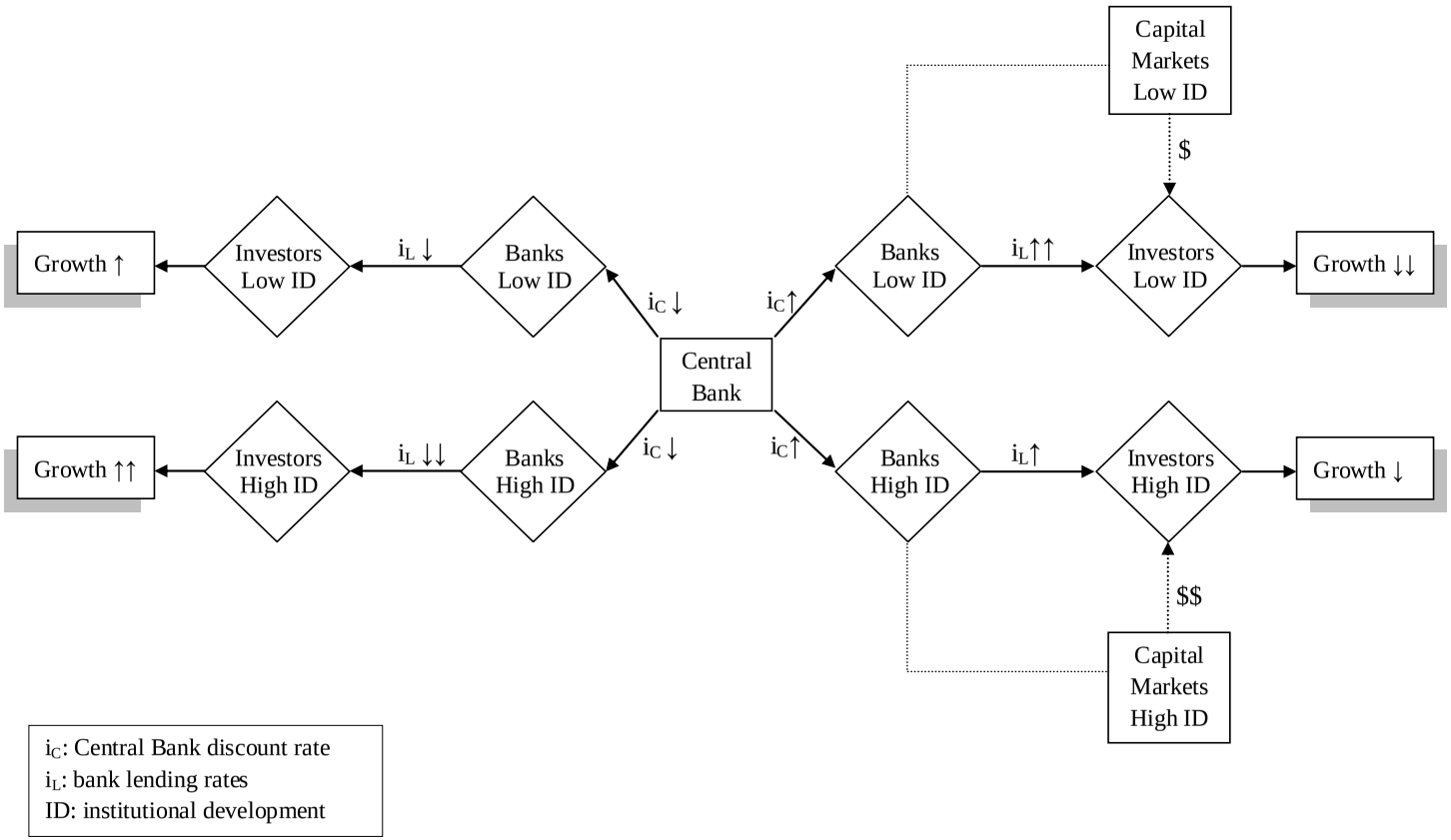
[16] About the role played by the development of capital markets, Kashyap, Lamont, and Stein (1994) found that the investment of firms without access to public bond markets is significantly liquidity-constrained during periods of contractionary policies. In contrast, these liquidity-constraints are absent in periods of expansionary monetary policies. This evidence shows that for the purpose of this study the development of capital markets matters most for the case of an increase in interest rates. Underdeveloped capital markets bind the investments of bank-dependent firms (compared to the investments of firms that have access to capital markets) in periods of contractionary monetary policies because these firms are not able to use capital markets to capture financial resources. However, underdeveloped capital markets do not bind the investments of bank-dependent firms (compared to the investments of firms that have access to capital markets) in periods of expansionary monetary policies. Therefore, we claim that the effect of capital markets in the transmission of monetary policies is dependent upon institutions only for the case of a contractionary monetary policy. For the case of an expansionary policy, capital markets lose importance for the bank-dependent firms, reducing the importance of institutional differences for this case.

two steps in the analysis of the transmission of policy rates indicate that an expansionary monetary policy will give less stimulus to the output in a low institutional development country than in a high institutional development country. Figure 1 summarizes these mechanisms.

This theoretical framework allows the development of three hypotheses. The first one is that institutional development matters for the effects of monetary policies on real output. The second one is that a contractionary policy reduces the output more in countries with low institutional development than in countries with high institutional development. Finally, the third hypothesis is that an expansionary policy stimulates the output more in countries with high institutional development than in countries with low institutional development.

Hypotheses two and three are in accordance with the literature providing empirical evidence that institutional development has positive effects on output. If institutional development affects economic performance through its impact on the effectiveness of monetary policies, thus a decrease in interest rates stimulates more the output in a good institutional environment than in a weak institutional environment. Also, an increase in interest rates reduces the output more in a weak institutional environment than in a good institutional environment. Low institutional development would work as a factor that enhances the negative stimulus on output generated by economic policies and diminishes the positive stimulus on output generated by economic policies. As a consequence, we can see that our second and third hypotheses are consistent or, at least, do not contradict the empirical evidence that more institutional quality is associated with better economic performance.

Figure 1 Monetary Policy Transmission and Institutional Development



In addition, hypotheses two and three are in accordance with Ball and Mankiw's model of asymmetric price adjustment and economic fluctuations (Ball and Mankiw (1994)). Rhee and Rich (1995) explains that Ball and Mankiw's model implies that monetary policy shocks have asymmetric effects on output and that the degree of asymmetry increases with the average inflation. Increases in average inflation diminish the real effects of expansionary monetary shocks and increase the real effects of contractionary monetary shocks[17]. If we consider that, in general, countries with relatively high inflation rates also have relatively low institutional development, then, the results from Ball and Mankiw's model are the same ones implied by our hypotheses two and three. The difference is that in Ball and Mankiw's model the asymmetric effects of monetary policies increase with average inflation, while in this research, the asymmetric effects of monetary policies increase with the worsening of the institutional development. From the literature review, we remember that Acemoglu et al. (2003) argue that macroeconomic issues like high inflation, for example, are symptoms of a poor institutional environment. Acemoglu et al. (2003) conclude that the reduced growth in countries with high inflation, large budget deficits and misaligned exchange rates is ultimately caused by the poor institutional development and not by these macroeconomic issues. Putting together the conclusions extracted from Rhee and Rich (1995) and Acemoglu et al. (2003), we can realize that the hypotheses developed in this research provide an alternative explanation for the asymmetric effects of monetary policies on

[17] According to Rhee and Rich (1995), the explanation for this result is that an expansionary monetary shock, under a positive inflation rate, will lead to an increase in the firms' desired real price and a decrease in the firms' actual relative price. As a consequence, the discrepancy between desired and actual prices will make many firms adjust their prices, reducing the absolute impact on output. By contrast, a contractionary monetary shock, under a positive inflation rate, will lead to a decrease in the firms' desired real price and a decrease in the firms' actual relative price. Due to the smaller discrepancy between desired and actual prices, fewer firms will adjust their prices, increasing the absolute impact on output.

output and this explanation seems to be fine with the monetary policy literature and with the institutional economics literature.

6 Case Studies

This section presents two case studies that demonstrate institutional development as a factor that changes the behavior of the economic agents and the effectiveness of monetary policies. The case of Nigeria illustrates our third hypothesis and the case of Brazil illustrates the second hypothesis of this dissertation.

6.1 The Case of Nigeria: Bank Lending Channel and Institutional Development

According to The Worldwide Governance Indicators from The World Bank, Nigeria scored -1.06 in control of corruption, -0.96 in government effectiveness, -0.89 in regulatory quality and -1.11 in rule of law in the year 2006. The governance indicators go from -2.5 to 2.5 and higher grades mean more institutional development (see table A.1 for a detailed description of these indicators). Overall, Nigeria can be considered a country with low institutional development. With respect to the financial system, Nigeria is tremendously dominated by commercial banks, which account for about 90% of the financial system assets and approximately two-thirds of total private sector credit extension (Fomum (2011)). This means that capital markets have a reduced participation in the Nigerian financial system.

By January 1st 2006, the banking consolidation process that occurred in Nigeria was completed and the industry was reduced from the original 89 banks to 25 banks. In order to achieve the minimum capitalization required by the reform, the banks were forced to merge or stop activities. According to Soludo (2004), the banking consolidation's

objective is to ensure a diversified, strong and reliable banking sector with banks that will guarantee the safety of depositors money, play an active role in the development of the Nigerian economy, and be competent and competitive players in the African regional and global financial system.

A. R. Sanusi (2010) measures the interest rate pass-through in Nigeria for the period of 2002 to 2010. The lending rate pass-through at a time t is the ratio between the percentage change in the lending rate between period 0 and period t and the percentage change in the policy rate at period 0. A pass-through equal to one or close to one means that the transmission from policy rates to lending rates is complete. A pass-through smaller than one indicates an incomplete transmission process. The pass-through may also be bigger than one, meaning that the change in lending rates overshoots the change in policy rates. The study concludes that the interest rate pass-through in Nigeria is incomplete and quite slow. More important, it provides empirical evidence that the pass-through from monetary policy rate to retail lending rate declined in comparison with the pre-consolidation period (2002-2005), an indication that the reform failed to eliminate the distortions in the retail loans market.

Fomum (2011) also provides evidence that the pass-through from policy rates to lending rates was substantially reduced after the banking consolidation. The investigation covers the period from 1990 to 2010 and shows that the long-run pass-through declined from an average of 0.90 in the pre-consolidation era to an average of 0.70 in the post-consolidation era.

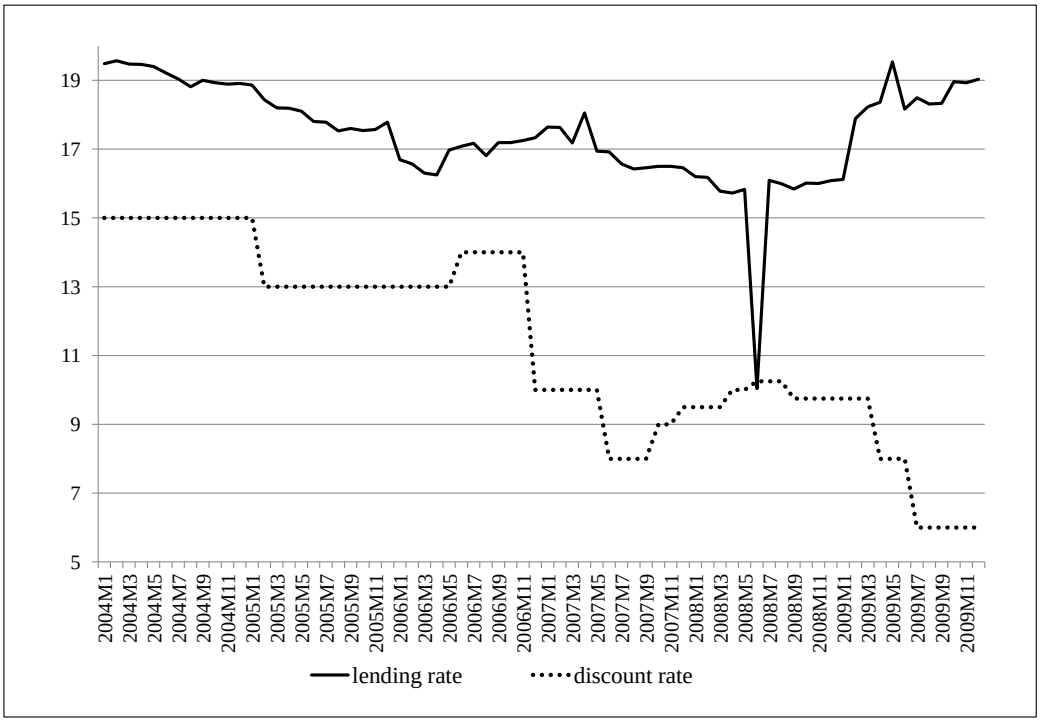
Still on the outcomes of the banking consolidation, Siyanbola (2012) presents evidence that the consolidation has not reduced lending rates. In addition, it seems that the

reform has not fully eliminated the existence of family banks and neither improved corporate governance in Nigerian banking system. As an example of poor corporate governance after consolidation, the author mentions the existence of insider related lending, which is motivated by the lack of transparency and the pervasive influence of family and related party affiliation.

Figure 2 presents the evolution of monthly discount and lending rates in Nigeria from January 2004 to December 2009. The series are from the International Financial Statistics of the International Monetary Fund (IFS-IMF) and are in percent per annum. The Central Bank of Nigeria conducted an overall expansionary monetary policy, reducing discount rates from 15% in January 2004 to 6% in December 2009. In the pre-consolidation era (January/2004 to December/2005) the lending rates seem to accompany the decrease in discount rates. Over this period, discount rates decreased from 15% to 13% (growth rate = -13.3%) and lending rates decreased from 19.5% to 17.8% (growth rate = -8.7%). In the post-consolidation era that started in January 2006, it is apparent that lending rates are no longer following the decreasing path of discount rates. From January 2006 to December 2009, discount rates decreased from 13% to 6% (growth rate = -53.8%) and lending rates increased from 16.7% to 19% (growth rate = 13.7%). The simple analysis of the evolution of lending and discount rates in Nigeria seems to support the evidence provided by other studies that indicates that the banking consolidation was not successful in terms of increasing the transmission of discount rate reductions to lending rates.

Delis (2012) provides important insights on the outcomes of the Nigerian financial reform. The research uses a panel analysis including 84 countries to study the effect of

Figure 2 Evolution of Nigerian Lending and Discount Rates (percent per annum)



Source: IFS-IMF

financial reforms and institutional quality on banking competition. Financial reforms are policy changes that aim to enhance competition and efficiency in the banking sector and they are measured by an index of financial liberalization. Institutional development is measured by the level of transparency (corruption), the quality of the legal system and the bureaucratic quality. Banking competition is measured by the banks' market power, which depends on the elasticity of profits to marginal cost. The empirical results indicate that the effect of financial liberalization on banks' market power depends on the level of overall institutional quality of the country, more specifically; financial reforms reduce banks' market power more in countries with good institutional development than in countries

with weak institutional development. Delis (2012) also claims that a concentrated banking system does not imply a non-competitive banking system if institutions are strong. First, the research provides evidence that financial liberalization increases banking concentration. This phenomenon is due to the mergers and acquisitions that occur with the liberalization policies. Second, the research provides evidence that banking concentration increases banks' market power only in low-income countries. A higher banking concentration in well-developed countries does not imply a significantly higher market power for banks. According to Delis (2012), the consequence of this result is that mergers and acquisitions in countries where institutions are relatively weak might lead to monopolistic outcomes. The main policy implication of the research is that a certain level of institutional development is a precondition for the success of financial reforms that intend to improve competition and efficiency in the banking industry.

Following the insights provided by Delis (2012), it may be the case that the banking consolidation in Nigeria accompanied by the low institutional development of this country stimulated a non-competitive behavior in the banking sector. Alternatively, some studies also mention the problem of poor corporate governance in the Nigerian post-consolidation era. S. L. Sanusi (2010) claims that the consolidation failed to overcome the corporate governance weakness in many of the banks, which commonly engage in unethical and fraudulent business practices. The author cites the case of CEOs who lent money to themselves for stock price manipulation, the case of the bank that set up 100 fake companies for the purpose of perpetrating fraud, among other cases. The author also mentions that a lot of the capital supposedly raised to achieve the capitalization requirements imposed by the consolidation reform was actually fake capital

financed by depositors' funds. Ebimobowei and Sophia (2011) also argue that consolidation did not enhance corporate governance and highlight the necessity of minimizing fraud, corruption and insiders abuse in the banking industry.

A financial reform that reduces the number of banks will not necessarily result in a less competitive banking sector. As evidenced by Delis (2012), the outcome of this reform in terms of competition will depend on the level of institutional development. The lack of good regulatory quality and the inability to identify and punish anticompetitive behavior in the industry, for example, may promote a non-competitive environment. The low scores in the governance indicators and the empirical evidence on the outcomes of the consolidation reform indicate that this may be the Nigerian case. A. R. Sanusi (2010) and Fomum (2011) provide evidence that the pass-through from policy rates to lending decreased after the banking consolidation and Siyanbola (2012) provides evidence that the lending rates were not reduced in the post-consolidation era. It is also important to note that the post-consolidation era was characterized by an overall expansionary monetary policy, with significant reductions in the central bank discount rate. Alternatively, the poor corporate governance in the financial sector stimulated by the weak rule of law and weak regulatory quality may also play a role in the outcomes of the Nigerian banking consolidation. The institutional environment works as a factor that changes the behavior of the agents and, as a consequence, the effectiveness of economic policies. It seems that reductions in central bank discount rates tend to be weakly transmitted to lending rates in Nigeria, especially after the 2006 reform, causing expansionary policies to be less effective in terms of output promotion. This phenomenon seems to have deep institutional causes. In conclusion, the Nigerian case illustrates well the hypothesis that a monetary

expansion will be less effective in terms of output promotion in countries with low institutional development than in countries with high institutional development.

6.2 The Case of Brazil: Balance Sheet Channel and Institutional Development

According to The Worldwide Governance Indicators from The World Bank, Brazil scored 0.013 in rule of law in the year 2011. As described in Kaufmann et al. (2010), the rule of law indicator reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The indicator goes from -2.5 to 2.5 and higher grades mean more institutional development. Overall, Brazil can be considered a country with low/middle institutional development.

According to the central bank of Brazil, the Brazilian credit market is characterized by high costs and reduced supply of funds. Fachada, Figueiredo, and Lundberg (2003) in a research conducted by the central bank of Brazil state that the high spreads and the reduced credit supply are explained by the high banking default rates, the bad quality of contractual guarantees and the high costs and slowness of credit recovery through judicial means. On average, the recovery of non-paid debts through the judicial system takes from 20 to 37 months, depending on the kind of contractual guarantee[18]. After the subtraction of judicial expenses, it is estimated that the lender recovers around 24.1% of the principal amount, considering a debt of R$50,000 (approximately US$25,000)[19]. Banco Central do

[18]Result estimated for the year 2001

[19]The calculation considers all sorts of judicial expenses and an inter-temporal discount rate of 20% per

Brasil (2002) in Fachada et al. (2003) also estimates that the banking default rate is responsible for approximately 17% of the banking spread in the country[20]. This means that, everything else constant, if the default rates were reduced to zero or the judicial system provided certainty with respect to the recovery of non-paid debts, the banking spread would be reduced by approximately seven percentage points.

Pinheiro and Cabral (1999) detail the process to recover a loan in Brazil when the borrower defaults. The legal procedures are perceived to be excessively burdensome and to allow many ways of postponing a decision, creating a strong incentive for debtors to default. In general, the legal debt recovery process is costly (it is not worth to apply for a legal recovery for a small loan) and slow (the entire recovery process may take between one and ten years). Using data from 1988 to 1997, the research tests whether the judicial performance (slowness, fairness and costs of the judiciary) explains the differences in the size of credit markets across Brazilian states. The legislation protecting creditor rights is the same throughout the country, but there is a lack of uniformity in the quality of judicial enforcement across the states. They found out that the lack of proper judicial enforcement significantly reduces the ratio of credit to GDP, even after controlling for the level of per capita income in each state.

According to Beck (2000), the high degree of discretionary power for judges and the possibility of several levels of appeal up to the highest courts undermine efficient contract enforcement and impair the resolution of credit disputes in Brazilian courts. Using cross-country data, the study shows that contract enforceability has a statistically significant and economically large impact on the level of private credit. The research

year. Result estimated for the year 2001

[20]Result estimated for the year 2002

estimates that if Brazil had achieved the average quality of contract enforcement found in OECD countries, private credit as a share of GDP would have been more than twice as high (55% instead of 25%) over the period 1980-95. In addition, Demirgüç-Kunt and Huizinga (1999) in Beck (2000) estimates that if Brazil had achieved the average quality of contract enforcement found in OECD countries, net interest margins could have declined by 3.5 percentage points, a 40 percent reduction from the average margin of 8.9 percent over the period 1988-95.

It is apparent that the weak contract enforcement in Brazil works as a factor that intensifies adverse selection and moral hazard problems in credit markets, reducing the volume of credit and increasing its cost. With respect to the transmission of monetary policies, some studies have provided evidence that money contractions increase banking spread in Brazil, that is; lending rates increases overshoot the increases in central bank discount rates. Souza-Sobrinho (2003) uses a time-series analysis to study the response of financial markets to monetary policies in Brazil from 1996 to 2001. The research provides evidence that banks reduce the quantity of loans and increase the quantity of government bonds in their assets after a money contraction. In addition, banking spread increases in response to an increase in policy rates. All these conclusions are confirmed by Denardin and Balbinotto Neto (2007) in a time-series analysis of the Brazilian economy for the period 1996-2007. And finally, Manhiça and Jorge (2012) uses a panel composed by 140 banks operating in Brazil for the years 2000 to 2010 and provides evidence that banking spread increases with central bank discount rates.

As previously mentioned, Fachada et al. (2003) and Demirgüç-Kunt and Huizinga (1999) in Beck (2000) establish a negative relationship between the quality of the legal

system and banking spread in Brazil. Cross-country studies have also demonstrated this same negative relationship. Laeven and Majnoni (2005) conducts a panel analysis with 106 countries at the country level and 32 countries at the level of individual banks. The study found out that better judicial efficiency is associated with considerably smaller banking spreads[21]. Thus, the fact that lending rate increases overshoot the increases in policy rates in Brazil may, at least partially, be explained by the weak rule of law found in the country. The weak rule of law would work as a factor that exacerbates the effect of an increase in policy rates on lending rates, intensifying the adverse effects of monetary contractions on output. Then, the case of Brazil seems to illustrate well the hypothesis two of this dissertation, which states that monetary contractions will have more adverse effects on output in countries with low institutional development than in countries with high institutional development.

[21] One standard deviation improvement in judicial efficiency is estimated to reduce banking spreads in about 2.3-2.6% points.

7 Data

The main macroeconomic variables included in this research are the seasonally adjusted growth rate of real GDP and the growth rate of central bank discount rates[22]. These variables have quarterly frequency, going from the first quarter of 2002 to the fourth quarter of 2011. The raw series used to build these variables were extracted from the International Financial Statistics (IFS) of the International Monetary Fund (International Monetary Fund (2012)).

We have only 52 countries in our sample because many low development countries do not have quarterly GDP data. We could have a much bigger sample of countries using annual data; however, for the purposes of this study we consider that it is essential to use a higher frequency data. Interest rates have short-run effects on output, and these effects could be missed using annual data. Even though, our sample of countries comprises a wide variety of institutional development levels. According to the IMF's definition, our sample contains 30 advanced economies and 22 emerging and developing economies. The advanced economies included in our sample are: Australia, Austria, Belgium, Canada, China (Hong Kong), Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Malta, Netherlands, New Zealand, Norway, Portugal, Republic of Korea, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom and United States. The emerging and developing economies included in our sample are: Bolivia, Botswana, Brazil, Bulgaria, Colombia, Costa Rica, Croatia,

[22]The Euro area discount rate was used for member countries after their inclusion in the area. Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain had Euro area discount rates used for the whole sample period. Cyprus and Malta had Euro area rates used from the first quarter of 2008 to the fourth quarter of 2011. Slovenia had Euro area values used from the first quarter of 2007 to the fourth quarter of 2011 and Slovak Republic from first quarter of 2009 to the fourth quarter of 2011.

Egypt, Hungary, Indonesia, Latvia, Lithuania, Macedonia, Malaysia, Peru, Philippines, Poland, Russian Federation, South Africa, Thailand, Turkey and Ukraine.

The Worldwide Governance Indicators from World Bank are used as measures of institutional development (Kaufmann et al. (2010)). There are six indicators available at annual frequency from 1996 to 2011[23]: voice and accountability; political stability and absence of violence/terrorism; government effectiveness; regulatory quality; rule of law, and control of corruption. Table A.1 details these indicators. Each country receives for each indicator a grade that goes from approximately -2.5 to 2.5. Higher grades indicate higher institutional development. Table A.2 presents the countries included in our sample and their average values over the 2002-2011 years for the six institutional development indicators.

The Worldwide Governance Indicators are perception-based indicators, as opposed to facts-based indicators. The facts-based indicators reflect formal *de jure* institutions, while the perception-based indicators reflect the *de facto* institutions. According to Arndt and Oman (2006), perception-based indicators, which often include informal and unwritten institutions, determine much more the true quality of governance in a country than facts-based indicators. In this study, we argue that institutions determine the behavior of banks and investors. These agents will behave according to their perception of the actual incentives and constraints in a society. Thus, the perception-based Worldwide Governance Indicators are in accordance with the purposes of this research. In addition, Arndt and Oman (2006) states that the Worldwide Governance Indicators are probably the most carefully constructed governance indicators. Finally, the Worldwide Governance Indicators obviously satisfy our underlying concepts because both of them, the indicators

[23]They are not available for the years 1997, 1999 and 2001.

and our concepts, are based on the theoretical definition of institutional quality proposed by Kaufmann et al. (2010). As detailed in the subsection 5.3, all aspects of our concept of institutional development may affect the transmission of monetary policies, thus, all six Worldwide Governance Indicators will be used in our empirical evaluation.

Finally, the data presented in this section is summarized in tables A.3 and A.4 and will be used in a panel analysis. This research aims to test whether the effectiveness of monetary policies is dependent upon institutional development. A time-series analysis would not be appropriate to answer this question because institutions in a given country change incrementally and slowly, as stated by North (1990). Since our sample of countries embrace a wide variety of institutional development levels, the comparison across countries that we propose in this research seems to very appropriate for the purposes of this study.

8 Evaluation of Hypothesis 1

This section presents an econometric evaluation of hypothesis 1, which states that the effect of changes in central bank discount rates on real output is altered by the institutional quality (regulatory quality, rule of law, control of corruption, political stability, voice and accountability and government effectiveness). This hypothesis will be tested through the estimation of the following linear panel data model using fixed-effects method:

$$gy_{i,t} = \sum_{j=1}^{J} \gamma_j gy_{i,t-j} + \sum_{j=1}^{J} \phi_j gdisc_{i,t-j} + \sum_{j=1}^{J} \Theta_j inst_{i,t-j} gdisc_{i,t-j} + \sum_{j=1}^{J} \tau_j inst_{i,t-j} + \delta trend_t + Z'_{i,t} v + u_{i,t} \quad (1)$$

The variable $gy_{i,t}$ is the seasonally adjusted growth rate of real GDP in percentage points for each country i at each time period t. The variable $gy_{i,t-j}$ is the j-th lag of the growth rate of real GDP for country i. The variable $gdisc_{i,t-j}$ is the j-th lag of the growth rate of central bank discount rate in percentage points for country i. The variable $inst_{i,t-j}$ is the j-th lag of one of the six measures of institutional development. The variable $inst_{i,t-j} gdisc_{i,t-j}$ is the interaction term between the j-th lag of one of the six measures of institutional development and the j-th lag of the growth rate of central bank discount rate. The variable $trend_t$ is a linear trend in time. $Z'_{i,t}$ is a vector of control variables. Finally, $u_{i,t} = \alpha_i + \varepsilon_{i,t}$, where α_i is modeled as fixed-effects and $\varepsilon_{i,t}$ is the idiosyncratic error.

Other studies have also used panel analysis to investigate whether the effectiveness of monetary policies is differential by some relevant economic variable. Karras (1999) and Karras (2001) make use of panel analysis to evaluate whether the effect of monetary

policies on output is dependent upon trade openness. The two studies employ a panel data model assuming fixed-effects. Karras (1999) uses a sample of 38 countries and annual data from the 1953-1990 period (T=38). Karras (2001) uses a sample of 8 countries and quarterly data from the 1960-1993 period (T=136). Similarly to this section, these studies do not differentiate between expansionary and contractionary monetary policies.

In this research, we will follow Cecchetti (1999) and Aysun et al. (2013) and treat institutional development as an exogenous variable. Cecchetti (1999) runs SVAR models to estimate the impact of a positive shock in interest rates on output. In a second step, these impact measures are regressed on financial structure quality, using three measures of legal quality (shareholder rights, creditor rights and law enforcement) as instruments for financial structure quality. Thus, Cecchetti (1999) assumes that institutional quality is exogenous to monetary policy effectiveness. Aysun et al. (2013) runs a measure of monetary policy effectiveness on legal origin and institutional quality, assuming that these last two variables are exogenous. Aysun et al. (2013) argues that the potential endogeneity arising from reverse causality would be mitigated if the explanatory variable in question was mostly time invariant or if cross-country differences were stable. In general, this is the case of institutional factors. In addition, in this research only lagged values of discount rate growth and institutional development will be included in all regressions. Contemporaneous values of these variables will not be included in order to mitigate a potential simultaneity bias that may arise if discount rates and institutional development depend on real GDP growth.

Since the institutional development indicators are available at an annual frequency, we are assuming that they are constant over the quarters inside each year. In addition, we

will run one regression for each institutional development measure. As explained by Arndt and Oman (2006), it is not recommended to aggregate the indicators in order to produce an overall governance index. The authors explain the reason giving the example of China and India. The two countries have similar scores if one looks at an index aggregating the six indicators for the year 2004. However, China has a relatively high score in government effectiveness and a relatively low score in voice and accountability, while India scores in the middle on both indicators. Thus, the aggregate index hides important differences between the two countries, providing no meaningful overall indicator of governance in terms of comparing two different countries. Also, empirically determine which aspects of the institutional development are more relevant for the effectiveness of monetary policies is one of the objectives of this research. Such empirical verification may have important policy implications, indicating the specific institutional improvements that would be more fundamental.

The total effect of a permanent one percent increase in discount rates on real GDP growth will be given by: $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$. We want to test our first hypothesis that institutional development matters for the transmission of monetary policies from central bank discount rates to real output. This hypothesis is not rejected whenever this total effect is significant, relevant in size and considerably dependent on the level of institutional development. More specifically, we will consider that our first hypothesis holds whenever $\left(\sum_{j=1}^{J}\Theta_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ is significant at the 5% level.

For simplicity, we assume that J in equation 1 is the same for all variables included in the model. Also, there is no theoretical consensus on the value of J, that is, there is no consensus on how long does it take for a full transmission of a monetary policy to output.

Then, the AIC criterion was used to select the most appropriate value for J. The fixed-effects model described by equation 1 was estimated assuming J=1, 2, 3, 4, 5, 6, 7 and 8. No additional controls were included. Table A.5 describes that we should prefer the model with 5 lags for regulatory quality, rule of law, voice and accountability and government effectiveness. For the models using the indicators control of corruption and political stability and absence of violence/terrorism, the specification with 8 lags should be preferred.

Table 1 presents fixed-effects regressions for each one of the six institutional development indicators. For each model, the choice of J is based on the AIC criterion. Driscoll and Kraay standard errors are presented for the coefficient estimates. These standard errors are robust to disturbances being heteroskedastic, autocorrelated and cross-sectionally dependent. Cameron and Trivedi (2010) explains that Driscoll and Kraay standard errors are appropriate for long panels, which is the case of our cross-country macroeconomic dataset.

Table 1 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypothesis 1

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
*gy*1	0.0867	0.0939	0.0741	0.0904	0.0905	0.0905
	(0.113)	(0.107)	(0.106)	(0.113)	(0.114)	(0.112)
*gy*2	0.176*	0.164*	0.150*	0.178*	0.178*	0.179*
	(0.0417)	(0.0434)	(0.0445)	(0.0435)	(0.0420)	(0.0426)
*gy*3	-0.0573*	-0.0397	-0.0516	-0.0567*	-0.0562*	-0.0557*
	(0.0234)	(0.0287)	(0.0332)	(0.0228)	(0.0226)	(0.0232)
*gy*4	-0.0713	-0.111*	-0.123*	-0.0701	-0.0727	-0.0712
	(0.0453)	(0.0545)	(0.0541)	(0.0465)	(0.0461)	(0.0453)
*gy*5	0.114*	0.0828	0.0724	0.112*	0.111*	0.113*

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypothesis 1 - Continued

	(0.0515)	(0.0494)	(0.0497)	(0.0518)	(0.0499)	(0.0512)
*gy*6		0.0000584	-0.00913			
		(0.0304)	(0.0329)			
*gy*7		-0.0305	-0.0336			
		(0.0651)	(0.0642)			
*gy*8		-0.189*	-0.191*			
		(0.0420)	(0.0404)			
*gdisc*1	-0.00565	0.00198	0.00382	0.000966	0.0000487	-0.00108
	(0.00533)	(0.00296)	(0.00244)	(0.00361)	(0.00345)	(0.00387)
*gdisc*2	-0.0135*	-0.0127+	-0.00823*	-0.0118+	-0.0169*	-0.0122+
	(0.00644)	(0.00667)	(0.00401)	(0.00624)	(0.00723)	(0.00698)
*gdisc*3	-0.00734	-0.00517	-0.00640+	-0.00597	-0.00395	-0.00612
	(0.00552)	(0.00392)	(0.00321)	(0.00424)	(0.00522)	(0.00467)
*gdisc*4	-0.00146	0.00605	0.00218	0.000382	0.000691	0.000290
	(0.00624)	(0.00555)	(0.00396)	(0.00512)	(0.00576)	(0.00542)
*gdisc*5	-0.00847	-0.00495	-0.00362	-0.00802+	-0.0100+	-0.00828+
	(0.00532)	(0.00479)	(0.00355)	(0.00440)	(0.00554)	(0.00480)
*gdisc*6		-0.000373	-0.00132			
		(0.00239)	(0.00190)			
*gdisc*7		0.00155	0.000165			
		(0.00328)	(0.00225)			
*gdisc*8		-0.000695	-0.00371+			
		(0.00296)	(0.00188)			
*inst*1 ∗ *gdisc*1	0.0122*	0.00551*	0.00918*	0.00723*	0.00936*	0.00812*
	(0.00418)	(0.00179)	(0.00334)	(0.00271)	(0.00360)	(0.00279)
*inst*2 ∗ *gdisc*2	0.00484	0.00294	-0.000284	0.00364	0.00946*	0.00364
	(0.00304)	(0.00241)	(0.00266)	(0.00248)	(0.00355)	(0.00307)
*inst*3 ∗ *gdisc*3	0.00196	0.000519	0.000802	0.000841	-0.00130	0.000940
	(0.00369)	(0.00223)	(0.00330)	(0.00260)	(0.00428)	(0.00282)
*inst*4 ∗ *gdisc*4	0.000497	-0.00409	-0.00218	-0.000769	-0.00146	-0.000699
	(0.00397)	(0.00301)	(0.00354)	(0.00319)	(0.00470)	(0.00309)
*inst*5 ∗ *gdisc*5	0.00231	0.00222	0.00294	0.00220	0.00489	0.00218
	(0.00294)	(0.00247)	(0.00327)	(0.00220)	(0.00458)	(0.00243)
*inst*6 ∗ *gdisc*6		-0.000156	0.000475			
		(0.00224)	(0.00303)			
*inst*7 ∗ *gdisc*7		-0.00143	-0.00223			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypothesis 1 - Continued

		(0.00206)	(0.00282)			
$inst8 * gdisc8$		-0.00210+	-0.00146			
		(0.00120)	(0.00175)			
$inst1$	-0.425	0.206	1.349*	-0.804	-1.354*	-0.222
	(0.633)	(0.519)	(0.387)	(0.925)	(0.572)	(0.424)
$inst2$	1.259	0.650	-0.912+	1.712	2.053+	0.445
	(0.949)	(0.790)	(0.511)	(1.042)	(1.194)	(0.633)
$inst3$	-0.168	-0.0974	0.671	-1.440	-0.991	0.238
	(0.687)	(0.620)	(0.658)	(1.101)	(1.092)	(0.471)
$inst4$	-0.446	1.259*	0.689	0.0759	0.355	-0.273
	(0.741)	(0.600)	(0.612)	(1.193)	(1.033)	(0.537)
$inst5$	-0.275	-2.859*	-1.128	0.499	0.272	0.230
	(0.604)	(0.783)	(0.898)	(1.229)	(0.970)	(0.486)
$inst6$		2.268*	0.781+			
		(0.864)	(0.452)			
$inst7$		-0.464	-0.133			
		(1.000)	(0.333)			
$inst8$		-0.478	-0.745*			
		(0.411)	(0.350)			
$trend$	-0.0245*	-0.0366*	-0.0454*	-0.0246*	-0.0242*	-0.0238*
	(0.00829)	(0.0113)	(0.0123)	(0.00829)	(0.00839)	(0.00822)
$Constant$	1.082*	1.150*	1.613*	0.999+	0.755+	0.617+
	(0.362)	(0.254)	(0.327)	(0.543)	(0.385)	(0.335)
$\sum_{j=1}^{J} \phi_j$	-0.0364	-0.0143	-0.0171	-0.0245	-0.0302	-0.0274
	[0.0204]	[0.226]	[0.0214]	[0.0429]	[0.0120]	[0.0451]
$\sum_{j=1}^{J} \Theta_j$	0.0218	0.00341	0.00724	0.0131	0.0210	0.0142
	[0.00702]	[0.502]	[0.0522]	[0.0212]	[0.00570]	[0.0345]
$\sum_{j=1}^{J} \gamma_j$	0.248	-0.0294	-0.112	0.254	0.251	0.255
	[0.0701]	[0.848]	[0.489]	[0.0630]	[0.0568]	[0.0593]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0484	-0.0139	-0.0154	-0.0328	-0.0403	-0.0368
	[0.063]	[0.197]	[0.012]	[0.096]	[0.039]	[0.102]
$\frac{\left(\sum_{j=1}^{J} \Theta_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.0290	0.00331	0.00652	0.0176	0.0280	0.0190
	[0.042]	[0.500]	[0.077]	[0.071]	[0.025]	[0.095]
N	1769	1610	1610	1769	1769	1769
within R^2	0.1210	0.1640	0.1709	0.1174	0.1204	0.1171

Results estimated for equation 1. The number after each variable name represents the lag j specified in equation 1. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*),

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypothesis 1 - Continued

control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table 1 provides evidence that regulatory quality and voice and accountability matter for the effectiveness of monetary policies. The conclusion is based on the total effect of the coefficients associated with the interaction term between institutional development and discount rates, $\left(\sum_{j=1}^{J} \Theta_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, which is significant at the 5% level for these two indicators. In addition, the total effect of the central bank discount rate coefficients, $\left(\sum_{j=1}^{J} \phi_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, is negative and significant at the 5% level for voice and accountability and at the 10% level for regulatory quality.

Table 1 shows that the effect of monetary policies is dependent upon institutions, supporting hypothesis 1 of this dissertation. In addition, the sign of the coefficients indicates that an increase in central bank discount rates has more adverse effects on economic growth under weaker institutional environments than under stronger institutional environments. As expected, positive changes in interest rates are driving the results presented in table 1, making them also consistent with our second hypothesis (contractionary policies reduce the output more in countries with low institutional development than in countries with high institutional development). There is a significant amount of literature on monetary policy transmission providing evidence that increases in

interest rates reduce the output more than decreases in interest rates raise it[24]. Since the effect of positive changes in interest rates is bigger than the effect of negative changes in interest rates, the regression results are probably driven by the positive changes in interest rates and are consistent with our first and second hypotheses.

It is also interesting to present the estimated total effect of a permanent one percent increase in discount rates on real GDP growth, $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$, and its standard error at specific levels of $inst_{i,t-j}$. Table 2 presents the total effect of an increase in discount rates on real GDP growth for several different levels of institutional development. The results are derived from the regressions presented in table 1.

Table 2 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions - Evaluating Hypothesis 1

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
−2			-0.0284*			
			(0.0111)			
−1.5			-0.0252*			
			(0.00959)			
−1	-0.0774+	-0.0172	-0.0219*	-0.0504+	-0.0683*	-0.0559+
	(0.0393)	(0.0152)	(0.00815)	(0.0287)	(0.0309)	(0.0331)
−0.5	-0.0629+	-0.0155	-0.0187*	-0.0416+	-0.0543*	-0.0463+
	(0.0324)	(0.0129)	(0.00688)	(0.0240)	(0.0249)	(0.0276)
0	-0.0484+	-0.0139	-0.0154*	-0.0328+	-0.0403*	-0.0368
	(0.0255)	(0.0106)	(0.00589)	(0.0194)	(0.0190)	(0.0221)
0.5	-0.0339+	-0.0122	-0.0121*	-0.0240	-0.0263+	-0.0273
	(0.0187)	(0.00846)	(0.00536)	(0.0147)	(0.0133)	(0.0167)

[24]One of the reasons is that prices are less flexible downward than upward. Another reason is that some monetary policy transmission channels work only for positive interest rate changes or for negative interest rate changes. This is the case of channels based on asymmetric information, for example. Due to asymmetric information, an increase in interest rates increases adverse selection and moral hazard problems. There is no counterpart for a decrease in interest rates.

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions - Evaluating Hypothesis 1 - Continued

1	-0.0194	-0.0106	-0.00888	-0.0152	-0.0123	-0.0178
	(0.0120)	(0.00653)	(0.00540)	(0.0103)	(0.00803)	(0.0114)
1.5	-0.00488	-0.00891+	-0.00562	-0.00638	0.00167	-0.00827
	(0.00607)	(0.00505)	(0.00601)	(0.00624)	(0.00513)	(0.00667)
2	0.00963+	-0.00725		0.00243	0.0157+	0.00124
	(0.00503)	(0.00449)		(0.00427)	(0.00786)	(0.00459)
N	1769	1610	1610	1769	1769	1769

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table 1 (equation 1).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table 2 illustrates the evidence presented in table 1, showing that institutions matter for the effectiveness of monetary policies and that an increase in central bank discount rates has more adverse effects on economic growth under weaker institutional environments than under stronger institutional environments. Table 2 demonstrates that, for example, a ten percent increase in central bank discount rates would produce an average decrease of 0.68 percentage points in the quarterly real GDP growth for a country with average voice and accountability equal to -1. On the other hand, a ten percent increase in central bank discount rates would produce an average decrease of 0.40 percentage points in the quarterly real GDP growth for a country with average voice and accountability equal to 0 and a decrease not significantly different than zero for a country with average voice and accountability equal to 1. The average discount rate in our sample is 5.8 percent, then, a ten percent increase in central bank discount rates means that the

average discount rate would increase from 5.8 percent to 6.4 percent[25]. The average real GDP growth per quarter in our sample is 0.7 percent, or 2.8 percent per year. Assuming this initial output growth rate, the increase in interest rates would reduce the GDP growth from 0.7 percent per quarter (2.8 percent per year) to 0.02 percent per quarter (0.08 percent per year) in the country with voice and accountability equal to -1. On the other hand, the increase in interest rates would reduce the GDP growth from 0.7 percent per quarter (2.8 percent per year) to 0.30 percent per quarter (1.2 percent per year) in the country with voice and accountability equal to 0. And finally, the GDP growth would be unaffected in a country with voice and accountability equal to 1. These results are in accordance with the first and second hypotheses of this research.

As a robustness check, *J* lags of the variable openness and its interaction with growth rate of central bank discount rates are included in the previous regressions. Karras (1999) and Karras (2001) provide empirical evidence that the more open the economy, the smaller the effects of monetary policies on output [26]. Since there is a positive correlation between institutional development and openness [27], our first results may be capturing the effects of openness instead of the relevance of the institutional indicators. The estimated results are displayed in Table 3. The variable openness is the same one used by Karras (1999) and Karras (2001), defined as the sum of imports and exports as a fraction of GDP, as detailed in the table A.3.

[25] An one percent increase in discount rates means that the average discount rate would increase from 5.8 percent to 5.86 percent. This increase is irrelevant in size, explaining why we use a ten percent increase in our analysis.

[26] According to Karras (1999), in the case of a monetary expansion, for example, the currency depreciation will increase more prices and wages and less the output, the more open the economy.

[27] Correlations between openness and the institutional indicators: 0.24 (regulatory quality); 0.11 (control of corruption); 0.28 (political stability); 0.16 (rule of law); 0.0017 (voice and accountability) and 0.18 (government effectiveness).

Table 3 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypothesis 1

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
*gy*1	0.0844	0.0904	0.0724	0.0902	0.0880	0.0903
	(0.112)	(0.103)	(0.102)	(0.113)	(0.113)	(0.112)
*gy*2	0.173*	0.167*	0.153*	0.174*	0.174*	0.174*
	(0.0424)	(0.0456)	(0.0469)	(0.0451)	(0.0434)	(0.0440)
*gy*3	-0.0517*	-0.0124	-0.0217	-0.0498*	-0.0481*	-0.0493*
	(0.0199)	(0.0238)	(0.0255)	(0.0190)	(0.0195)	(0.0194)
*gy*4	-0.0663	-0.104+	-0.114*	-0.0652	-0.0667	-0.0669
	(0.0419)	(0.0525)	(0.0515)	(0.0450)	(0.0441)	(0.0438)
*gy*5	0.120*	0.0890+	0.0786	0.122*	0.123*	0.122*
	(0.0525)	(0.0497)	(0.0503)	(0.0530)	(0.0515)	(0.0521)
*gy*6		-0.0124	-0.0231			
		(0.0358)	(0.0380)			
*gy*7		-0.0458	-0.0510			
		(0.0674)	(0.0663)			
*gy*8		-0.201*	-0.206*			
		(0.0408)	(0.0387)			
*gdisc*1	-0.00662	-0.00145	0.000700	-0.00304	-0.0103+	-0.00397
	(0.00450)	(0.00275)	(0.00235)	(0.00343)	(0.00573)	(0.00340)
*gdisc*2	-0.0105+	-0.00809	-0.00301	-0.00771	-0.0122*	-0.00861
	(0.00591)	(0.00497)	(0.00311)	(0.00518)	(0.00568)	(0.00619)
*gdisc*3	-0.00650	-0.00603	-0.00773*	-0.00660	-0.00429	-0.00656
	(0.00538)	(0.00399)	(0.00301)	(0.00466)	(0.00690)	(0.00499)
*gdisc*4	-0.00171	0.00286	0.000285	-0.000622	-0.00136	-0.000626
	(0.00633)	(0.00508)	(0.00313)	(0.00520)	(0.00721)	(0.00539)
*gdisc*5	-0.00739	-0.00555	-0.00338	-0.00701+	-0.0104+	-0.00728+
	(0.00521)	(0.00425)	(0.00313)	(0.00399)	(0.00596)	(0.00422)
*gdisc*6		-0.000698	-0.000601			
		(0.00231)	(0.00169)			
*gdisc*7		0.000363	-0.00165			
		(0.00344)	(0.00244)			
*gdisc*8		0.00216	-0.00135			
		(0.00218)	(0.00179)			
$inst1 * gdisc1$	0.0103*	0.00397*	0.00778*	0.00629*	0.0124*	0.00660*
	(0.00397)	(0.00175)	(0.00339)	(0.00239)	(0.00542)	(0.00221)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypothesis 1 - Continued

$inst2 * gdisc2$	0.00602+	0.00362	0.000735	0.00380	0.00775*	0.00433
	(0.00356)	(0.00263)	(0.00289)	(0.00264)	(0.00310)	(0.00343)
$inst3 * gdisc3$	0.00160	-0.000108	-0.000332	0.000163	-0.00197	0.0000738
	(0.00363)	(0.00243)	(0.00345)	(0.00271)	(0.00494)	(0.00289)
$inst4 * gdisc4$	0.000575	-0.00265	-0.00147	-0.000284	0.0000886	-0.000340
	(0.00405)	(0.00306)	(0.00367)	(0.00326)	(0.00520)	(0.00327)
$inst5 * gdisc5$	0.00189	0.00241	0.00287	0.00182	0.00474	0.00191
	(0.00304)	(0.00255)	(0.00377)	(0.00229)	(0.00475)	(0.00268)
$inst6 * gdisc6$		0.00123	0.00202			
		(0.00246)	(0.00325)			
$inst7 * gdisc7$		-0.00217	-0.00294			
		(0.00243)	(0.00324)			
$inst8 * gdisc8$		-0.00257*	-0.00149			
		(0.00121)	(0.00173)			
$inst1$	-0.378	0.282	1.339*	-0.915	-1.459*	-0.160
	(0.628)	(0.513)	(0.368)	(0.873)	(0.547)	(0.431)
$inst2$	1.152	0.446	-0.865+	1.718+	2.092+	0.355
	(0.918)	(0.729)	(0.516)	(1.025)	(1.172)	(0.643)
$inst3$	-0.117	0.133	0.578	-1.347	-1.031	0.253
	(0.702)	(0.672)	(0.621)	(1.059)	(1.083)	(0.470)
$inst4$	-0.409	1.036+	0.711	-0.0562	0.295	-0.294
	(0.751)	(0.593)	(0.609)	(1.262)	(1.002)	(0.553)
$inst5$	-0.338	-2.670*	-1.062	0.603	0.417	0.266
	(0.634)	(0.717)	(0.826)	(1.264)	(0.895)	(0.496)
$inst6$		2.047*	0.848+			
		(0.818)	(0.491)			
$inst7$		-0.132	-0.195			
		(0.940)	(0.343)			
$inst8$		-0.607	-0.764*			
		(0.428)	(0.362)			
$trend$	-0.0230*	-0.0357*	-0.0451*	-0.0228*	-0.0222*	-0.0223*
	(0.00724)	(0.0100)	(0.0114)	(0.00748)	(0.00762)	(0.00752)
$open1$	1.305	1.529	1.630	1.314	1.346	1.365
	(0.983)	(1.486)	(1.521)	(1.056)	(1.110)	(1.055)
$open2$	-1.720	-4.109	-4.308	-2.263	-2.293	-2.259
	(1.211)	(2.894)	(2.872)	(1.718)	(1.732)	(1.727)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypothesis 1 - Continued

*open*3		1.194	1.174	0.950	0.813	0.955
		(2.053)	(1.925)	(1.096)	(1.034)	(1.091)
*open*4		0.0565	-0.150	-1.114	-1.137	-1.068
		(0.905)	(0.928)	(0.753)	(0.748)	(0.733)
*open*5		0.956	1.203	0.686	0.774	0.644
		(0.758)	(0.780)	(0.484)	(0.494)	(0.485)
*open*6		1.875	1.904			
		(1.830)	(1.795)			
*open*7		0.536	0.491			
		(1.778)	(1.819)			
*open*8		-2.347+	-2.036+			
		(1.220)	(1.206)			
$open1 * gdisc1$	0.00224	0.00399*	0.00277	0.00404*	0.00635*	0.00376*
	(0.00185)	(0.00155)	(0.00186)	(0.00109)	(0.000962)	(0.00124)
$open2 * gdisc2$	-0.00419*	-0.00482*	-0.00522*	-0.00378*	-0.00256	-0.00403*
	(0.00151)	(0.00209)	(0.00165)	(0.00156)	(0.00171)	(0.00159)
$open3 * gdisc3$		0.00320+	0.00386+	0.00199	0.00168	0.00209
		(0.00187)	(0.00201)	(0.00143)	(0.00167)	(0.00139)
$open4 * gdisc4$		0.00133	0.00138	0.000181	0.000296	0.000195
		(0.00122)	(0.00127)	(0.00119)	(0.00139)	(0.00119)
$open5 * gdisc5$		0.000905	0.000726	0.000293	0.00125	0.000167
		(0.00166)	(0.00192)	(0.00170)	(0.00139)	(0.00179)
$open6 * gdisc6$		-0.00297+	-0.00306+			
		(0.00174)	(0.00170)			
$open7 * gdisc7$		0.000676	0.000962			
		(0.00107)	(0.00123)			
$open8 * gdisc8$		-0.00321*	-0.00356*			
		(0.00138)	(0.00137)			
Constant	1.454*	1.372*	1.694*	1.377*	1.171*	0.907*
	(0.666)	(0.617)	(0.736)	(0.499)	(0.481)	(0.419)
$\sum_{j=1}^{J} \phi_j$	-0.0328	-0.0164	-0.0167	-0.0250	-0.0385	-0.0270
	[0.0113]	[0.0807]	[0.0116]	[0.0136]	[0.00424]	[0.0157]
$\sum_{j=1}^{J} \Theta_j$	0.0204	0.00373	0.00717	0.0118	0.0230	0.0126
	[0.00922]	[0.432]	[0.0710]	[0.0216]	[0.00575]	[0.0397]
$\sum_{j=1}^{J} \gamma_j$	0.260	-0.0287	-0.112	0.271	0.271	0.270
	[0.0665]	[0.844]	[0.466]	[0.0564]	[0.0521]	[0.0554]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0443	-0.0160	-0.0151	-0.0343	-0.0529	-0.0370

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypothesis 1 - Continued

	[0.052]	[0.060]	[0.006]	[0.059]	[0.030]	[0.065]
$\frac{\left(\sum_{j=1}^{J}\Theta_j\right)}{\left(1-\sum_{j=1}^{J}\gamma_j\right)}$	0.0275	0.00363	0.00645	0.0162	0.0315	0.0172
	[0.056]	[0.435]	[0.101]	[0.083]	[0.034]	[0.113]
N	1769	1610	1610	1769	1769	1769
within R^2	0.1273	0.1859	0.1937	0.1262	0.1317	0.1256

Results estimated for equation 1. The number after each variable name represents the lag j specified in equation 1. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

After the inclusion of J lags of openness and its interaction with the discount rates, the term $\left(\sum_{j=1}^{J}\Theta_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ keeps being significant at the 5% level for voice and accountability. However, now this term is only significant at the 10% level for regulatory quality. Since the regulatory quality indicator lost its importance after the inclusion of openness, we proceeded with the elimination of lags of openness and its interaction term that are not significant at the 5% level, starting from the highest to the lowest lag orders. This procedure was only used for the regression using regulatory quality as a measure of institutional development. Following this approach, we ended up including only two lags of openness in the regression. Even after the exclusion of excessive lags of openness, the term $\left(\sum_{j=1}^{J}\Theta_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ keeps being significant only at the 10% level. We conclude that hypothesis 1 is no longer supported by the regulatory quality indicator after the inclusion of openness. According to table 3, only voice and accountability matters for

the effectiveness of monetary policies after controlling for openness. In addition, we can note that $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and significant at the 5% level for voice and accountability, as expected.

The included openness variables have a jointly significant effect on output in all regressions. An interesting observation is that the total effect of the interaction between openness and discount rates, given by the sum of the coefficients estimated for the interaction terms between openness and discount rates divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is positive and significant at the 5% level for the voice and accountability regression[28]. This means that an increase in interest rates will have more adverse effects in countries with lower economic openness than in countries with higher economic openness. This result is in accordance with the mainstream economic theory and with the empirical results presented by Karras (1999) and Karras (2001) with respect to the impact of openness on the effectiveness of monetary policies.

Finally, table 4 presents the estimated value of $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and its standard error for specific levels of $inst_{i,t-j}$, after controlling for openness. Table 4 demonstrates the evidence presented by table 3 that the effect of monetary policies on output is differential by the level of voice and accountability. A ten percent increase in central bank discount rates would produce a decrease of 0.84 percentage points in the quarterly real GDP growth for a country with average voice and accountability equal to -1 and a reduction not significantly different than zero for a country with average voice and accountability equal to 1.5 or 2. These results are in accordance with the first (institutional development matters for the effects of

[28]The estimated total effect of the interaction between openness and discount rates in the voice and accountability regression is 0.0096416 and the p-value is 0.001. This effect is not significant at the 5% level in the other regressions.

monetary policies on real output) and second (contractionary policies reduce the output more in countries with low institutional development than in countries with high institutional development) hypotheses of this research.

Table 4 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with Openness - Evaluating Hypothesis 1

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
-2			-0.0280*			
			(0.0109)			
-1.5			-0.0247*			
			(0.00921)			
-1	-0.0718+	-0.0196	-0.0215*	-0.0504+	-0.0844*	-0.0542+
	(0.0361)	(0.0125)	(0.00764)	(0.0266)	(0.0378)	(0.0301)
-0.5	-0.0580+	-0.0178+	-0.0183*	-0.0424+	-0.0686*	-0.0456+
	(0.0292)	(0.0103)	(0.00627)	(0.0222)	(0.0307)	(0.0248)
0	-0.0443+	-0.0160+	-0.0151*	-0.0343+	-0.0529*	-0.0370+
	(0.0223)	(0.00831)	(0.00526)	(0.0178)	(0.0236)	(0.0197)
0.5	-0.0305+	-0.0142*	-0.0118*	-0.0262+	-0.0371*	-0.0284+
	(0.0155)	(0.00648)	(0.00485)	(0.0135)	(0.0167)	(0.0146)
1	-0.0167+	-0.0123*	-0.00861	-0.0181+	-0.0213*	-0.0198*
	(0.00912)	(0.00505)	(0.00518)	(0.00939)	(0.0103)	(0.00986)
1.5	-0.00296	-0.0105*	-0.00538	-0.0100	-0.00559	-0.0112+
	(0.00501)	(0.00443)	(0.00613)	(0.00608)	(0.00607)	(0.00615)
2	0.0108	-0.00871+		-0.00196	0.0102	-0.00261
	(0.00811)	(0.00493)		(0.00525)	(0.00857)	(0.00595)
N	1769	1610	1610	1769	1769	1769

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table 3 (equation 1).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

8.1 Discussion of the Empirical Results

The results presented in this section provide empirical support in favor of hypothesis 1, which states that the effect of changes in central bank discount rates on real output depends on the level of institutional development. Voice and accountability seem to be the characteristics of institutional development that matters most for the effectiveness of monetary policies. In addition, the results provide evidence that the effect on output of a monetary contraction seems to be more negative under weaker institutional environments than under stronger institutional environments, supporting also hypothesis 2 of this dissertation.

Since monetary expansions and contractions are expected to have asymmetrical effects on output depending on the level of institutional development, the models presented in this section are unable to provide evidence that is simultaneously consistent with hypotheses 2 (contractionary policies reduce the output more in countries with low institutional development than in countries with high institutional development) and 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development). The next sections focus on models that treat increases and decreases in interest rates separately, as two different phenomena. Even though the models that follow would be enough to provide evidence in favor or against hypothesis 1 (institutional development matters for the effects of monetary policies on real output), we consider that the models presented in this section have the important function of providing a comparison between the results when asymmetries are considered and when it is assumed that asymmetries are not present.

9 Evaluation of Hypotheses 2 and 3 - I

In this section we empirically evaluate the hypotheses 2 and 3 developed in the section 5 of this dissertation. The second hypothesis states that a positive change in interest rates reduces the output more in countries with low institutional development than in countries with high institutional development. The third hypothesis states that a negative change in interest rates increases the output more in countries with high institutional development than in countries with low institutional development. Robustness checks are performed through the use of alternative econometric models, the choice of different numbers of lags and the inclusion of control variables.

The following procedure is based on the methodology used in Garibaldi (1997) to test whether positive and negative interest rate shocks have asymmetrical effects on job flows. First, the author extracted positive and negative interest rate shocks from the interest rate time series process estimated for the US economy. Then, net employment changes were regressed on the positive and negative shocks extracted in the first step. He concluded that contractionary policies increase job destruction while expansionary policies are ineffective in terms of job creation. Garibaldi (1997) focuses on monetary policy shocks and treats interest rates as endogenous to real output growth, inflation and past interest rates. In this section, we focus on ordinary monetary policies and treat interest rates as exogenous. In addition, we have a panel of countries instead of a time series analysis for only one country. Finally, we include the role of institutional development in the transmission process. It is worth to mention that the methodology used by Garibaldi (1997) follows the technique pioneered by Cover (1992) to test the asymmetric effects of monetary shocks. Cover (1992) proposed the use of the original

monetary shock series to derive two additional time series, one including only the positive shocks and other including only the negative shocks. The addition of these two series results in the original series. Thus, in this research we follow the suggestion and define positive growth rates in interest rates as:

$$gdisc^{+}_{i,t} = max(gdisc_{i,t}, 0)$$

and negative growth rates in interest rates as:

$$gdisc^{-}_{i,t} = min(gdisc_{i,t}, 0)$$

Then, the following linear panel data model will be estimated:

$$gy_{i,t} = \beta + \sum_{j=1}^{J} \gamma_j gy_{i,t-j} + \sum_{j=1}^{J} \phi_j gdisc^{+}_{i,t-j} + \sum_{j=1}^{J} \Theta_j inst_{i,t-j} gdisc^{+}_{i,t-j} + \sum_{j=1}^{J} \lambda_j gdisc^{-}_{i,t-j} + \sum_{j=1}^{J} \psi_j inst_{i,t-j} gdisc^{-}_{i,t-j} + \sum_{j=1}^{J} \tau_j inst_{i,t-j} + \delta trend_t + Z^{'}_{i,t} v + u_{i,t} \quad (2)$$

The variable $gy_{i,t}$ is the seasonally adjusted real GDP growth for each country i at each time period t. The variable $gdisc^{+}_{i,t-j}$ represents the positive growth rates in central bank discount rates. The variable $gdisc^{-}_{i,t-j}$ represents the negative growth rates in central bank discount rates. These positive and negative growth rates in interest rates interact with one of the six measures of institutional development, $inst_{i,t-j}$. The term $trend_t$ is a linear trend in time. $Z^{'}_{i,t}$ is a vector of control variables. Finally, $u_{i,t}$ is the error term.

Cover's methodology has also been used including a relevant economic variable that interacts with monetary policies and with panel data models. Rhee and Rich (1995) uses quarterly United States data over the period 1961:2-1990:4. The study provides evidence that the asymmetric effects of monetary shocks on output depend on average inflation. The empirical test is conducted including the interaction terms of monetary

expansions and contractions with average inflation. Karras and Stokes (1999) examines whether the asymmetric effect of money on output is an international phenomenon using quarterly data from the 1963-1993 period (T=124) for a panel of 12 OECD countries. The empirical results indicate that money contractions have a stronger effect on output than money expansions.

The total effect of a permanent one percent increase in discount rates is given by: $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$. If our second hypothesis holds this total effect is expected to be statistically significant, relevant in size and considerably dependent on the level of institutional development. In addition, $\sum_{j=1}^{J}\phi_j$ is expected to be negative and $\sum_{j=1}^{J}\Theta_j$ is expected to be positive. More specifically, we will consider that our second hypothesis holds whenever $\left(\sum_{j=1}^{J}\Theta_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and significant at the 5% level. The total effect of a permanent one percent decrease in discount rates is given by: $\left(-\sum_{j=1}^{J}\lambda_j - \sum_{j=1}^{J}\psi_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$. If our third hypothesis holds this total effect is expected to be statistically significant, relevant in size and considerably dependent on the level of institutional development. In addition, $\sum_{j=1}^{J}\lambda_j$ is expected to be negative and $\sum_{j=1}^{J}\psi_j$ is also expected to be negative. More specifically, we will consider that our third hypothesis holds whenever $\left(\sum_{j=1}^{J}\psi_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and significant at the 5% level.

9.1 Fixed-effects Regression

In this subsection we assume that the error term in equation 2 is described as $u_{i,t} = \alpha_i + \varepsilon_{i,t}$, where α_i is modeled as fixed-effects and $\varepsilon_{i,t}$ is the idiosyncratic error.

For simplicity, we assume that J in equation 2 is the same for all variables included

in the model. Also, there is no theoretical consensus on the value of J, that is, there is no consensus on how long does it take for a full transmission of a monetary policy to output. Fixed-effects models were estimated assuming J=1, 2, 3, 4, 5, 6, 7 and 8. Then, the AIC criterion was used to select the most appropriate model. Table A.6 describes that we should choose the model with 5 lags for the regressions including regulatory quality, control of corruption, rule of law, voice and accountability and government effectiveness. For the model using political stability, the choice of 8 lags is preferable, even though, the choice of 5 lags is the second best one. This subsection will focus on models that include 5 lags. Models using alternative numbers of lags will be presented in the following subsections.

Table 5 presents fixed-effects estimations of the model described by equation 2 without the inclusion of additional controls. Driscoll and Kraay standard errors are presented for the coefficient estimates. These standard errors are robust to disturbances being heteroskedastic, autocorrelated and cross-sectionally dependent and seem to be appropriate for long panels with cross-country macroeconomic data.

Table 5 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
*gy*1	0.0816	0.0893	0.0819	0.0866	0.0876	0.0859
	(0.111)	(0.111)	(0.112)	(0.112)	(0.113)	(0.111)
*gy*2	0.174*	0.177*	0.169*	0.175*	0.176*	0.176*
	(0.0425)	(0.0431)	(0.0448)	(0.0442)	(0.0424)	(0.0435)
*gy*3	-0.0570*	-0.0562*	-0.0650*	-0.0568*	-0.0575*	-0.0554*
	(0.0226)	(0.0225)	(0.0243)	(0.0222)	(0.0227)	(0.0226)
*gy*4	-0.0670	-0.0687	-0.0789	-0.0661	-0.0687	-0.0660
	(0.0444)	(0.0464)	(0.0485)	(0.0464)	(0.0448)	(0.0449)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

$gy5$	0.118*	0.116*	0.111*	0.117*	0.117*	0.119*
	(0.0539)	(0.0538)	(0.0535)	(0.0542)	(0.0523)	(0.0534)
$gdisc1+$	-0.0145+	-0.00419	-0.000449	-0.00734	-0.0108	-0.0114
	(0.00800)	(0.00696)	(0.00514)	(0.00722)	(0.00782)	(0.00832)
$gdisc2+$	-0.0315*	-0.0217*	-0.00732	-0.0221*	-0.0263*	-0.0285*
	(0.00867)	(0.00699)	(0.00517)	(0.00761)	(0.00963)	(0.00955)
$gdisc3+$	-0.00962	-0.00624	-0.00461	-0.00817	-0.00339	-0.00982
	(0.0158)	(0.0108)	(0.00673)	(0.0114)	(0.0145)	(0.0136)
$gdisc4+$	-0.0120+	-0.00279	0.00365	-0.00568	-0.00397	-0.00805
	(0.00668)	(0.00560)	(0.00613)	(0.00590)	(0.00775)	(0.00688)
$gdisc5+$	-0.0157	-0.00931	-0.00243	-0.00940	-0.0151	-0.0125
	(0.0149)	(0.0115)	(0.00814)	(0.0107)	(0.0188)	(0.0134)
$inst1*gdisc1+$	0.0121*	0.00279	0.00203	0.00591	0.00979+	0.00798+
	(0.00499)	(0.00319)	(0.00391)	(0.00368)	(0.00555)	(0.00412)
$inst2*gdisc2+$	0.0284*	0.0191*	0.0139*	0.0210*	0.0282*	0.0233*
	(0.00838)	(0.00615)	(0.00610)	(0.00720)	(0.0104)	(0.00779)
$inst3*gdisc3+$	0.00261	0.000356	-0.00323	0.00188	-0.00243	0.00284
	(0.0120)	(0.00705)	(0.00693)	(0.00806)	(0.0123)	(0.00885)
$inst4*gdisc4+$	0.0123*	0.00398	-0.00136	0.00672*	0.00668	0.00776+
	(0.00490)	(0.00262)	(0.00377)	(0.00322)	(0.00578)	(0.00409)
$inst5*gdisc5+$	0.0145	0.00932	0.00698	0.00966	0.0175	0.0109
	(0.0108)	(0.00668)	(0.00890)	(0.00707)	(0.0177)	(0.00835)
$gdisc1-$	-0.00263	0.00488	0.00645*	0.00322	0.00391	0.00166
	(0.00490)	(0.00327)	(0.00258)	(0.00345)	(0.00386)	(0.00371)
$gdisc2-$	-0.00985	-0.00989	-0.00713+	-0.00871	-0.0140+	-0.00777
	(0.00606)	(0.00603)	(0.00399)	(0.00540)	(0.00744)	(0.00610)
$gdisc3-$	-0.00520	-0.00478	-0.00678*	-0.00534	-0.00339	-0.00488
	(0.00453)	(0.00369)	(0.00309)	(0.00371)	(0.00353)	(0.00412)
$gdisc4-$	0.00339	0.00327	-0.00147	0.00323	0.00277	0.00429
	(0.00799)	(0.00625)	(0.00415)	(0.00640)	(0.00722)	(0.00669)
$gdisc5-$	-0.00525	-0.00723*	-0.00859*	-0.00720+	-0.00748*	-0.00648
	(0.00408)	(0.00344)	(0.00285)	(0.00372)	(0.00362)	(0.00415)
$inst1*gdisc1-$	0.0119*	0.00624*	0.0122*	0.00791*	0.00900*	0.00845*
	(0.00359)	(0.00203)	(0.00373)	(0.00262)	(0.00391)	(0.00257)
$inst2*gdisc2-$	-0.000546	-0.000465	-0.00533	-0.00156	0.00317	-0.00212
	(0.00275)	(0.00201)	(0.00351)	(0.00207)	(0.00429)	(0.00235)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

$inst3 * gdisc3-$	0.000531	0.000295	0.00276	0.000718	-0.00117	0.000259
	(0.00242)	(0.00177)	(0.00257)	(0.00191)	(0.00294)	(0.00215)
$inst4 * gdisc4-$	-0.00430	-0.00412	-0.00159	-0.00407	-0.00480	-0.00467
	(0.00553)	(0.00401)	(0.00527)	(0.00449)	(0.00665)	(0.00430)
$inst5 * gdisc5-$	-0.00184	-0.000177	0.00152	-0.000177	0.0000369	-0.000764
	(0.00264)	(0.00164)	(0.00194)	(0.00188)	(0.00237)	(0.00210)
$inst1$	-0.315	0.321	1.235*	-0.750	-1.356*	-0.147
	(0.658)	(0.377)	(0.339)	(0.976)	(0.545)	(0.413)
$inst2$	1.010	-0.481	-0.843*	1.607	1.993+	0.495
	(0.895)	(0.883)	(0.419)	(1.056)	(1.188)	(0.596)
$inst3$	0.0130	0.643	0.450	-1.396	-0.998	0.148
	(0.712)	(0.784)	(0.626)	(1.101)	(1.117)	(0.445)
$inst4$	-0.453	0.870	0.671	-0.156	0.397	-0.541
	(0.706)	(0.538)	(0.551)	(1.237)	(1.053)	(0.586)
$inst5$	-0.558	-1.234*	-1.183	0.498	0.214	0.388
	(0.600)	(0.530)	(0.824)	(1.273)	(0.950)	(0.543)
$trend$	-0.0246*	-0.0238*	-0.0285*	-0.0244*	-0.0243*	-0.0234*
	(0.00890)	(0.00898)	(0.0106)	(0.00887)	(0.00905)	(0.00874)
$Constant$	1.316*	0.920*	1.013*	1.196*	0.811*	0.694*
	(0.404)	(0.211)	(0.201)	(0.545)	(0.349)	(0.320)
$\sum_{j=1}^{J} \phi_j$	-0.0832	-0.0442	-0.0112	-0.0526	-0.0595	-0.0703
	[0.00416]	[0.0441]	[0.431]	[0.00861]	[0.0310]	[0.00823]
$\sum_{j=1}^{J} \Theta_j$	0.0699	0.0356	0.0183	0.0452	0.0597	0.0528
	[0.00139]	[0.00993]	[0.181]	[0.00178]	[0.0145]	[0.00230]
$\sum_{j=1}^{J} \lambda_j$	-0.0195	-0.0137	-0.0175	-0.0148	-0.0182	-0.0132
	[0.158]	[0.205]	[0.0630]	[0.192]	[0.159]	[0.256]
$\sum_{j=1}^{J} \psi_j$	0.00576	0.00177	0.00952	0.00283	0.00624	0.00116
	[0.464]	[0.748]	[0.0658]	[0.633]	[0.513]	[0.848]
$\sum_{j=1}^{J} \gamma_j$	0.249	0.258	0.218	0.256	0.255	0.259
	[0.0719]	[0.0596]	[0.113]	[0.0641]	[0.0564]	[0.0579]
$\frac{(\sum_{j=1}^{J} \phi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.111	-0.0596	-0.0143	-0.0708	-0.0798	-0.0950
	[0.018]	[0.074]	[0.444]	[0.030]	[0.052]	[0.033]
$\frac{(\sum_{j=1}^{J} \Theta_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.0932	0.0479	0.0234	0.0607	0.0802	0.0713
	[0.013]	[0.037]	[0.212]	[0.017]	[0.033]	[0.022]
$\frac{(\sum_{j=1}^{J} \lambda_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0260	-0.0185	-0.0224	-0.0199	-0.0244	-0.0178
	[0.207]	[0.252]	[0.109]	[0.245]	[0.191]	[0.300]
$\frac{(\sum_{j=1}^{J} \psi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.00768	0.00238	0.0122	0.00381	0.00837	0.00156

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

	[0.468]	[0.748]	[0.062]	[0.635]	[0.509]	[0.848]
N	1769	1769	1769	1769	1769	1769
within R^2	0.1340	0.1312	0.1352	0.1302	0.1308	0.1307

Results estimated for equation 2. The number after each variable name represents the lag j specified in equation 2. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table 5 provides evidence that an increase in central bank discount rates will have more adverse effects on output under weaker institutional environments, supporting hypothesis 2 (contractionary policies reduce the output more in countries with low institutional development than in countries with high institutional development) of this dissertation. The total effect of the coefficients associated with the interaction term between institutional development and positive growth rates in interest rates, $\left(\sum_{j=1}^{J} \Theta_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, is positive and significant at the 5% level for all indicators, except for political stability. In addition, the total effect of the coefficients estimated for the positive growth rates in interest rates, $\left(\sum_{j=1}^{J} \phi_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, is negative for all indicators and significant at the 5% level for regulatory quality, rule of law and government effectiveness and at the 10% level for control of corruption and voice and accountability. However, there is no evidence to support hypothesis 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development) of this dissertation because $\sum_{j=1}^{J} \lambda_j$ and

$\sum_{j=1}^{J} \psi_j$ are not significant at the 5% level for any of the indicators.

In order to make the evidence clearer, it is also appropriate to present the estimated total effects of an increase $\left(\sum_{j=1}^{J} \phi_j + \sum_{j=1}^{J} \Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$ and a decrease $\left(\sum_{j=1}^{J} \lambda_j + \sum_{j=1}^{J} \psi_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$ in discount rates on real GDP growth and their standard errors for specific levels of $inst_{i,t-j}$. Table 6 presents the total effect of a permanent one percent increase/decrease in discount rates on real GDP growth for several different levels of institutional development.

Table 6 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 5 Lags - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J} \phi_j + \sum_{j=1}^{J} \Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$			
-2			-0.0610			
			(0.0502)			
-1.5			-0.0493			
			(0.0415)			
-1	-0.204*	-0.108*	-0.0376	-0.132*	-0.160*	-0.166*
	(0.0798)	(0.0531)	(0.0330)	(0.0542)	(0.0752)	(0.0720)
-0.5	-0.157*	-0.0836+	-0.0260	-0.101*	-0.120*	-0.131*
	(0.0623)	(0.0427)	(0.0251)	(0.0426)	(0.0575)	(0.0574)
0	-0.111*	-0.0596+	-0.0143	-0.0708*	-0.0798+	-0.0950*
	(0.0454)	(0.0327)	(0.0185)	(0.0317)	(0.0402)	(0.0432)
0.5	-0.0643*	-0.0356	-0.00257	-0.0404+	-0.0397	-0.0593+
	(0.0299)	(0.0239)	(0.0150)	(0.0223)	(0.0243)	(0.0299)
1	-0.0177	-0.0117	0.00913	-0.0101	0.000372	-0.0237
	(0.0197)	(0.0178)	(0.0167)	(0.0170)	(0.0154)	(0.0194)
1.5	0.0289	0.0123	0.0208	0.0203	0.0404+	0.0119
	(0.0233)	(0.0178)	(0.0225)	(0.0196)	(0.0234)	(0.0177)
2	0.0754*	0.0362		0.0507+	0.0805*	0.0475+
	(0.0369)	(0.0238)		(0.0279)	(0.0391)	(0.0266)

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$						
-2			-0.0467+			
			(0.0237)			
-1.5			-0.0407+			
			(0.0209)			
-1	-0.0337	-0.0209	-0.0346+	-0.0237	-0.0328	-0.0194
	(0.0292)	(0.0217)	(0.0183)	(0.0233)	(0.0294)	(0.0235)
-0.5	-0.0299	-0.0197	-0.0285+	-0.0218	-0.0286	-0.0186
	(0.0246)	(0.0187)	(0.0159)	(0.0200)	(0.0237)	(0.0201)
0	-0.0260	-0.0185	-0.0224	-0.0199	-0.0244	-0.0178
	(0.0203)	(0.0160)	(0.0137)	(0.0169)	(0.0184)	(0.0170)
0.5	-0.0222	-0.0173	-0.0163	-0.0180	-0.0202	-0.0170
	(0.0166)	(0.0138)	(0.0121)	(0.0144)	(0.0139)	(0.0144)
1	-0.0184	-0.0161	-0.0102	-0.0161	-0.0160	-0.0162
	(0.0139)	(0.0123)	(0.0111)	(0.0126)	(0.0112)	(0.0126)
1.5	-0.0145	-0.0150	-0.00414	-0.0142	-0.0118	-0.0155
	(0.0129)	(0.0118)	(0.0111)	(0.0119)	(0.0118)	(0.0119)
2	-0.0107	-0.0138		-0.0123	-0.00765	-0.0147
	(0.0139)	(0.0124)		(0.0125)	(0.0152)	(0.0126)
N	1769	1769	1769	1769	1769	1769

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table 5 (equation 2).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table 6 illustrates the conclusions from table 5, providing support for hypothesis 2, but not for hypothesis 3. Table 6 shows that an increase in interest rates has more negative effects on output in countries with weaker institutional development than in countries with

stronger institutional development. This is true for all institutional indicators, except for political stability. A decrease in interest rates seems to be ineffective in terms of output promotion for all countries, meaning that there is no evidence to support hypothesis 3 of this dissertation.

Table 6 shows that a ten percentage point increase in the growth rate of central bank discount rates would produce a decrease of 2 percentage points in the quarterly real GDP growth for a country with average regulatory quality equal to -1 and a decrease not significantly different than zero for a country with average regulatory quality equal to 1 or 1.5. A ten percentage point increase in the growth rate of central bank discount rates would produce a decrease of 1 percentage point in the quarterly real GDP growth for a country with average control of corruption equal to -1 and a reduction not significantly different than zero for a country with average control of corruption equal or higher than 0.5. The evidence in favor of hypothesis 2 is also strong for rule of law, voice and accountability and government effectiveness. For all these three indicators, the effect of an increase in interest rates on output is negative and significant at the 5% level for countries with relatively weak institutional development and not significantly different than zero for countries with relatively high institutional development.

As a robustness check, *J* lags of the variable openness and its interaction with positive and negative growth rates of central bank discount rates are included in the previous regressions. As mentioned in the previous section, Karras (1999) and Karras (2001) provide empirical evidence that the more open the economy, the smaller the effects of monetary policies on output. There is a positive correlation between institutional development and openness [29]. Then, our previous results may be capturing the effects of

[29]Correlations between openness and the institutional indicators: 0.24 (regulatory quality); 0.11 (control of

openness instead of the relevance of the institutional indicators. The estimated results are displayed in table 7.

Table 7 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags with Openness - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0810	0.0884	0.0818	0.0855	0.0853	0.0846
	(0.110)	(0.111)	(0.112)	(0.111)	(0.113)	(0.110)
$gy2$	0.167*	0.171*	0.164*	0.169*	0.172*	0.169*
	(0.0439)	(0.0447)	(0.0459)	(0.0459)	(0.0439)	(0.0448)
$gy3$	-0.0517*	-0.0508*	-0.0579*	-0.0511*	-0.0499*	-0.0508*
	(0.0194)	(0.0191)	(0.0195)	(0.0188)	(0.0200)	(0.0194)
$gy4$	-0.0654	-0.0668	-0.0753	-0.0637	-0.0644	-0.0645
	(0.0431)	(0.0455)	(0.0465)	(0.0453)	(0.0438)	(0.0438)
$gy5$	0.126*	0.125*	0.121*	0.126*	0.128*	0.127*
	(0.0546)	(0.0545)	(0.0543)	(0.0550)	(0.0535)	(0.0540)
$gdisc1+$	-0.0105	0.000424	0.00644	-0.00286	-0.00685	-0.00733
	(0.00901)	(0.00813)	(0.00508)	(0.00861)	(0.00848)	(0.00945)
$gdisc2+$	-0.0302*	-0.0247*	-0.00682	-0.0235*	-0.0276*	-0.0313*
	(0.00963)	(0.0102)	(0.00735)	(0.00976)	(0.0108)	(0.0121)
$gdisc3+$	-0.00954	-0.00650	-0.00416	-0.00845	-0.00596	-0.00970
	(0.0129)	(0.00983)	(0.00701)	(0.0102)	(0.0122)	(0.0119)
$gdisc4+$	-0.0156*	-0.00715	-0.00166	-0.0123+	-0.0111	-0.0143+
	(0.00703)	(0.00733)	(0.00640)	(0.00699)	(0.00667)	(0.00772)
$gdisc5+$	-0.00995	-0.00422	0.00333	-0.00366	-0.0123	-0.00676
	(0.00862)	(0.00534)	(0.00517)	(0.00526)	(0.0135)	(0.00811)
$inst1 * gdisc1+$	0.0124*	0.00239	0.00214	0.00551	0.00876+	0.00764+
	(0.00526)	(0.00322)	(0.00387)	(0.00370)	(0.00516)	(0.00416)
$inst2 * gdisc2+$	0.0280*	0.0193*	0.0144*	0.0211*	0.0281*	0.0236*
	(0.00756)	(0.00603)	(0.00563)	(0.00687)	(0.0101)	(0.00745)
$inst3 * gdisc3+$	0.00209	-0.000192	-0.00409	0.00119	-0.00193	0.00188
	(0.0121)	(0.00707)	(0.00684)	(0.00807)	(0.0121)	(0.00877)
$inst4 * gdisc4+$	0.0123*	0.00487+	-0.000859	0.00783*	0.00811	0.00907*

corruption); 0.28 (political stability); 0.16 (rule of law); 0.0017 (voice and accountability) and 0.18 (government effectiveness).

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.00478)	(0.00263)	(0.00350)	(0.00316)	(0.00534)	(0.00385)
$inst5 * gdisc5+$	0.0139	0.00858	0.00726	0.00871	0.0176	0.00986
	(0.0106)	(0.00629)	(0.00868)	(0.00674)	(0.0172)	(0.00795)
$gdisc1-$	-0.00375	0.00161	0.00420	-0.00105	-0.00902	-0.00110
	(0.00430)	(0.00320)	(0.00275)	(0.00334)	(0.00656)	(0.00354)
$gdisc2-$	-0.00810	-0.00748	-0.00574	-0.00589	-0.00860	-0.00566
	(0.00554)	(0.00531)	(0.00428)	(0.00458)	(0.00631)	(0.00550)
$gdisc3-$	-0.00514	-0.00485	-0.00705*	-0.00539	-0.00374	-0.00489
	(0.00444)	(0.00386)	(0.00340)	(0.00396)	(0.00567)	(0.00417)
$gdisc4-$	0.00280	0.00191	-0.00263	0.00210	0.00149	0.00311
	(0.00759)	(0.00607)	(0.00350)	(0.00646)	(0.00972)	(0.00652)
$gdisc5-$	-0.00515	-0.00704*	-0.00813*	-0.00684+	-0.00782	-0.00619
	(0.00386)	(0.00332)	(0.00294)	(0.00363)	(0.00468)	(0.00390)
$inst1 * gdisc1-$	0.0102*	0.00515*	0.0113*	0.00721*	0.0135*	0.00700*
	(0.00389)	(0.00196)	(0.00408)	(0.00260)	(0.00604)	(0.00257)
$inst2 * gdisc2-$	-0.0000381	-0.000176	-0.00523	-0.00165	0.000941	-0.00183
	(0.00342)	(0.00214)	(0.00354)	(0.00211)	(0.00411)	(0.00257)
$inst3 * gdisc3-$	0.000130	-0.000299	0.00232	0.000115	-0.00186	-0.000377
	(0.00250)	(0.00166)	(0.00261)	(0.00183)	(0.00390)	(0.00206)
$inst4 * gdisc4-$	-0.00463	-0.00405	-0.00179	-0.00362	-0.00347	-0.00444
	(0.00587)	(0.00393)	(0.00546)	(0.00436)	(0.00733)	(0.00428)
$inst5 * gdisc5-$	-0.00237	-0.000670	0.00117	-0.000795	-0.000242	-0.00147
	(0.00273)	(0.00151)	(0.00213)	(0.00172)	(0.00289)	(0.00191)
$inst1$	-0.277	0.383	1.233*	-0.867	-1.422*	-0.0755
	(0.670)	(0.385)	(0.333)	(0.912)	(0.522)	(0.429)
$inst2$	0.902	-0.599	-0.912*	1.598	2.021+	0.404
	(0.911)	(0.859)	(0.421)	(1.027)	(1.170)	(0.633)
$inst3$	0.0970	0.770	0.528	-1.278	-0.947	0.121
	(0.733)	(0.781)	(0.629)	(1.055)	(1.095)	(0.449)
$inst4$	-0.478	0.730	0.576	-0.262	0.237	-0.482
	(0.701)	(0.514)	(0.516)	(1.284)	(0.976)	(0.566)
$inst5$	-0.579	-1.148*	-1.119	0.561	0.347	0.399
	(0.608)	(0.491)	(0.766)	(1.288)	(0.872)	(0.533)
$trend$	-0.0238*	-0.0228*	-0.0271*	-0.0233*	-0.0226*	-0.0226*
	(0.00820)	(0.00836)	(0.00986)	(0.00813)	(0.00850)	(0.00811)
$open1$	1.505	1.483	1.420	1.471	1.435	1.534

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

	(1.126)	(1.133)	(1.133)	(1.109)	(1.174)	(1.100)
$open2$	-2.104	-2.153	-2.139	-2.120	-2.162	-2.118
	(1.690)	(1.695)	(1.718)	(1.704)	(1.729)	(1.714)
$open3$	0.941	0.938	0.842	0.934	0.825	0.928
	(1.010)	(1.022)	(0.962)	(1.039)	(1.008)	(1.030)
$open4$	-1.093	-1.120	-1.107	-1.163	-1.202+	-1.080
	(0.721)	(0.705)	(0.703)	(0.731)	(0.715)	(0.718)
$open5$	0.527	0.554	0.645	0.548	0.652	0.502
	(0.423)	(0.438)	(0.442)	(0.448)	(0.426)	(0.437)
$open1 * gdisc1+$	-0.00505	-0.00488	-0.00811	-0.00463	-0.00292	-0.00423
	(0.00541)	(0.00532)	(0.00522)	(0.00551)	(0.00538)	(0.00507)
$open2 * gdisc2+$	-0.000241	0.00444	0.0000708	0.00262	0.00265	0.00390
	(0.00691)	(0.00816)	(0.00793)	(0.00752)	(0.00638)	(0.00763)
$open3 * gdisc3+$	0.000862	0.00134	0.000175	0.00141	0.00244	0.00154
	(0.0107)	(0.0100)	(0.0103)	(0.00975)	(0.00963)	(0.00964)
$open4 * gdisc4+$	0.00488	0.00452	0.00656	0.00739	0.00748	0.00642
	(0.00736)	(0.00769)	(0.00700)	(0.00767)	(0.00802)	(0.00741)
$open5 * gdisc5+$	-0.00628	-0.00539	-0.00755	-0.00604	-0.00384	-0.00573
	(0.0121)	(0.0119)	(0.0132)	(0.0125)	(0.0106)	(0.0121)
$open1 * gdisc1-$	0.00204	0.00309+	0.00157	0.00352*	0.00647*	0.00311+
	(0.00208)	(0.00175)	(0.00212)	(0.00156)	(0.00130)	(0.00167)
$open2 * gdisc2-$	-0.00256	-0.00273	-0.00172	-0.00260	-0.00272	-0.00251
	(0.00229)	(0.00214)	(0.00181)	(0.00207)	(0.00195)	(0.00205)
$open3 * gdisc3-$	0.00107	0.00142	0.00144	0.00127	0.00141	0.00134
	(0.00124)	(0.00136)	(0.00158)	(0.00134)	(0.00155)	(0.00139)
$open4 * gdisc4-$	0.000748	0.000933	0.000986	0.000310	-0.000179	0.000578
	(0.00138)	(0.00116)	(0.00159)	(0.00122)	(0.00192)	(0.00114)
$open5 * gdisc5-$	0.00148	0.00135	0.000880	0.00129	0.00149	0.00141
	(0.00119)	(0.00111)	(0.00123)	(0.00115)	(0.00140)	(0.00116)
Constant	1.526*	1.145*	1.290*	1.501*	1.178*	0.858*
	(0.646)	(0.405)	(0.496)	(0.550)	(0.438)	(0.414)
$\sum_{j=1}^{J} \phi_j$	-0.0757	-0.0422	-0.00287	-0.0508	-0.0638	-0.0694
	[0.00119]	[0.0153]	[0.748]	[0.00223]	[0.00761]	[0.00300]
$\sum_{j=1}^{J} \Theta_j$	0.0687	0.0350	0.0188	0.0443	0.0607	0.0521
	[0.00122]	[0.0105]	[0.167]	[0.00173]	[0.0112]	[0.00214]
$\sum_{j=1}^{J} \lambda_j$	-0.0193	-0.0159	-0.0193	-0.0171	-0.0277	-0.0147
	[0.0918]	[0.0611]	[0.0149]	[0.0690]	[0.0682]	[0.106]

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 5 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$\sum_{j=1}^{J} \psi_j$	0.00327	-0.0000467	0.00780	0.00126	0.00890	-0.00112
	[0.685]	[0.993]	[0.119]	[0.816]	[0.391]	[0.837]
$\sum_{j=1}^{J} \gamma_j$	0.257	0.266	0.233	0.266	0.271	0.265
	[0.0690]	[0.0583]	[0.0984]	[0.0605]	[0.0527]	[0.0584]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.102	-0.0575	-0.00375	-0.0692	-0.0875	-0.0944
	[0.013]	[0.049]	[0.752]	[0.020]	[0.026]	[0.027]
$\frac{\left(\sum_{j=1}^{J} \Theta_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.0925	0.0477	0.0246	0.0604	0.0832	0.0708
	[0.015]	[0.044]	[0.205]	[0.020]	[0.032]	[0.025]
$\frac{\left(\sum_{j=1}^{J} \lambda_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0260	-0.0216	-0.0252	-0.0233	-0.0380	-0.0200
	[0.145]	[0.113]	[0.054]	[0.130]	[0.110]	[0.160]
$\frac{\left(\sum_{j=1}^{J} \psi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.00440	-0.0000637	0.0102	0.00171	0.0122	-0.00153
	[0.687]	[0.993]	[0.118]	[0.816]	[0.398]	[0.837]
N	1769	1769	1769	1769	1769	1769
within R^2	0.1409	0.1388	0.1426	0.1381	0.1415	0.1381

Results estimated for equation 2. The number after each variable name represents the lag *j* specified in equation 2. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

After the inclusion of openness as a control, the conclusions keep being the same as the ones extracted from table 5: there is strong support in favor of hypothesis 2 and no support in favor of hypothesis 3. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J} \phi_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, is negative and significant at the 5% level and the total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates, $\left(\sum_{j=1}^{J} \Theta_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, is

positive and significant at the 5% level for all indicators, except for political stability. In addition, it seems that there is no evidence to support hypothesis 3 because $\sum_{j=1}^{J} \psi_j$ is not significant at the 5% level for any of the indicators.

In all regressions, the openness variables have a jointly significant effect on output. In addition, the total effect of the interaction between openness and the negative growth rates in interest rates is positive and significant at the 5% level in the regression for the voice and accountability indicator[30]. This means that the effectiveness of monetary expansions decreases with the level of openness, which is in accordance with the accepted economic theory. Finally, table 8 presents the total effect of a permanent one percent increase/decrease in discount rates on real GDP growth for several different levels of institutional development after controlling for openness.

Table 8 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 5 Lags and Openness - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J} \phi_j + \sum_{j=1}^{J} \Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$			
-2			-0.0528			
			(0.0471)			
-1.5			-0.0406			
			(0.0377)			
-1	-0.195*	-0.105*	-0.0283	-0.130*	-0.171*	-0.165*
	(0.0761)	(0.0509)	(0.0285)	(0.0535)	(0.0754)	(0.0718)
-0.5	-0.148*	-0.0813*	-0.0160	-0.0995*	-0.129*	-0.130*

[30]The total effect of the interaction between openness and the negative growth rates in interest rates is given by the sum of the coefficients associated with this interaction term divided by $\left(1 - \sum_{j=1}^{J} \gamma_j\right)$. This total effect for the voice and accountability regression is estimated to be 0.008886 with a corresponding p-value of 0.008. This total effect is not significant in the other regressions. In addition, the total effect of the interaction between openness and the positive growth rates in interest rates is given by the sum of the coefficients associated with these interaction terms divided by $\left(1 - \sum_{j=1}^{J} \gamma_j\right)$. These total effects are not significant at the 5% level in any of the regressions.

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 5 Lags and Openness - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.0578)	(0.0396)	(0.0196)	(0.0411)	(0.0567)	(0.0565)
0	-0.102*	-0.0575*	-0.00375	-0.0692*	-0.0875*	-0.0944*
	(0.0398)	(0.0285)	(0.0118)	(0.0288)	(0.0382)	(0.0414)
0.5	-0.0557*	-0.0336+	0.00853	-0.0390*	-0.0459*	-0.0590*
	(0.0225)	(0.0179)	(0.00878)	(0.0171)	(0.0204)	(0.0265)
1	-0.00943	-0.00979	0.0208	-0.00880	-0.00425	-0.0236+
	(0.0103)	(0.00975)	(0.0141)	(0.00824)	(0.00940)	(0.0129)
1.5	0.0368+	0.0140	0.0331	0.0214+	0.0374+	0.0118
	(0.0197)	(0.0117)	(0.0224)	(0.0127)	(0.0218)	(0.0102)
2	0.0831*	0.0379+		0.0516*	0.0790+	0.0473*
	(0.0368)	(0.0210)		(0.0239)	(0.0397)	(0.0227)
	$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$					
-2			-0.0456*			
			(0.0217)			
-1.5			-0.0405*			
			(0.0191)			
-1	-0.0304	-0.0215	-0.0354*	-0.0250	-0.0502	-0.0185
	(0.0266)	(0.0178)	(0.0166)	(0.0204)	(0.0364)	(0.0192)
-0.5	-0.0282	-0.0216	-0.0303*	-0.0241	-0.0441	-0.0193
	(0.0219)	(0.0154)	(0.0145)	(0.0176)	(0.0297)	(0.0164)
0	-0.0260	-0.0216	-0.0252+	-0.0233	-0.0380	-0.0200
	(0.0176)	(0.0134)	(0.0128)	(0.0151)	(0.0234)	(0.0141)
0.5	-0.0238+	-0.0216+	-0.0201+	-0.0224+	-0.0319+	-0.0208+
	(0.0142)	(0.0120)	(0.0117)	(0.0132)	(0.0176)	(0.0124)
1	-0.0216+	-0.0217+	-0.0151	-0.0216+	-0.0258+	-0.0216+
	(0.0123)	(0.0116)	(0.0115)	(0.0121)	(0.0133)	(0.0116)
1.5	-0.0194	-0.0217+	-0.00997	-0.0207+	-0.0197	-0.0223+
	(0.0126)	(0.0121)	(0.0122)	(0.0121)	(0.0121)	(0.0121)
2	-0.0172	-0.0217		-0.0199	-0.0136	-0.0231+
	(0.0150)	(0.0135)		(0.0132)	(0.0147)	(0.0135)
N	1769	1769	1769	1769	1769	1769

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table 7 (equation 2).
Standard errors in parentheses

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 5 Lags and Openness - Evaluating Hypotheses 2 and 3 - I - Continued

+ $p < 0.10$, * $p < 0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table 8 demonstrates that an increase in interest rates has more negative effects on output in countries with weaker institutional development than in countries with stronger institutional development, supporting hypothesis 2. This is true for all institutional indicators, except for political stability. As an example, table 8 shows that a ten percentage point increase in the growth rate of central bank discount rates would produce a decrease of 1.95 percentage points in the quarterly real GDP growth for a country with average regulatory quality equal to -1 and a decrease not significantly different than zero for a country with average regulatory quality equal to 1 or 1.5.

Table 8 also presents some interesting results with respect to hypothesis 3. We may consider that the results for government effectiveness provide a weak support in favor of hypothesis 3. For this indicator, the effect on output of a decrease in interest rates increases with the level of institutional development, that is, $\left(\sum_{j=1}^{J} \psi_j\right)$ is negative, as described in the bottom of table 7. Table 8 shows that the effect of a monetary expansion is significantly different than zero at the 10% level for countries with relatively high government effectiveness (≥ 0.5) and not significantly different than zero for countries with relatively low government effectiveness (≤ 0). However, this evidence should be considered pretty fragile because table 7 showed that $\left(\sum_{j=1}^{J} \psi_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$ is not statistically significant, indicating that the effect of money expansions is not differential

by government effectiveness.

The results presented in this subsection provide empirical support for the hypothesis 2, which states that an increase in interest rates has more adverse effects on output in countries with weaker institutional development than in countries with stronger institutional development. This evidence holds for all institutional indicators, except for political stability. In general, we may conclude that there is no evidence to support hypothesis 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development).

Comparing with the results in the previous section, in general, treating positive and negative changes in interest rates as two different phenomena improved the statistical significance of our estimates. According to the results estimated in section 8, hypothesis 1 (institutional development matters for the effects of monetary policies on real output) of this dissertation holds only for the voice and accountability indicator. In contrast, this section demonstrated that hypothesis 1 holds for all indicators, with the exception of political stability. This improvement in the statistical significance of our results may be an indication that taking asymmetries into account is the appropriate way of modeling the transmission of monetary policies.

9.2 Prais-Winsten Regression

As a first robustness check, this subsection presents an alternative econometric model. Since we are dealing with a long panel (T=40), the errors in equation 2 may be serially correlated. The Prais-Winsten regression provides pooled least-squares estimators and models the serial correlation in the error term assuming that it follows an AR(1) process,

$u_{i,t} = \rho_i u_{i,t-1} + \varepsilon_{i,t}$. In addition, standard error estimates are robust to disturbances being heteroskedastic and contemporaneously cross-sectionally correlated.

The Prais-Winsten regression may produce more efficient results than the previous fixed-effects model with Driscoll and Kraay standard errors because it models the serial correlation in the error term instead of simply adjusting the standard errors. Table 7 in the previous subsection showed that the effect on output of a decrease in interest rates increases with the level of government effectiveness, that is, $\left(\sum_{j=1}^{J} \lambda_j\right)$ is negative and $\left(\sum_{j=1}^{J} \psi_j\right)$ is also negative for this indicator. Even though the direction of these effects was in accordance with the hypothesis 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development) of this dissertation, neither of these effects was statistically significant. In this case, the gain of efficiency provided by the models developed in this subsection can be relevant to find support for the hypothesis 3 of this dissertation. However, it is important to note that the models presented in this subsection are inconsistent under the fixed-effects assumption and because of this reason the estimates should be interpreted with caution.

The results for the Prais-Winsten regressions are displayed in tables A.7 and A.8, assuming J=5 and without the inclusion of additional controls. Tables A.9 and A.10 assume J=5 and include the openness variables as additional controls. In general, the total effects in the bottom of table A.9 are more statistically significant than the total effects displayed in the bottom of table 7, as expected. For example, the effect of monetary expansions, $\left(\sum_{j=1}^{J} \lambda_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, which was insignificant at the 5% level for all indicators in table 7, turned out to be statistically significant at the 5% level for all indicators in table A.9.

Unfortunately, the increase in efficiency offered by the Prais-Winsten models was not enough to provide evidence in favor of hypothesis 3 of this dissertation. Tables A.7 shows that $\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is not significant at the 5% level for any of the indicators. Table A.9 shows that $\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is significant at the 5% level only for the voice and accountability indicator. This result indicates that the effect of a monetary expansion does not depend on the level of institutional development, except for the voice and accountability indicator. In addition, for this indicator, $\left(\sum_{j=1}^{J}\psi_j\right)$ is positive, contradicting hypothesis 3 of this dissertation. This unexpected result for the voice and accountability indicator is illustrated by table A.10.

Our conclusions keep being the same for the hypothesis 2. Tables A.7 and A.9 show that $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and both of them are significant at the 5% level for all indicators, except for political stability. This means that the effect on output of a money contraction is more negative in countries with weaker institutional development than in countries with higher institutional development. Tables A.8 and A.10 illustrate this evidence.

Finally, the openness variables included are jointly significant at the 5% level for voice and accountability and at the 10% level for regulatory quality and rule of law. They are not jointly significant for the other indicators. In addition, the total effect of the interaction between openness and the negative growth rates in interest rates is positive and significant at the 5% level in the regression for the voice and accountability indicator[31].

[31]The total effect of the interaction between openness and the negative growth rates in interest rates is given by the sum of the coefficients associated with this interaction term divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$. This total effect for the voice and accountability regression is estimated to be .012584 with a corresponding p-value of 0.020. This total effect is not significant in the other regressions. In addition, the total effect of the interaction between openness and the positive growth rates in interest rates is given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$. These total effects are not significant at the 5% level in any of the regressions.

This means that the effectiveness of monetary expansions decreases with the level of openness, which is in accordance with the accepted economic theory.

9.3 Alternative Number of Lags

As a second robustness check, this subsection estimates equation 2 assuming alternative values for J. Fixed-effects regressions with Driscoll and Kraay standard errors will be presented because this is our favorite and most conservative approach.

Table A.6 shows that the specification with 4 lags (J=4) is the second best option for regulatory quality, rule of law, voice and accountability and government effectiveness and the third best option for control of corruption and political stability. Tables A.11 and A.12 present the results for the estimation of equation 2 including four lags and the openness variables as additional controls. The openness variables are jointly significant in all regressions[32]. Table A.11 shows that $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and both of them are significant at the 5% level for all indicators, except for political stability. This evidence that an increase in interest rates has more adverse effects on output in countries with relatively weak institutional development, except for the political stability indicator, is illustrated in table A.12. Thus, the models with 4 lags provide strong and additional support in favor of hypothesis 2. There is not support in favor of hypothesis 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development). Table A.11 shows that $\sum_{j=1}^{J}\lambda_j$ and $\sum_{j=1}^{J}\psi_j$ are not significant at the 5% level for any of the indicators. In addition, table A.12 confirms that the effect of

[32]The total effect of the interaction between openness and the negative/positive growth rates in interest rates is given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$. These total effects are not significant in any of the regressions.

a monetary expansion is not significantly different than zero for any institutional development level.

Table A.6 shows that the specification with 8 lags (J=8) is the first best option for political stability, the second best option for control of corruption and the third best option for regulatory quality, rule of law, voice and accountability and government effectiveness. Tables A.13 and A.14 present the results for equation 2 including eight lags and the openness variables as additional controls. The openness variables are jointly significant in all regressions[33]. Table A.13 shows that $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and significant at the 5% level for all indicators, except for political stability. In addition, $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and significant at the 5% level for regulatory quality, control of corruption, rule of law and government effectiveness, significant at the 10% level for voice and accountability and not significant for political stability. Table A.14 shows that the effect on output of an increase in interest rates is more adverse for countries with relatively weak institutions. In conclusion, the models with 8 lags support hypothesis 2 of this dissertation, except for the political stability and voice and accountability indicators[34].

With respect to hypothesis 3, the models with 8 lags provide mixed evidence. On one hand, table A.13 and table A.14 indicate that a decrease in interest rates has stronger

[33]The total effect of the interaction between openness and the positive growth rates in interest rates is given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$. These total effects are not significant at the 5% level in any of the regressions. The total effect of the interaction between openness and the negative growth rates in interest rates is given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$. These total effects are not significant at the 5% level in any of the regressions.

[34]Since the voice and accountability indicator lost its relevance in terms of supporting hypothesis 2, compared to the previous models, we would proceed with the elimination of excessive lags of openness and its interaction terms. However, the 8-th lag of the interaction between openness and the negative growth rate in interest rates is significant in the voice and accountability model. Then, we do not eliminate any lag of openness, concluding that hypothesis 2 is no longer supported by the voice and accountability indicator.

positive effects on output in countries with weaker political stability than in countries with stronger political stability. The term $\left(\sum_{j=1}^{J}\lambda_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and the term $\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and both of them are significant at the 5% level for the political stability indicator. This evidence contradicts hypothesis 3 of this dissertation. On the other hand, the results in table A.14 for control of corruption, voice and accountability and, especially, for government effectiveness, weakly support hypothesis 3 of this dissertation. For example, a ten percentage point decrease in the growth rate of central bank discount rates would produce an increase of 0.15 percentage points in the quarterly real GDP growth for a country with government effectiveness equal to 2 and an increase not significantly different than zero for a country with government effectiveness equal or smaller than 0.5. However, this evidence is weak and should be interpreted with caution because table A.13 shows that $\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is not significant in the model including the government effectiveness indicator, meaning that we cannot affirm that these two mentioned effects are really statistically different from each other.

9.4 Institutional Quality or Financial Development?

In the subsection 5.2, we argue that an increase in central bank discount rates tends to have more negative effects on output in countries with relatively low institutional development because, among other reasons, firms are more bank-dependent in these countries, that is, they are more limited in terms of finding alternative ways for capturing funds. The development of capital markets would be constrained by poor investor protection, low quality of contract enforcement and a weak legal framework. This argument used for the construction of our second hypothesis may induce the reader to the

conclusion that, eventually, it is the level of financial development that matters for the effectiveness of monetary policies rather than the level of institutional development. In addition, there is support for the argument that financial development matters for the effectiveness of monetary policies. Carranza, Galdon-Sanchez, and Gomez-Biscarri (2010), for example, provides empirical evidence that the cumulative impact of monetary policies is larger when the financial system is less developed and the level of activity in the stock market is smaller. This subsection aims to address the criticism that it is the level of financial development, and not the level of institutional development, the ultimate explanation for the degree of effectiveness of monetary policies.

Thus, as a third robustness check, the variable financial development and its interaction with positive and negative growth rates in central bank discount rates are included in all regressions as additional controls. The financial development variable ($fd_{i,t}$) is defined as the number of publicly listed companies per capita (Beck et al. (2000)), as detailed in table A.3[35] [36]. If the institutional variables and their interactions with interest rates become insignificant after the inclusion of the financial development variables, this means that the effectiveness of monetary policies may depend on institutional development, but only through its effect on financial development (in the case that financial development statistically matters for the effectiveness of monetary policies). If the institutional variables and their interactions with interest rates keep being significant after the inclusion of the financial development variables, this means that institutions have a direct impact on the effectiveness of monetary policies, even though they may have also

[35]The financial development variable is only available at an annual frequency. We assume that the financial development index is constant over the quarters inside each year. This is the same assumption used for the institutional development indicators.

[36]Correlation between financial development and institutional development: 0.4355 (regulatory quality), 0.4157 (control of corruption), 0.2413 (political stability), 0.3917 (rule of law), 0.2524 (voice and accountability) and 0.4398 (government effectiveness)

an impact through financial development. In this case, we can state that the degree of monetary policy effectiveness has deep institutional causes.

Table A.15 presents fixed-effects regressions with Driscoll and Kraay standard errors, including also the openness variables as additional controls. For each institutional indicator, J in equation 2 was chosen following the AIC criterion presented in table A.6. After the inclusion of J lags of openness, financial development and their interaction terms, the total effect $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ was no longer significant at the 5% level in the regressions including control of corruption and voice and accountability. Then, we proceed with the elimination of insignificant lags of openness and financial development for these two models. Following this procedure, we ended up choosing the model with one lag of openness and three lags of financial development for the specification using control of corruption and one lag of openness and no lags of financial development for the specification using voice and accountability as the measure of institutional development. According to table A.15, we conclude that hypothesis 2 is supported by regulatory quality, rule of law, voice and accountability and government effectiveness. Table A.15 shows that $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and both of them are significant at the 5% level for these indicators. This evidence is illustrated by table A.16, which shows the effect of an increase/decrease in interest rates at specific institutional development levels. For all these indicators, table A.16 describes that the effect of an increase in interest rates is more negative for countries with relatively weak institutional development.

There is no evidence in favor of hypothesis 3. Actually, the results presented for political stability in tables A.15 and A.16 contradict hypothesis 3. The total effect

$\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and significant at the 5% level for this indicator, meaning that money expansions are more effective in terms of output promotion in countries with relatively weak institutional development.

The openness variables are jointly significant in all regressions. The total effect of the interaction between openness and the negative growth rates in interest rates is given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$. These total effects are positive and significant at the 5% level for control of corruption and voice and accountability[37]. This means that the effectiveness of money expansions diminishes with the level of openness, as predicted by the accepted economic theory. The financial development variables are jointly significant in the models for regulatory quality, political stability and rule of law and not jointly significant in the models for control of corruption and government effectiveness[38].

9.5 Discussion of the Empirical Results

First, the results presented in this section are in accordance with numerous empirical works (Cover (1992), Rhee and Rich (1995), Garibaldi (1997), Karras and Stokes (1999), among others) that have showed that expansionary monetary policies have smaller and less statistically significant effects on output than contractionary policies.

Second, there is strong evidence in favor of hypothesis 2 for regulatory quality, rule of law and government effectiveness. Fixed-effects models with 4, 5 and 8 lags and

[37]The total effect of the interaction between openness and the negative growth rates in interest rates was estimated to be 0.007371 for control of corruption and 0.009304 for voice and accountability. This effect is not significant at the 5% level for any other regression. In addition, the total effect of the interaction between openness and the positive growth rates in interest rates is not significant at the 5% level in any of the regressions.

[38]The total effect of the interaction between financial development and the negative/positive growth rates in interest rates is not significant at the 5% level in any of the models.

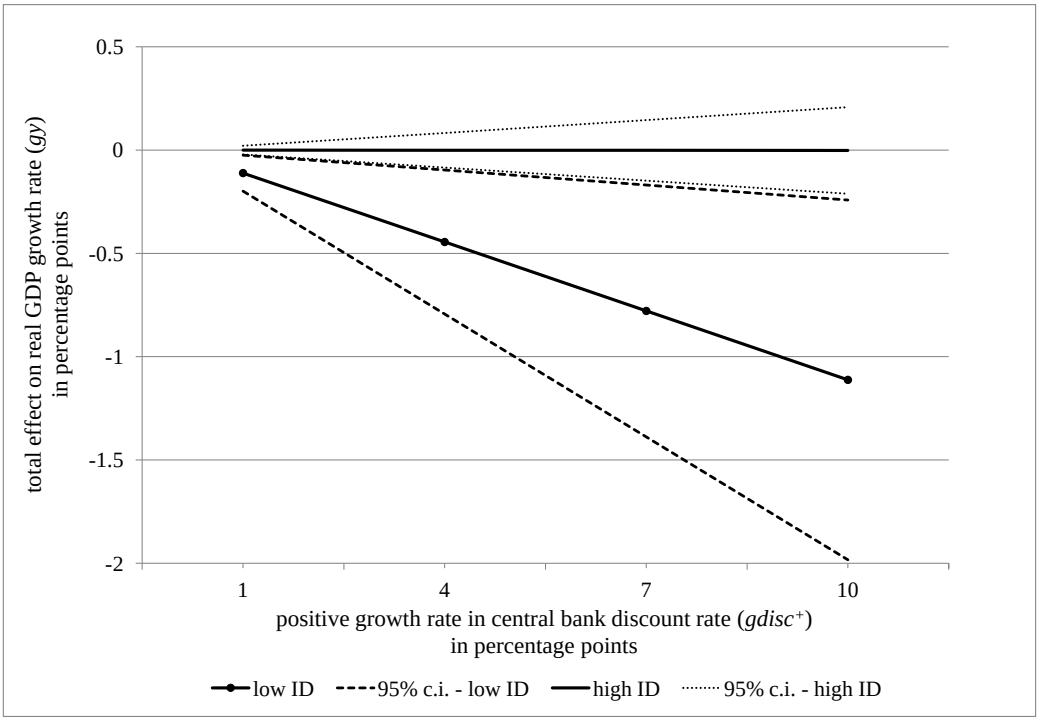
Prais-Winsten models with 5 lags support hypothesis 2 for the mentioned indicators. The evidence is robust to the inclusion of openness, financial development and their interactions with policy rates. There is strong evidence that a contractionary monetary policy will have more adverse effects on output in countries with lower institutional development than in countries with higher institutional development. The effectiveness of monetary contractions seems to have deep institutional causes.

Figure 3 exemplifies the evidence presented in this section in favor of hypothesis 2. The total effects of monetary contractions on the real GDP growth were derived from the fixed-effects model with five lags and openness variables as controls (tables 7 and 8). The graph shows that the effect of an increase in interest rates on output is more negative for a country with regulatory quality equal to -0.1 (low ID) than for a country with regulatory quality equal to 1.1 (high ID). The 95% confidence interval associated with the effect estimated for the country with low institutional development embraces only negative values, meaning that this effect is negative and statistically significant at the 5% level. On the other hand, the 95% confidence interval associated with the effect estimated for the country with high institutional development floats around zero, indicating that this effect is not statistically significant.[39]

Figure 4 demonstrates the relevance of the rule of law indicator for the transmission of monetary policies. The graph describes the result estimated for the fixed-effects model with five lags and openness variables as controls (tables 7 and 8). A permanent ten percent increase in interest rates is expected to reduce the quarterly real GDP growth rate by almost one percentage point, on average, in a country with average rule of law equal to

[39]Despite not being the research question of this study, Figure B.1 presents the estimated total effect of institutional development on real GDP growth. The graph displays a positive relationship between institutional development and real GDP growth.

Figure 3 Empirical Evidence on the Hypothesis 2 - Regulatory Quality

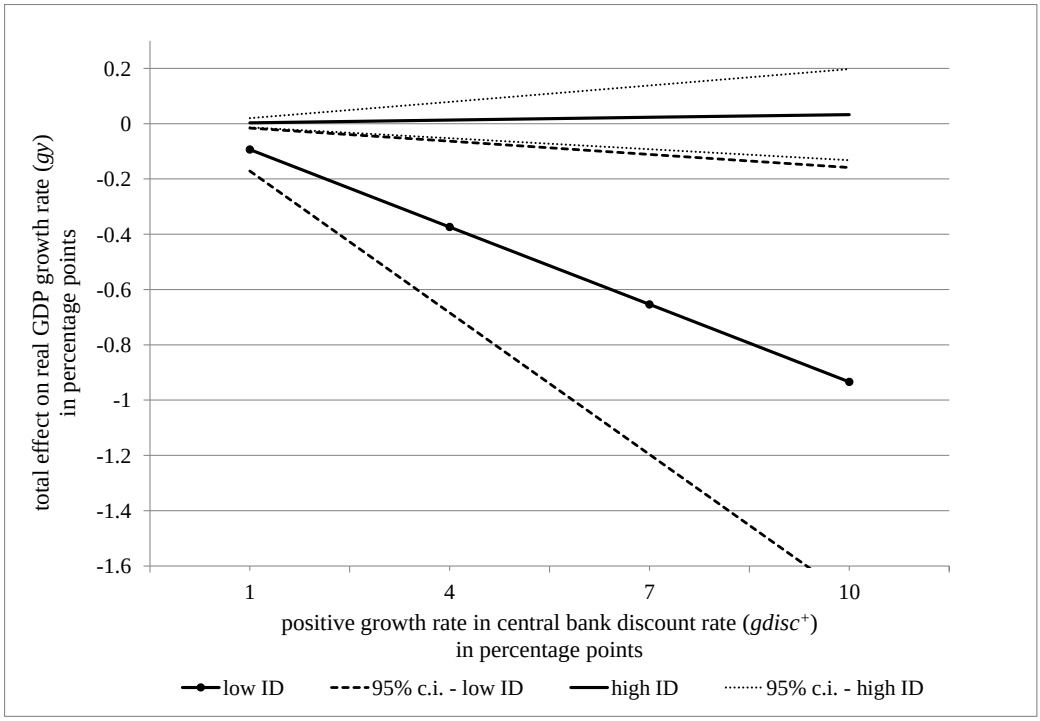


Total effects were extracted from table 8 for the regulatory quality indicator. Low ID (institutional development) represents a country with regulatory quality equal to -0.1 and high ID represents a country with regulatory quality equal to 1.1.

-0.4 (low ID country). The same change in interest rates would not be statistically different than zero in a country with average rule of law equal to 1.2 (high ID country).

Figure 5 shows that the effect of a given money contraction in a country with low government effectiveness (low ID) is statistically different than the effect of the same money contraction in a country with high government effectiveness (high ID). The graph demonstrates that a permanent ten percent increase in central bank discount rates would produce a reduction of approximately 1 percentage point in the quarterly real GDP growth in a country with average government effectiveness equal to 0 (low ID country). The effect of the same policy would not be statistically different than zero in a country with

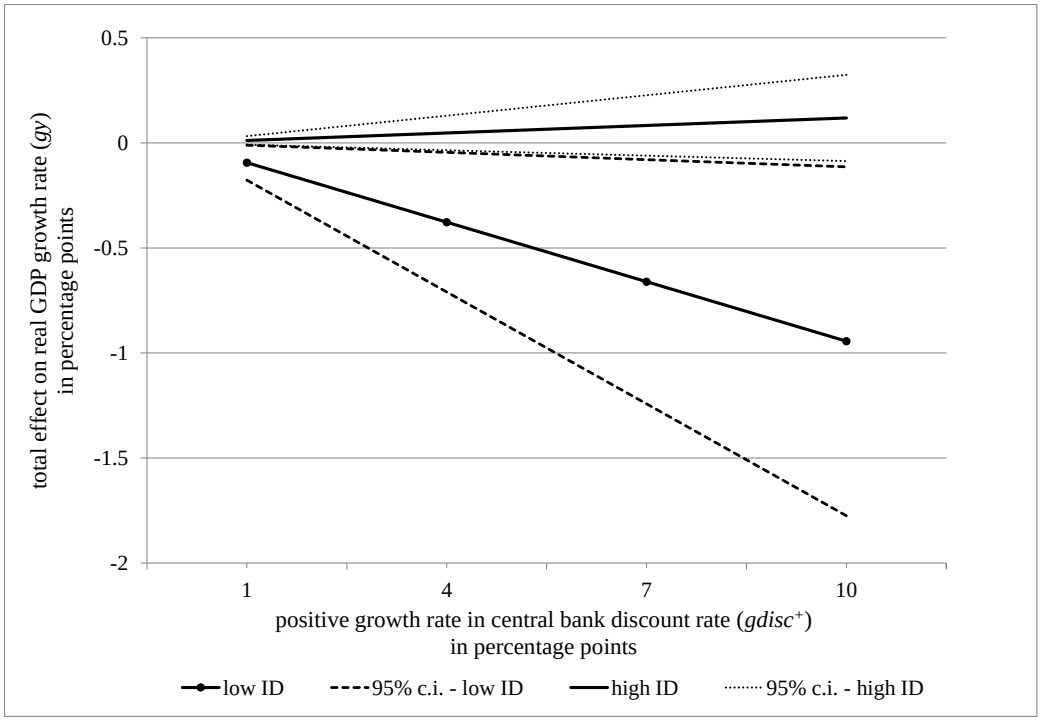
Figure 4 Empirical Evidence on the Hypothesis 2 - Rule of Law



Total effects were extracted from table 8 for the rule of law indicator. Low ID (institutional development) represents a country with rule of law equal to -0.4 and high ID represents a country with rule of law equal to 1.2.

government effectiveness equal to 1.5 (high ID country). The evidence indicates that the effect of an increase in interest rates in countries with average government effectiveness equal or smaller than zero (Ukraine, Bolivia, Egypt, Russian Federation, Peru, Indonesia, Macedonia, Colombia, Philippines and Brazil) is more pronounced and statistically different than the effect of the same increase in interest rates in a country with average government effectiveness equal or greater than 1.5 (Ireland, United States, Germany, France, United Kingdom, Belgium, China,P.R.:Hong Kong, New Zealand, Australia, Austria, Iceland, Netherlands, Canada, Norway, Switzerland, Sweden, Finland and Denmark), supporting hypothesis 2 of this dissertation.

Figure 5 Empirical Evidence on the Hypothesis 2 - Government Effectiveness



Total effects were extracted from table 8 for the government effectiveness indicator. Low ID (institutional development) represents a country with government effectiveness equal to 0 and high ID represents a country with government effectiveness equal to 1.5.

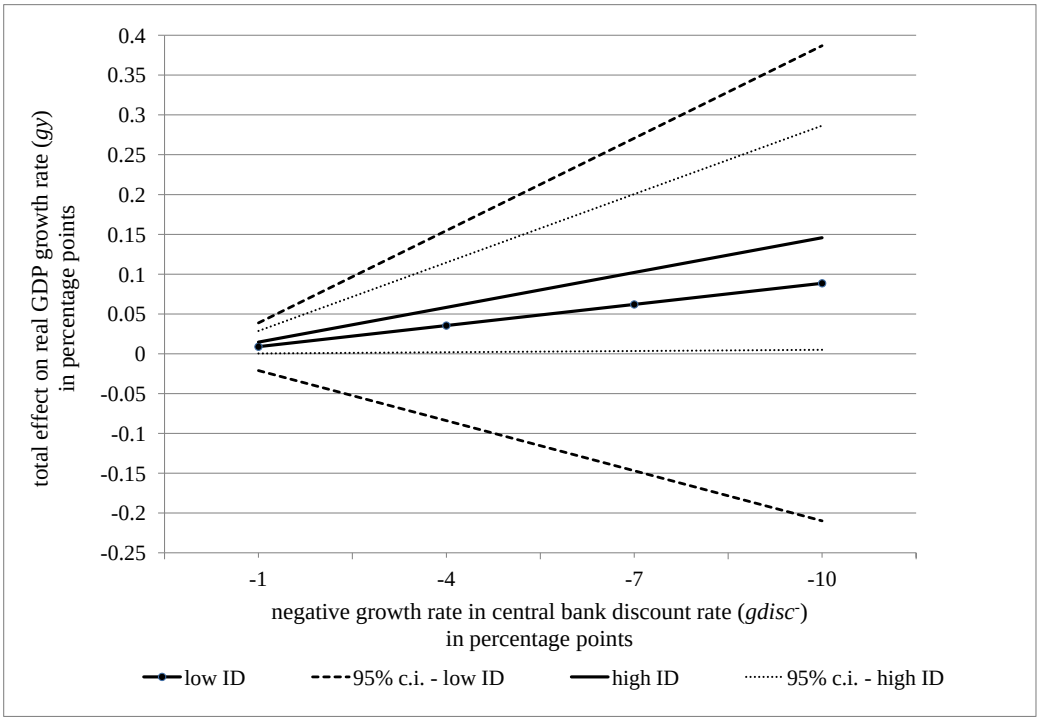
Third, the evidence in favor of hypothesis 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development) is weak and provided mainly by the government effectiveness indicator. The support was extracted from the fixed-effects models with 5 and 8 lags and openness variables as additional controls. For these models, we estimate that a decrease in interest rates is more effective in terms of output promotion in countries with higher government effectiveness than in countries with lower government effectiveness. The total effect of money expansions was found to be statistically significant only for countries with relatively high government effectiveness. However, we have to mention that this evidence

is pretty fragile because the fact that the impact is significant for countries with high institutional development and not significant for countries with low institutional development does not make them statistically different from each other.

Figure 6 illustrates the evidence in favor of hypothesis 3. The total effects of monetary expansions on the real GDP growth were derived from the fixed-effects model with eight lags and openness variables as controls (tables A.13 and A.14). The graph shows that the effect of a decrease in interest rates on output is greater for a country with government effectiveness equal to 2 (high ID) than for a country with government effectiveness equal to -0.5 (low ID). The 95% confidence interval associated with the effect estimated for the country with high institutional development embraces only positive values, meaning that this effect is positive and statistically significant at the 5% level. On the other hand, the 95% confidence interval associated with the effect estimated for the country with low institutional development is quite imprecise, indicating that it is not possible to reject the hypothesis that this effect is equal to zero. However, the complete overlap between the two confidence intervals makes the evidence pretty fragile. It is not possible to state that the effect estimated for a country with high ID is really statistically different from the effect estimated for a country with low ID.

Finally, the political stability indicator requires special consideration. In general, this indicator does not provide support for hypothesis 2 and contradicts hypothesis 3. The detailed description of this measure provided by Kaufmann et al. (2010) indicates that political stability and absence of violence/terrorism reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. Some countries in our

Figure 6 Empirical Evidence on the Hypothesis 3



Total effects were extracted from table A.14 for the government effectiveness indicator. Low ID (institutional development) represents a country with government effectiveness equal to -0.5 and high ID represents a country with government effectiveness equal to 2.

sample, despite having good overall institutional development, score below the average in terms of political stability. This is the case of Cyprus, France, Israel, Republic of Korea, Malaysia, Spain, United Kingdom and United States. All these countries score above the average in terms of government effectiveness and below the average in terms of political stability. For example, while Spain scores on average 1.2 in government effectiveness and Brazil scores zero in this indicator, both countries score approximately zero in political stability. United States scores 1.6 in government effectiveness and Bulgaria scores zero in this indicator, even though, the two countries have similar low scores in political stability, 0.2 for United States and 0.3 for Bulgaria. Israel and Indonesia score poorly in political

stability, respectively, -1.4 and -1.3. However, Israel scores above the average in terms of government effectiveness, 1.2, and Indonesia scores below the average in this indicator, -0.3. All this makes political stability a complicated indicator of institutional development that may lead to misleading conclusions. In general, we may conclude that the level of political stability and absence of violence/terrorism is irrelevant for the effectiveness of monetary contractions. In addition, the evidence against hypothesis 3 provided by some regressions using the political stability indicator should be interpreted with caution. If this evidence is driven by countries with overall high institutional development and poor scores in political stability, the results can actually be interpreted as an indication in favor of hypothesis 3, meaning that the effect of monetary expansions on output tends to be relatively great in countries with low political stability but overall high institutional development.

10 Evaluation of Hypotheses 2 and 3 - II

In this section we present an alternative methodology to evaluate the hypotheses 2 and 3 developed in the section 5 of this dissertation. The main objective of this section is to address the criticism that discount rates are endogenous to real GDP growth. It is likely that discount rates respond to movements in the real output. This lack of exogeneity in one of our main independent variables may cause some bias in the estimated results. In the previous section, this endogeneity in the form of reverse causality was mitigated through the inclusion of lagged values of the explanatory variables and the exclusion of current values of these variables. In this section, an alternative approach is introduced as an important robustness check.

The methodology consists of two steps. In the first step, a model for the discount rate growth is estimated and the residuals are extracted. In the second step, equation 2, presented in the previous section, is rewritten using the residuals estimated in the first step instead of the growth rate of central bank discount rates. This two-step approach was used by Cover (1992), Rhee and Rich (1995), Garibaldi (1997), Karras (1999), Karras and Stokes (1999), Karras (2001) and Berument, Konac, and Senay (2007).

Equation 3 specifies a model for the discount rate growth and composes the first step. The model is written in terms of past values of the growth rate of central bank discount rate and past values of the real output growth rate. In addition, following the specification used by Garibaldi (1997) and Berument et al. (2007), past values of inflation rates are also included in the model.

$$gdisc_{i,t} = \sum_{j=1}^{J} \rho_j gdisc_{i,t-j} + \sum_{j=1}^{J} \eta_j gy_{i,t-j} + \sum_{j=1}^{J} \chi_j infl_{i,t-j} + \delta trend_t + \nu_{i,t} \qquad (3)$$

The variable $gdisc_{i,t}$ is the growth rate of central bank discount rate in percentage points for country i at time t. The variable $gdisc_{i,t-j}$ is the j-th lag of the growth rate of central bank discount rate. The variable $gy_{i,t-j}$ is the j-th lag of the seasonally adjusted growth rate of real GDP in percentage points for each country i. The variable $infl_{i,t-j}$ is the j-th lag of the inflation rate in percentage points for each country i. The variable $trend_t$ is a linear trend in time. Finally, $v_{i,t} = \pi_i + \omega_{i,t}$, where π_i is modeled as fixed-effects and $\omega_{i,t}$ is the idiosyncratic error.

The rationale for equation 3 is that central bankers set discount rates in response to inflation rates and output movements. Current values of these two variables are not included in order to reduce a potential reverse causality problem that might arise. In addition, past values of the discount rate growth are also included in the model because expansionary or contractionary policies may exhibit some inertia.

The shocks $\omega_{i,t}$ extracted from equation 3 offer an alternative measure for the discount rate growth variable, mitigating the endogeneity of policy rates with respect to the real GDP growth rates. In this sense, the shocks $\omega_{i,t}$ represent the exogenous part of the discount rate movements or the discount rate growth series after subtracting the effect that the real GDP growth has on policy rate movements.

In the second step, the equation 2 presented in the previous section will be rewritten using only the exogenous part of monetary policies, which is described by $\omega_{i,t}$. In order to deal with the asymmetric effects of monetary policies, the residuals $\omega_{i,t}$ extracted from equation 3 are used to derive two additional variables, one including only the positive shocks and other including only the negative shocks. The addition of these two series results in the original series. Thus, the positive discount rate shocks are defined as:

$\omega_{i,t}^{+} = max(\omega_{i,t}, 0)$

and the negative discount rate shocks are defined as:

$\omega_{i,t}^{-} = min(\omega_{i,t}, 0)$

In the second step, equation 2 will be rewritten using these alternative monetary policy measures:

$$gy_{i,t} = \sum_{j=1}^{J} \gamma_j gy_{i,t-j} + \sum_{j=1}^{J} \phi_j \omega_{i,t-j}^{+} + \sum_{j=1}^{J} \Theta_j inst_{i,t-j} \omega_{i,t-j}^{+} + \sum_{j=1}^{J} \lambda_j \omega_{i,t-j}^{-} + \sum_{j=1}^{J} \psi_j inst_{i,t-j} \omega_{i,t-j}^{-} + \sum_{j=1}^{J} \tau_j inst_{i,t-j} + \delta trend_t + Z_{i,t}^{'} v + u_{i,t} \quad (4)$$

The variable $gy_{i,t}$ is the seasonally adjusted real GDP growth for each country i at each time period t. The variable $\omega_{i,t-j}^{+}$ represents the exogenous part of the positive growth rates in central bank discount rates. The variable $\omega_{i,t-j}^{-}$ represents the exogenous part of the negative growth rates in central bank discount rates. These positive and negative shocks in the growth rate of interest rates interact with one of the six measures of institutional development, $inst_{i,t-j}$. The term $trend_t$ is a linear trend in time. $Z_{i,t}^{'}$ is a vector of control variables. Finally, $u_{i,t}$ is the error term. We assume that the error term is described as $u_{i,t} = \alpha_i + \varepsilon_{i,t}$, where α_i is modeled as fixed-effects and $\varepsilon_{i,t}$ is the idiosyncratic error.

Table A.17 presents the results estimated for equation 3, which composes the first-step. Initially, we assume that J=4 for all variables. This choice is explained by the fact that we are using quarterly data. The inclusion of four lags guarantees that all the four quarters of the year will be taken into account by the set of explanatory variables. In

addition, we are not considering the inclusion of more than four lags to avoid an excessive loss of observations, as we have to remember that the approach developed in this section consists of two steps, and each of them makes use of lagged explanatory variables. The estimation of the model described by equation 3 proceeds with the elimination of lags that are not significant, from the highest to the lowest orders. Following this procedure, we choose the model with one lag of discount rate growth, two lags of real GDP growth, two lags of inflation and no time trend. The residuals $\omega_{i,t}$ are extracted and used to derive the positive and negative discount rate shock series, as previously explained. It is important to mention that the results estimated for equation 3 and displayed in table A.17 are quite intuitive. Discount rate movements are explained by previous discount rate movements. The coefficient estimated for the first lag of the discount rate growth is positive, highlighting the inertial component of monetary policies. In addition, discount rates increase in response to increases in real GDP growth and inflation rates, a result that is in accordance with the expectations.

The residuals $\omega_{i,t}^{+}$ and $\omega_{i,t}^{-}$ derived from the first step are used in the second step, which consists of the estimation of equation 4. The AIC criterion was used to select the most appropriate number of lags that should be included in equation 4. Fixed-effects models without additional controls were estimated assuming J=4, 5, 6, 7 and 8. The choice of $J \geq 4$ is based on the results of the previous section, where the models with 4, 5 and 8 lags were pointed as the favorite ones. Table A.18 indicates that we should choose the model with 4 lags for all institutional development indicators, except for political stability, whose model with 5 lags seems to be more appropriate.

Table 9 presents fixed-effects estimations of the model described by equation 4

without the inclusion of additional controls. Driscoll and Kraay standard errors are presented for the coefficient estimates. These standard errors are robust to disturbances being heteroskedastic, autocorrelated and cross-sectionally dependent and seem to be appropriate for long panels with cross-country macroeconomic data.

Table 9 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypotheses 2 and 3 - II

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0764	0.0770	0.0891	0.0781	0.0802	0.0769
	(0.115)	(0.116)	(0.114)	(0.116)	(0.116)	(0.114)
$gy2$	0.174*	0.176*	0.175*	0.177*	0.178*	0.175*
	(0.0447)	(0.0444)	(0.0479)	(0.0453)	(0.0453)	(0.0443)
$gy3$	-0.0508	-0.0489	-0.0668*	-0.0477	-0.0475	-0.0514
	(0.0344)	(0.0339)	(0.0304)	(0.0339)	(0.0332)	(0.0348)
$gy4$	-0.0962*	-0.0976*	-0.104*	-0.0936*	-0.0933*	-0.0959*
	(0.0411)	(0.0430)	(0.0478)	(0.0422)	(0.0408)	(0.0417)
$gy5$			0.0938			
			(0.0576)			
$\omega 1+$	-0.0206	-0.0156	-0.00617	-0.0155	-0.0163	-0.0249
	(0.0143)	(0.0119)	(0.00799)	(0.0123)	(0.0121)	(0.0155)
$\omega 2+$	0.000142	0.000384	0.00523	0.00250	0.00641	0.00302
	(0.00815)	(0.00657)	(0.00579)	(0.00609)	(0.00732)	(0.00797)
$\omega 3+$	-0.00447	-0.00241	-0.00119	-0.00350	-0.00494	-0.00378
	(0.0234)	(0.0164)	(0.0113)	(0.0177)	(0.0211)	(0.0213)
$\omega 4+$	-0.0218*	-0.0106*	-0.00268	-0.0125*	-0.0157*	-0.0176*
	(0.00658)	(0.00504)	(0.00459)	(0.00549)	(0.00686)	(0.00580)
$\omega 5+$			0.00884			
			(0.0102)			
$inst1 * \omega 1+$	0.0137+	0.00859+	0.00231	0.00935	0.0107+	0.0154*
	(0.00736)	(0.00478)	(0.00418)	(0.00567)	(0.00608)	(0.00756)
$inst2 * \omega 2+$	0.00738+	0.00724*	0.00760	0.00538*	0.00220	0.00418
	(0.00408)	(0.00217)	(0.00470)	(0.00250)	(0.00432)	(0.00330)
$inst3 * \omega 3+$	0.00179	-0.000103	-0.00177	0.000983	0.00304	0.000917
	(0.0155)	(0.00901)	(0.00804)	(0.0106)	(0.0153)	(0.0122)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypotheses 2 and 3 - II - Continued

$inst4 * \omega 4+$	0.0180*	0.00757*	0.000901	0.00985*	0.0155*	0.0129*
	(0.00415)	(0.00239)	(0.00516)	(0.00273)	(0.00459)	(0.00289)
$inst5 * \omega 5+$			0.00348			
			(0.0103)			
$\omega 1-$	0.0119*	0.0176*	0.0126*	0.0162*	0.0184*	0.0177*
	(0.00533)	(0.00477)	(0.00293)	(0.00496)	(0.00478)	(0.00588)
$\omega 2-$	-0.0150	-0.0162+	-0.0123+	-0.0152	-0.0230+	-0.0164
	(0.0109)	(0.00922)	(0.00614)	(0.00961)	(0.0116)	(0.0108)
$\omega 3-$	-0.0129	-0.00955	-0.00811+	-0.00880	-0.00585	-0.0101
	(0.0108)	(0.00802)	(0.00406)	(0.00788)	(0.00459)	(0.0103)
$\omega 4-$	0.00700	0.00813	0.00194	0.00663	0.00603	0.00804
	(0.00929)	(0.00713)	(0.00407)	(0.00750)	(0.00671)	(0.00820)
$\omega 5-$			-0.0121*			
			(0.00256)			
$inst1 * \omega 1-$	0.00505+	0.00114	0.00933*	0.00217	0.000147	0.00105
	(0.00281)	(0.00205)	(0.00366)	(0.00242)	(0.00445)	(0.00291)
$inst2 * \omega 2-$	0.00283	0.00375	-0.000413	0.00310	0.0114	0.00389
	(0.00468)	(0.00306)	(0.00364)	(0.00368)	(0.00715)	(0.00423)
$inst3 * \omega 3-$	0.00650	0.00394	0.00350+	0.00344	0.00107	0.00418
	(0.00630)	(0.00414)	(0.00197)	(0.00425)	(0.00246)	(0.00573)
$inst4 * \omega 4-$	-0.00580	-0.00668	-0.00531	-0.00573	-0.00713	-0.00633
	(0.00606)	(0.00443)	(0.00581)	(0.00482)	(0.00579)	(0.00495)
$inst5 * \omega 5-$			0.00419+			
			(0.00240)			
$inst1$	0.250	0.316	1.315*	-0.106	-1.005*	-0.209
	(0.637)	(0.480)	(0.442)	(0.797)	(0.452)	(0.524)
$inst2$	0.448	-0.346	-1.044*	0.958	1.628+	0.441
	(0.771)	(0.936)	(0.486)	(0.657)	(0.906)	(0.638)
$inst3$	0.0630	0.599	0.575	-1.407	-1.090	0.284
	(0.663)	(0.741)	(0.638)	(1.091)	(1.095)	(0.436)
$inst4$	-1.049	-0.356	0.739	0.327	0.578	-0.272
	(0.778)	(0.659)	(0.600)	(0.575)	(0.519)	(0.297)
$inst5$			-1.197			
			(0.792)			
$trend$	-0.0288*	-0.0281*	-0.0313*	-0.0287*	-0.0289*	-0.0280*
	(0.00976)	(0.00964)	(0.0113)	(0.00971)	(0.00971)	(0.00976)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypotheses 2 and 3 - II - Continued

Constant	1.570*	1.126*	1.050*	1.490*	1.199*	1.079*
	(0.368)	(0.224)	(0.210)	(0.563)	(0.418)	(0.358)
$\sum_{j=1}^{J}\phi_j$	-0.0468	-0.0282	0.00403	-0.0290	-0.0306	-0.0432
	[0.0103]	[0.0566]	[0.826]	[0.0251]	[0.0856]	[0.00749]
$\sum_{j=1}^{J}\Theta_j$	0.0409	0.0233	0.0125	0.0256	0.0315	0.0334
	[0.00467]	[0.00511]	[0.321]	[0.00673]	[0.0346]	[0.00114]
$\sum_{j=1}^{J}\lambda_j$	-0.00893	0.0000306	-0.0179	-0.00118	-0.00440	-0.000825
	[0.549]	[0.998]	[0.0861]	[0.915]	[0.748]	[0.945]
$\sum_{j=1}^{J}\psi_j$	0.00859	0.00214	0.0113	0.00299	0.00548	0.00279
	[0.234]	[0.647]	[0.0541]	[0.515]	[0.556]	[0.603]
$\sum_{j=1}^{J}\gamma_j$	0.103	0.107	0.188	0.114	0.117	0.104
	[0.367]	[0.359]	[0.139]	[0.327]	[0.313]	[0.359]
$\frac{\left(\sum_{j=1}^{J}\phi_j\right)}{\left(1-\sum_{j=1}^{J}\gamma_j\right)}$	-0.0521	-0.0316	0.00496	-0.0327	-0.0347	-0.0483
	[0.021]	[0.062]	[0.826]	[0.034]	[0.090]	[0.015]
$\frac{\left(\sum_{j=1}^{J}\Theta_j\right)}{\left(1-\sum_{j=1}^{J}\gamma_j\right)}$	0.0456	0.0261	0.0154	0.0288	0.0356	0.0373
	[0.016]	[0.012]	[0.333]	[0.017]	[0.045]	[0.006]
$\frac{\left(\sum_{j=1}^{J}\lambda_j\right)}{\left(1-\sum_{j=1}^{J}\gamma_j\right)}$	-0.00996	0.0000343	-0.0220	-0.00133	-0.00498	-0.000922
	[0.559]	[0.998]	[0.123]	[0.916]	[0.750]	[0.945]
$\frac{\left(\sum_{j=1}^{J}\psi_j\right)}{\left(1-\sum_{j=1}^{J}\gamma_j\right)}$	0.00957	0.00240	0.0139	0.00337	0.00621	0.00312
	[0.250]	[0.646]	[0.070]	[0.522]	[0.557]	[0.605]
N	1719	1719	1666	1719	1719	1719
within R^2	0.1151	0.1143	0.1360	0.1128	0.1133	0.1143

Results estimated for equation 4. The number after each variable name represents the lag j specified in equation 4. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

As explained in the previous section, the total effect of a permanent one percent increase in discount rates is given by: $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$. If our second hypothesis (contractionary policies reduce the output more in countries with low

institutional development than in countries with high institutional development) holds this total effect is expected to be statistically significant, relevant in size and considerably dependent on the level of institutional development. In addition, $\sum_{j=1}^{J}\phi_j$ is expected to be negative and $\sum_{j=1}^{J}\Theta_j$ is expected to be positive. More specifically, we will consider that our second hypothesis holds whenever $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is positive and significant at the 5% level. The total effect of a permanent one percent decrease in discount rates is given by: $\left(-\sum_{j=1}^{J}\lambda_j-\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$. If our third hypothesis (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development) holds this total effect is expected to be statistically significant, relevant in size and considerably dependent on the level of institutional development. In addition, $\sum_{j=1}^{J}\lambda_j$ is expected to be negative and $\sum_{j=1}^{J}\psi_j$ is also expected to be negative. More specifically, we will consider that our third hypothesis holds whenever $\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ is negative and significant at the 5% level.

Table 9 provides evidence that an increase in central bank discount rates will have more adverse effects on output under weaker institutional environments than under stronger institutional environments, supporting hypothesis 2 of this dissertation. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the 5% level for regulatory quality, rule of law and government effectiveness. The total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is positive and significant at the 5% level for all indicators, except for political stability. Then, we can conclude that hypothesis 2 is supported by all

institutional development indicators, with the exception of political stability. However, there is no evidence to support hypothesis 3 of this dissertation because $\sum_{j=1}^{J} \lambda_j$ and $\sum_{j=1}^{J} \psi_j$ are not significant at the 5% level for any of the indicators.

It is also interesting to present the estimated total effect of a permanent one percent increase in discount rates, $\left(\sum_{j=1}^{J} \phi_j + \sum_{j=1}^{J} \Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, and of a permanent one percent decrease in discount rates, $\left(\sum_{j=1}^{J} \lambda_j + \sum_{j=1}^{J} \psi_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, at specific levels of $inst_{i,t-j}$. Table 10 presents these effects and their standard errors for different levels of institutional development.

Table 10 Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions - Evaluating Hypotheses 2 and 3 - II

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J} \phi_j + \sum_{j=1}^{J} \Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$			
-2			-0.0259			
			(0.0513)			
-1.5			-0.0182			
			(0.0437)			
-1	-0.0977*	-0.0577*	-0.0105	-0.0616*	-0.0703+	-0.0856*
	(0.0381)	(0.0241)	(0.0363)	(0.0236)	(0.0354)	(0.0301)
-0.5	-0.0749*	-0.0446*	-0.00275	-0.0471*	-0.0525+	-0.0669*
	(0.0297)	(0.0201)	(0.0291)	(0.0189)	(0.0274)	(0.0244)
0	-0.0521*	-0.0316+	0.00496	-0.0327*	-0.0347+	-0.0483*
	(0.0219)	(0.0165)	(0.0225)	(0.0150)	(0.0201)	(0.0191)
0.5	-0.0293+	-0.0185	0.0127	-0.0183	-0.0169	-0.0296+
	(0.0155)	(0.0140)	(0.0169)	(0.0127)	(0.0143)	(0.0149)
1	-0.00654	-0.00550	0.0204	-0.00388	0.000959	-0.0110
	(0.0131)	(0.0129)	(0.0138)	(0.0128)	(0.0125)	(0.0128)
1.5	0.0163	0.00754	0.0281+	0.0105	0.0188	0.00765
	(0.0163)	(0.0137)	(0.0148)	(0.0153)	(0.0161)	(0.0139)

Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions - Evaluating Hypotheses 2 and 3 - II - Continued

2	0.0391+	0.0206		0.0250	0.0366	0.0263
	(0.0230)	(0.0162)		(0.0193)	(0.0226)	(0.0175)
	$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$					
-2			-0.0499+			
			(0.0276)			
-1.5			-0.0429+			
			(0.0241)			
-1	-0.0195	-0.00237	-0.0360+	-0.00470	-0.0112	-0.00404
	(0.0249)	(0.0166)	(0.0206)	(0.0173)	(0.0254)	(0.0190)
-0.5	-0.0147	-0.00117	-0.0290+	-0.00301	-0.00809	-0.00248
	(0.0209)	(0.0142)	(0.0172)	(0.0148)	(0.0204)	(0.0161)
0	-0.00996	0.0000343	-0.0220	-0.00133	-0.00498	-0.000922
	(0.0169)	(0.0119)	(0.0141)	(0.0125)	(0.0156)	(0.0134)
0.5	-0.00517	0.00123	-0.0151	0.000357	-0.00188	0.000636
	(0.0131)	(0.00982)	(0.0113)	(0.0102)	(0.0111)	(0.0107)
1	-0.000385	0.00241	-0.00814	0.00204	0.00123	0.00219
	(0.00946)	(0.00800)	(0.00920)	(0.00815)	(0.00766)	(0.00827)
1.5	0.00440	0.00363	-0.00118	0.00373	0.00433	0.00375
	(0.00644)	(0.00665)	(0.00840)	(0.00652)	(0.00702)	(0.00633)
2	0.00919+	0.00483		0.00542	0.00743	0.00531
	(0.00523)	(0.00619)		(0.00567)	(0.00975)	(0.00546)
N	1719	1719	1666	1719	1719	1719

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table 9 (equation 4).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table 10 shows that an increase in interest rates has more negative effects on output for countries with relatively weak institutional development. This is true for all institutional indicators, except for political stability. Table 10 shows that a ten percent

increase in central bank discount rates would produce a decrease of 0.97 percentage points in the quarterly real GDP growth for a country with average regulatory quality equal to -1 and a decrease not significantly different than zero for a country with average regulatory quality equal to 1 or 1.5. A ten percent increase in central bank discount rates would produce a decrease of 0.57 percentage point in the quarterly real GDP growth for a country with average control of corruption equal to -1 and a reduction not significantly different than zero for a country with average control of corruption equal or higher than 0.5. Similar evidence is provided by rule of law, voice and accountability and government effectiveness. As described by table 9, table 10 shows that a decrease in interest rates is ineffective in terms of output promotion for all countries, meaning that there is no evidence to support hypothesis 3 of this dissertation.

As a robustness check, *J* lags of the variable openness and its interaction with positive and negative growth rates of central bank discount rates are included in the previous regressions. As mentioned in the previous section, Karras (1999) and Karras (2001) provide empirical evidence that the more open the economy, the smaller the effects of monetary policies on output. There is a positive correlation between institutional development and openness [40]. Then, our previous results may be capturing the effects of openness instead of the relevance of the institutional indicators.

Table 11 presents the results estimated for equation 4 after controlling for openness. Initially, *J* lags of openness and its interaction terms are included in all regressions, where *J* is determined according to the AIC criterion displayed in table A.18. In all regressions, the openness variables have a jointly significant effect on output. The

[40]Correlations between openness and the institutional indicators: 0.24 (regulatory quality); 0.11 (control of corruption); 0.28 (political stability); 0.16 (rule of law); 0.0017 (voice and accountability) and 0.18 (government effectiveness).

total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, keeps being positive and significant at the 5% level for regulatory quality, control of corruption, rule of law and government effectiveness. This effect is now significant only at the 10% level for voice and accountability and it keeps being insignificant for political stability. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the 5% level only for government effectiveness. This effect is significant at the 10% level for regulatory quality, control of corruption and rule of law and it is not significant for political stability and voice and accountability. In order to reduce the loss of efficiency caused by the inclusion of excessive lags of openness, we proceed with the elimination of lags of openness and its interaction terms that are not significant, from the highest to the lowest orders. In this way, we reduce the standard errors of the variables of interest without ignoring the role played by additional controls. Following this procedure, we choose the model with one lag of openness for regulatory quality, control of corruption, rule of law, voice and accountability and government effectiveness and the model with five lags of openness for the political stability indicator, as displayed in table 11.

Table 11 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
*gy*1	0.0770	0.0774	0.0902	0.0787	0.0809	0.0772
	(0.115)	(0.116)	(0.113)	(0.116)	(0.117)	(0.115)
*gy*2	0.176*	0.179*	0.168*	0.179*	0.180*	0.177*
	(0.0452)	(0.0452)	(0.0493)	(0.0461)	(0.0462)	(0.0450)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - Continued

$gy3$	-0.0482	-0.0461	-0.0580*	-0.0450	-0.0441	-0.0493
	(0.0309)	(0.0307)	(0.0234)	(0.0308)	(0.0299)	(0.0316)
$gy4$	-0.0930*	-0.0943*	-0.0992*	-0.0904*	-0.0900*	-0.0932*
	(0.0401)	(0.0422)	(0.0448)	(0.0414)	(0.0402)	(0.0409)
$gy5$			0.108+			
			(0.0557)			
$\omega 1+$	-0.0186	-0.0139	0.00105	-0.0132	-0.00937	-0.0237
	(0.0166)	(0.0145)	(0.00778)	(0.0146)	(0.0121)	(0.0179)
$\omega 2+$	0.000534	0.000490	0.00993*	0.00261	0.00630	0.00327
	(0.00811)	(0.00652)	(0.00421)	(0.00602)	(0.00746)	(0.00791)
$\omega 3+$	-0.00425	-0.00248	-0.00165	-0.00359	-0.00566	-0.00373
	(0.0233)	(0.0165)	(0.0105)	(0.0176)	(0.0209)	(0.0213)
$\omega 4+$	-0.0215*	-0.0106*	-0.0120*	-0.0124*	-0.0158*	-0.0175*
	(0.00668)	(0.00515)	(0.00501)	(0.00565)	(0.00708)	(0.00597)
$\omega 5+$			0.00924			
			(0.00720)			
$inst1 * \omega 1+$	0.0146+	0.00882+	0.00227	0.00941	0.00882	0.0158+
	(0.00750)	(0.00493)	(0.00422)	(0.00580)	(0.00588)	(0.00786)
$inst2 * \omega 2+$	0.00697+	0.00697*	0.00763+	0.00512*	0.00211	0.00382
	(0.00403)	(0.00216)	(0.00446)	(0.00250)	(0.00446)	(0.00322)
$inst3 * \omega 3+$	0.00147	-0.000167	-0.00180	0.000916	0.00338	0.000798
	(0.0154)	(0.00895)	(0.00792)	(0.0105)	(0.0151)	(0.0121)
$inst4 * \omega 4+$	0.0178*	0.00758*	0.00115	0.00985*	0.0156*	0.0129*
	(0.00422)	(0.00240)	(0.00531)	(0.00282)	(0.00484)	(0.00296)
$inst5 * \omega 5+$			0.00385			
			(0.0105)			
$\omega 1-$	0.0111+	0.0146*	0.0103*	0.0128*	0.0101	0.0151*
	(0.00588)	(0.00557)	(0.00361)	(0.00575)	(0.00652)	(0.00681)
$\omega 2-$	-0.0151	-0.0160+	-0.00774	-0.0150	-0.0227+	-0.0164
	(0.0109)	(0.00916)	(0.00619)	(0.00954)	(0.0121)	(0.0108)
$\omega 3-$	-0.0127	-0.00942	-0.00916+	-0.00863	-0.00570	-0.0100
	(0.0108)	(0.00804)	(0.00481)	(0.00778)	(0.00448)	(0.0102)
$\omega 4-$	0.00743	0.00827	0.00143	0.00671	0.00543	0.00819
	(0.00935)	(0.00713)	(0.00406)	(0.00742)	(0.00638)	(0.00820)
$\omega 5-$			-0.0139*			
			(0.00291)			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - Continued

$inst1 * \omega 1-$	0.00275	-0.0000726	0.00837*	0.00140	0.00321	-0.000442
	(0.00310)	(0.00211)	(0.00380)	(0.00242)	(0.00541)	(0.00317)
$inst2 * \omega 2-$	0.00311	0.00394	0.000854	0.00329	0.0115	0.00422
	(0.00501)	(0.00314)	(0.00358)	(0.00371)	(0.00745)	(0.00436)
$inst3 * \omega 3-$	0.00647	0.00393	0.00199	0.00343	0.00118	0.00418
	(0.00626)	(0.00412)	(0.00167)	(0.00417)	(0.00238)	(0.00570)
$inst4 * \omega 4-$	-0.00616	-0.00684	-0.00564	-0.00586	-0.00668	-0.00653
	(0.00617)	(0.00453)	(0.00596)	(0.00485)	(0.00559)	(0.00505)
$inst5 * \omega 5-$			0.00304			
			(0.00234)			
$inst1$	0.223	0.313	1.302*	-0.135	-1.048*	-0.211
	(0.626)	(0.492)	(0.440)	(0.784)	(0.464)	(0.513)
$inst2$	0.439	-0.348	-1.081*	0.934	1.608+	0.416
	(0.771)	(0.935)	(0.494)	(0.655)	(0.907)	(0.617)
$inst3$	0.0714	0.582	0.590	-1.398	-1.042	0.285
	(0.657)	(0.739)	(0.633)	(1.103)	(1.087)	(0.434)
$inst4$	-1.065	-0.320	0.690	0.342	0.592	-0.254
	(0.780)	(0.633)	(0.584)	(0.595)	(0.565)	(0.294)
$inst5$			-1.160			
			(0.745)			
$trend$	-0.0280*	-0.0272*	-0.0289*	-0.0278*	-0.0278*	-0.0274*
	(0.00955)	(0.00946)	(0.0103)	(0.00947)	(0.00966)	(0.00960)
$open1$	-0.237	-0.261	1.254	-0.266	-0.294	-0.193
	(0.473)	(0.452)	(1.202)	(0.457)	(0.477)	(0.456)
$open2$			-2.316			
			(1.761)			
$open3$			1.294			
			(0.927)			
$open4$			-1.421+			
			(0.757)			
$open5$			0.490			
			(0.517)			
$open1 * \omega 1+$	-0.00324	-0.00191	-0.00817	-0.00240	-0.00544	-0.00148
	(0.00633)	(0.00603)	(0.00619)	(0.00559)	(0.00496)	(0.00548)
$open2 * \omega 2+$			-0.00563			
			(0.00694)			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - Continued

$open3 * \omega 3+$			0.00211			
			(0.0103)			
$open4 * \omega 4+$			0.0105			
			(0.00634)			
$open5 * \omega 5+$			-0.0000926			
			(0.00815)			
$open1 * \omega 1-$	0.00323*	0.00383*	0.00136	0.00359*	0.00450*	0.00380*
	(0.00147)	(0.00149)	(0.00251)	(0.00148)	(0.00154)	(0.00138)
$open2 * \omega 2-$			-0.00546*			
			(0.00225)			
$open3 * \omega 3-$			0.00156			
			(0.00253)			
$open4 * \omega 4-$			0.000594			
			(0.00331)			
$open5 * \omega 5-$			0.00399*			
			(0.00161)			
Constant	1.812*	1.333*	1.636*	1.736*	1.442*	1.249*
	(0.617)	(0.437)	(0.532)	(0.549)	(0.435)	(0.499)
$\sum_{j=1}^{J} \phi_j$	-0.0438	-0.0264	0.00659	-0.0266	-0.0246	-0.0417
	[0.00678]	[0.0648]	[0.541]	[0.0320]	[0.195]	[0.00525]
$\sum_{j=1}^{J} \Theta_j$	0.0408	0.0232	0.0131	0.0253	0.0299	0.0333
	[0.00338]	[0.00397]	[0.313]	[0.00585]	[0.0452]	[0.000640]
$\sum_{j=1}^{J} \lambda_j$	-0.00928	-0.00252	-0.0191	-0.00408	-0.0129	-0.00318
	[0.488]	[0.790]	[0.0648]	[0.677]	[0.388]	[0.766]
$\sum_{j=1}^{J} \psi_j$	0.00616	0.000947	0.00861	0.00226	0.00924	0.00143
	[0.386]	[0.843]	[0.122]	[0.624]	[0.385]	[0.788]
$\sum_{j=1}^{J} \gamma_j$	0.112	0.116	0.210	0.123	0.127	0.112
	[0.332]	[0.328]	[0.0994]	[0.297]	[0.286]	[0.336]
$\frac{(\sum_{j=1}^{J} \phi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0493	-0.0299	0.00835	-0.0303	-0.0281	-0.0469
	[0.013]	[0.058]	[0.532]	[0.030]	[0.185]	[0.008]
$\frac{(\sum_{j=1}^{J} \Theta_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.0460	0.0262	0.0166	0.0288	0.0343	0.0375
	[0.015]	[0.011]	[0.328]	[0.016]	[0.054]	[0.005]
$\frac{(\sum_{j=1}^{J} \lambda_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0105	-0.00285	-0.0242	-0.00464	-0.0148	-0.00358
	[0.500]	[0.791]	[0.110]	[0.684]	[0.404]	[0.768]
$\frac{(\sum_{j=1}^{J} \psi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.00694	0.00107	0.0109	0.00257	0.0106	0.00161
	[0.395]	[0.843]	[0.150]	[0.628]	[0.394]	[0.788]
N	1719	1719	1666	1719	1719	1719
within R^2	0.1159	0.1155	0.1455	0.1140	0.1150	0.1154

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - Continued

Results estimated for equation 4. The number after each variable name represents the lag j specified in equation 4. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table 11 provides evidence that an increase in central bank discount rates will have more adverse effects on output under weaker institutional environments than under stronger institutional environments, supporting hypothesis 2 of this dissertation, even after controlling for openness. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J} \phi_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, keeps being negative and significant at the 5% level for regulatory quality, rule of law and government effectiveness. The total effect of the coefficients associated with the interaction term between institutional development and positive growth rates in interest rates, $\left(\sum_{j=1}^{J} \Theta_j\right) / \left(1 - \sum_{j=1}^{J} \gamma_j\right)$, is positive and significant at the 5% level for all indicators, except for political stability and voice and accountability. Then, we can conclude that hypothesis 2 is supported by all institutional development indicators, with the exception of political stability and voice and accountability. However, there is no evidence to support hypothesis 3 of this dissertation because $\sum_{j=1}^{J} \lambda_j$ and $\sum_{j=1}^{J} \psi_j$ are not significant at the 5% level for any of the indicators.

Table 12 presents the estimated total effect of a permanent one percent increase in

discount rates, $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, and of a permanent one percent decrease in discount rates, $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, at specific levels of $inst_{i,t-j}$. Table 12 makes clear that an increase in interest rates has more negative effects on output in countries with weaker institutional development than in countries with stronger institutional development. After controlling for openness, this is true for regulatory quality, control of corruption, rule of law and government effectiveness. For all these indicators, table 12 demonstrates that a contractionary monetary policy has a negative and significant effect on output for a country with institutional development equal to -0.5 and an effect that is not different than zero for a country with institutional development equal to 1.5, for example. As described by table 11, table 12 shows that a decrease in interest rates seems to be ineffective in terms of output promotion for all countries, meaning that there is no evidence to support hypothesis 3 of this dissertation.

Table 12 Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness - Evaluating Hypotheses 2 and 3 - II

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0248			
			(0.0439)			
-1.5			-0.0165			
			(0.0358)			
-1	-0.0953*	-0.0561*	-0.00823	-0.0591*	-0.0624+	-0.0844*
	(0.0348)	(0.0219)	(0.0278)	(0.0209)	(0.0355)	(0.0272)
-0.5	-0.0723*	-0.0430*	0.0000589	-0.0447*	-0.0452	-0.0656*
	(0.0266)	(0.0183)	(0.0201)	(0.0167)	(0.0278)	(0.0218)
0	-0.0493*	-0.0299+	0.00835	-0.0303*	-0.0281	-0.0469*
	(0.0191)	(0.0154)	(0.0133)	(0.0136)	(0.0209)	(0.0170)
0.5	-0.0264+	-0.0167	0.0166+	-0.0159	-0.0110	-0.0282*

Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness - Evaluating Hypotheses 2 and 3 - II - Continued

	(0.0137)	(0.0138)	(0.00941)	(0.0125)	(0.0159)	(0.0137)
1	-0.00337	-0.00363	0.0249*	-0.00146	0.00615	-0.00944
	(0.0134)	(0.0139)	(0.0119)	(0.0140)	(0.0148)	(0.0129)
1.5	0.0196	0.00949	0.0332+	0.0130	0.0233	0.00929
	(0.0183)	(0.0156)	(0.0183)	(0.0173)	(0.0183)	(0.0152)
2	0.0426	0.0226		0.0274	0.0404	0.0280
	(0.0257)	(0.0186)		(0.0217)	(0.0245)	(0.0195)
$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$						
-2			-0.0460+			
			(0.0268)			
-1.5			-0.0406+			
			(0.0235)			
-1	-0.0174	-0.00392	-0.0351+	-0.00722	-0.0254	-0.00520
	(0.0231)	(0.0154)	(0.0204)	(0.0161)	(0.0294)	(0.0175)
-0.5	-0.0139	-0.00339	-0.0297+	-0.00593	-0.0201	-0.00439
	(0.0192)	(0.0130)	(0.0174)	(0.0137)	(0.0234)	(0.0148)
0	-0.0105	-0.00285	-0.0242	-0.00464	-0.0148	-0.00358
	(0.0154)	(0.0107)	(0.0149)	(0.0114)	(0.0176)	(0.0121)
0.5	-0.00698	-0.00232	-0.0188	-0.00336	-0.00951	-0.00278
	(0.0117)	(0.00873)	(0.0129)	(0.00921)	(0.0121)	(0.00963)
1	-0.00351	-0.00179	-0.0133	-0.00207	-0.00422	-0.00197
	(0.00842)	(0.00723)	(0.0119)	(0.00739)	(0.00766)	(0.00754)
1.5	-0.0000419	-0.00124	-0.00787	-0.000785	0.00107	-0.00117
	(0.00608)	(0.00648)	(0.0119)	(0.00621)	(0.00683)	(0.00622)
2	0.00343	-0.000709		0.000502	0.00637	-0.000361
	(0.00598)	(0.00681)		(0.00603)	(0.0105)	(0.00617)
N	1719	1719	1666	1719	1719	1719

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table 11 (equation 4).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

The regressions in table 11 also provide some interesting results with respect to the impact of openness on the effectiveness of monetary policies. The total effect of the interaction between openness and the negative growth rates in interest rates (given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$) is positive and significant at the 5% level for all indicators, except for political stability[41]. This means that the effectiveness of money expansions diminishes with the level of openness, which is in accordance with the accepted economic theory.

Finally, J lags of financial development and its interaction terms are included in all regressions, where J is determined according to the AIC criterion displayed in table A.18. In order to reduce the loss of efficiency caused by the inclusion of excessive lags of financial development, we proceed with the elimination of lags that are not significant, from the highest to the lowest orders. Following this procedure, we choose the model with three lags of financial development for regulatory quality, control of corruption, political stability and government effectiveness. We ended up eliminating all lags of financial development for rule of law and voice and accountability. These results are displayed in table A.19.

Table A.19 provides evidence that an increase in central bank discount rates will have more adverse effects on output under weaker institutional environments than under stronger institutional environments for regulatory quality, rule of law and government effectiveness, supporting hypothesis 2 of this dissertation. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the

[41]The total effect of the interaction between openness and the negative growth rates in interest rates was estimated to be 0.0036369 for regulatory quality, 0.0043301 for control of corruption, 0.0040925 for rule of law, 0.0051484 for voice and accountability and 0.0042716 for government effectiveness. The total effect of the interaction between openness and the positive growth rates in interest rates is not significant at the 5% level in any of the regressions.

5% level and the total effect of the coefficients associated with the interaction term between institutional development and positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is positive and significant at the 5% level for these mentioned indicators[42]. There is no evidence to support hypothesis 3 of this dissertation because $\sum_{j=1}^{J}\lambda_j$ and $\sum_{j=1}^{J}\psi_j$ are not significant at the 5% level for any of the indicators. Table A.20, which presents the estimated total effect of a permanent one percent increase/decrease in discount rates at specific levels of institutional development after controlling for openness and financial development, demonstrates that a contractionary monetary policy has a negative and significant effect on output for a country with institutional development equal or smaller than 0 and an effect that is not different than zero for a country with institutional development equal or greater than 0.5. This is true for regulatory quality, rule of law and government effectiveness, illustrating the evidence on the relevance of these indicators provided by table A.19. In addition, table A.20 shows that a decrease in interest rates seems to be ineffective in terms of output promotion for all countries, meaning that there is no evidence to support hypothesis 3 of this dissertation.

Finally, the regressions in table A.19 indicate that the total effect of the interaction between openness and the negative growth rates in interest rates (given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$) is positive and significant at the 5% level for all indicators, except for political stability[43]. This

[42]Hypothesis 2 keeps holding for rule of law after the inclusion of one insignificant lag of financial development. In this case, the total effect of the positive growth rates in interest rates is -0.0216551 with a corresponding p-value of 0.095 and the total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates is 0.0242635 with a corresponding p-value of 0.040.

[43]The total effect of the interaction between openness and the negative growth rates in interest rates was estimated to be 0.0112389 for regulatory quality, 0.0112964 for control of corruption, 0.0040925 for rule of law, 0.0051484 for voice and accountability and 0.0110583 for government effectiveness. The total effect of the interaction between openness and the positive growth rates in interest rates is not significant at the 5% level in any of the regressions.

means that the effectiveness of money expansions diminishes with the level of openness, which is in accordance with the accepted economic theory. The total effect of the interaction between financial development and the negative/positive growth rates in interest rates (given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$) is not significant at the 5% level for any of the indicators.

In summary, under the two-step approach to deal with the endogeneity of discount rates, this subsection allows us to affirm that hypothesis 2 holds for regulatory quality, rule of law and government effectiveness, increasing the robustness of the previous section's conclusions. In addition, there is no support for hypothesis 3.

10.1 A Second Alternative Specification

As a robustness check, in this subsection we present an alternative specification for the discount rate growth model displayed in equation 3. Now, the model is written only in terms of past values of the growth rate of central bank discount rates and past values of the real output growth rate. Past values of inflation rate are no longer included in the model. A similar specification was used by Karras (1999), Karras (2001) and Karras and Stokes (1999). All these works disregard the role played by past inflation rates in the discount rate model. Equation 5 describes this alternative specification.

$$gdisc_{i,t} = \sum_{j=1}^{J} \rho_j gdisc_{i,t-j} + \sum_{j=1}^{J} \eta_j gy_{i,t-j} + \delta trend_t + \nu_{i,t} \tag{5}$$

The variable $gdisc_{i,t}$ is the growth rate of central bank discount rate in percentage points for country i at time t. The variable $gdisc_{i,t-j}$ is the j-th lag of the growth rate of central bank discount rate. The variable $gy_{i,t-j}$ is the j-th lag of the seasonally adjusted

growth rate of real GDP in percentage points for each country i. The variable $trend_t$ is a linear trend in time. Finally, $v_{i,t} = \pi_i + \omega_{i,t}$, where π_i is modeled as fixed-effects and $\omega_{i,t}$ is the idiosyncratic error.

The rationale for this alternative specification is that if we are trying to solve the endogeneity of discount rates with respect to the output, it would be enough to include only the real GDP growth in the first-step equation. In this sense, the inclusion of inflation in the first-step equation would be unjustifiable. On the other hand, the inclusion of inflation rates in the firt-step equation, earlier in this section, is strongly supported by the accepted economic theory, which states that, in general, central bankers set interest rates in response to real GDP growth and inflation rate movements. It seems that there is no consensus on the most appropriate way to model central bank discount rates while dealing with this endogeneity issue. Some works that use this two-step approach to study the effectiveness of monetary policies included inflation rates in the first step (Cover (1992), Rhee and Rich (1995), Garibaldi (1997) and Berument et al. (2007)) and others did not (Karras (1999), Karras (2001) and Karras and Stokes (1999)). As a result, we do not have a favorite specification and the results presented in this subsection offer an alternative and a robustness check to the previous estimations.

Table A.21 presents the results estimated for equation 5. Initially, we assume that J=4 for all variables. Then, we proceed with the elimination of lags that are not significant. Following this procedure, we choose the model with one lag of discount rate growth, two lags of real GDP growth and no time trend. The residuals $\omega_{i,t}$ are extracted and used to derive the positive and negative discount rate shock series, as explained earlier in this section. As expected, past movements in discount rates have a significant influence

on current monetary policies as the coefficient for the first lag of the growth rate of central bank discount rates is estimated to be positive. In addition, the results show that interest rates go up in response to increases in real GDP growth.

The residuals $\omega_{i,t}^{+}$ and $\omega_{i,t}^{-}$ derived from the first step are used in the second step, which consists of the estimation of equation 4. The AIC criterion was used to select the most appropriate number of lags that should be included in equation 4. Fixed-effects models without additional controls were estimated assuming J=4, 5, 6, 7 and 8. Table A.22 indicates that we should choose the model with 4 lags for all institutional development indicators, except for political stability, whose model with 5 lags seems to be more appropriate.

Table A.23 presents fixed-effects estimations of the model described by equation 4 without the inclusion of additional controls.[44] The table provides evidence that hypothesis 2 holds for regulatory quality, control of corruption, rule of law and government effectiveness. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the 5% level and the total effect of the coefficients associated with the interaction term between institutional development and positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$, is positive and significant at the 5% level for these indicators. There is no evidence to support hypothesis 3 because $\sum_{j=1}^{J}\lambda_j$ and $\sum_{j=1}^{J}\psi_j$ are not significant at the 5% level, except for political stability. The term $\left(\sum_{j=1}^{J}\psi_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ is significant at the 5% level for political stability, however, it has an unexpected positive sign, which is not in accordance with hypothesis 3 of this dissertation. Table A.24 presents the estimated total effect of a

[44] Driscoll and Kraay standard errors are presented for the coefficient estimates. These standard errors are robust to disturbances being heteroskedastic, autocorrelated and cross-sectionally dependent and seem to be appropriate for long panels with cross-country macroeconomic data.

permanent one percent increase/decrease in discount rates at specific levels of institutional development. The table makes clearer the strong support in favor of hypothesis 2. Countries with lower values of $inst_{i,t-j}$ suffer more adverse impacts on output after a monetary contraction than countries with higher values of $inst_{i,t-j}$. With respect to the monetary expansions, the evidence provided in table A.24 for the political stability indicator contradicts hypothesis 3, showing that these policies are more effective in countries with relatively low political stability.

Table A.25 presents the results estimated for equation 4 after controlling for openness. Initially, J lags of openness and its interaction terms are included in all regressions, where J is determined according to the AIC criterion displayed in table A.22. The total effect of the coefficients associated with the interaction term between institutional development and positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, keeps being positive and significant at the 5% level for regulatory quality, control of corruption, rule of law and government effectiveness. This effect keeps being significant at the 10% level for voice and accountability and insignificant for political stability. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the 5% level only for government effectiveness. This effect is significant at the 10% level for regulatory quality, control of corruption and rule of law and it is not significant for political stability and voice and accountability. In order to reduce the loss of efficiency caused by the inclusion of excessive lags of openness, we proceed with the elimination of lags of openness and its interaction terms that are not significant, from the highest to the lowest orders. Following this procedure, we ended up with the models displayed in table A.25. We include one lag

of openness in the model for control of corruption, rule of law, voice and accountability and government effectiveness, five lags of openness in the model for political stability and no lags of openness in the model for regulatory quality.

Table A.25 shows that there is support in favor of hypothesis 2 even after controlling for openness. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the 5% level and the total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$, is positive and significant at the 5% level for for regulatory quality, control of corruption, rule of law and government effectiveness. There is no evidence to support hypothesis 3 because $\sum_{j=1}^{J}\lambda_j$ and $\sum_{j=1}^{J}\psi_j$ are not significant at the 5% level, except for political stability. However, the term $\left(\sum_{j=1}^{J}\psi_j\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ in the political stability model is positive, contradicting hypothesis 3 of this dissertation. Table A.26 describes the total effect of a permanent one percent increase/decrease in discount rates at different levels of institutional development after controlling for openness, providing a good illustration of the conclusions extracted from table A.25. Table A.26 shows that a contractionary monetary policy has a negative and significant effect on output for a country with institutional development equal to or smaller than 0.5 and an effect that is not different than zero for a country with institutional development equal to or greater than 1. This evidence holds for regulatory quality, control of corruption, rule of law and government effectiveness. Table A.26 provides no evidence in favor of hypothesis 3 of this dissertation.

Finally, J lags of financial development and its interaction terms are included in all regressions, where J is determined according to the AIC criterion displayed in table A.22.

In order to reduce the loss of efficiency caused by the inclusion of excessive lags of financial development, we proceed with the elimination of lags that are not significant, from the highest to the lowest orders. Following this procedure, we choose the model with four lags of financial development for regulatory quality and control of corruption and the model with three lags of financial development for political stability and government effectiveness. We ended up eliminating all lags of financial development in the models for rule of law and voice and accountability. These results are displayed in table A.27. In addition, the first lag of openness becomes significant after the inclusion of the financial development variables in the regression for regulatory quality. Thus, we present the model for regulatory quality including the first lag of openness.

Table A.27 provides evidence that an increase in central bank discount rates will have more adverse effects on output under weaker institutional environments than under stronger institutional environments for rule of law and government effectiveness, supporting hypothesis 2 of this dissertation. The total effect of the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\phi_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$, is negative and significant at the 5% level and the total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates, $\left(\sum_{j=1}^{J}\Theta_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$, is positive and significant at the 5% level for these mentioned indicators[45]. There is no evidence to support hypothesis 3 of this dissertation because $\left(\sum_{j=1}^{J}\lambda_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\psi_j\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ are not significant at the 5% level for any of the indicators. Table A.28, which presents the estimated total effect of a permanent one percent

[45]Hypothesis 2 keeps holding for rule of law after the inclusion of one insignificant lag of financial development. In this case, the total effect of the positive growth rates in interest rates is -0.033902 with a corresponding p-value of 0.002 and the total effect of the coefficients associated with the interaction term between institutional development and the positive growth rates in interest rates is 0.028011 with a corresponding p-value of 0.037.

increase/decrease in discount rates at specific levels of institutional development after controlling for openness and financial development, demonstrates that a contractionary monetary policy has a negative and significant effect on output for countries with relatively weak institutional development and an effect that is not different than zero for countries with relatively strong institutional development. As displayed in table A.27, these differences are significantly explained by the level of institutional development, especially by the levels of rule of law and government effectiveness.

One more time we confirm the importance of openness for the effectiveness of money expansions. From table A.27, we derive that the total effect of the interaction between openness and the negative growth rates in interest rates (given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$) is positive and significant at the 5% level for regulatory quality, control of corruption, rule of law, voice and accountability and government effectiveness[46]. This means that the effectiveness of money expansions diminishes with the level of openness, which is in accordance with the accepted economic theory. The financial development variables and their interaction terms with interest rates are jointly significant in the regressions for regulatory quality, control of corruption and government effectiveness. However, the total effect of the interaction between financial development and the negative/positive growth rates in interest rates (given by the sum of the coefficients associated with these interaction terms divided by $\left(1-\sum_{j=1}^{J}\gamma_j\right)$) is not significant at the 5% level for any of the indicators.

[46]The total effect of the interaction between openness and the negative growth rates in interest rates was estimated to be 0.0100076 for regulatory quality, 0.0099343 for control of corruption, 0.0038849 for rule of law, 0.0065291 for voice and accountability and 0.0102255 for government effectiveness. The total effect of the interaction between openness and the positive growth rates in interest rates is not significant at the 5% level in any of the regressions.

10.2 Discussion of the Empirical Results

This section offered an alternative approach to deal with the endogeneity of discount rates; an approach that is no longer limited to the exclusion of current values of discount rate growth from the set of explanatory variables. On one hand, in comparison with the previous section, the two-step approach developed in this section has the advantage of being a potential solution to the issue of reverse causality that affects one of our main explanatory variables, the discount rates. On the other hand, despite being a common methodology in studies of monetary effectiveness, the solution for the endogeneity problem provided by the two-step approach has its own drawbacks. It seems that it is technically impossible to extract only the effect of real GDP growth from the discount rate growth series, what would be desirable since the objective is to solve the endogeneity of discount rates with respect to real GDP growth. If we include only past values of real GDP growth in the discount rate growth equation, the coefficients estimated will be biased in the case that important variables are omitted. As a consequence, the shocks extracted from the first step probably will not represent exactly the exogenous part, with respect to the real GDP growth, of the discount rate growth series. If we include past values of real GDP growth and other relevant variables in the discount rate growth equation, as we did through the inclusion of inflation rates, the shocks will exclude the effect of real GDP on discount rates, as desired, but they will also exclude the effect that other relevant variables have on the discount rate growth series, what is not exactly fine with our objectives and may lead to misleading conclusions. As a consequence, the two-step approach presented in this section should not be evaluated as better or worse than the methodology developed in the previous section, since both of them have advantages and drawbacks. The models

presented in this section should be seen as an alternative to the models described in the previous section, providing additional and important checks.

The tests in this section provided strong evidence in favor of hypothesis 2 (contractionary policies reduce the output more in countries with low institutional development than in countries with high institutional development) and no evidence in favor of hypothesis 3 (expansionary policies stimulate the output more in countries with high institutional development than in countries with low institutional development). Hypothesis 2 holds mainly for rule of law and government effectiveness. The evidence in favor of hypothesis 2 holds for these two indicators under all specifications and for all checks developed in this section. Hypothesis 2 also holds for these two indicators in all tests presented in the previous section, adding to the robustness of our findings.

It is important to note the strong association between the theory developed in the section 5 of this dissertation and our empirical results. Section 5 states that, after an increase in interest rates, adverse selection and moral hazard problems in credit markets would increase more in countries with low institutional development than in countries with high institutional development due to the relatively weak contract enforcement found in the first set of countries. As a consequence, banks would restrict the supply of credit or increase interest rates more in countries with low institutional development than in countries with high institutional development, exacerbating the negative effects of contractionary policies in countries with relatively weak institutions. In addition, borrowers in countries with low institutional development would have fewer substitutes for the banking loans due to the reduced development of capital markets, being more affected by the increase in interest rates than investors in countries with high institutional

development. We argue that the poor contract enforcement, the weak protection of property rights, the reduced quality of the legal system and the overall low institutional development are the deepest explanations for the reduced development of capital markets.

The strong evidence stating that the effectiveness of contractionary policies depends on the level of rule of law is completely in accordance with the theory presented in this dissertation. In the words of Kaufmann et al. (2010), the rule of law indicator reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The detailed description of the rule of law indicator makes even clearer the consistency between the theoretical hypothesis 2 and our empirical results.

According to Kaufmann et al. (2010), the government effectiveness indicator reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The government effectiveness indicator seems to be a much broader measure of institutional development than the rule of law indicator. However, the indicator evaluates, among other things, the quality of policy formulation and implementation, which is a feature that can be easily related to our developed theory. In sum, the strong evidence supporting that the effectiveness of contractionary policies depends on the level of government effectiveness seems to be also consistent with the theory presented in this dissertation.

Finally, there is also consistency between the case study presented for the Brazilian economy and our empirical results. The case study emphasizes the role played by the

judicial system on the effects of monetary policies. There is evidence that the high spreads and the reduced credit supply in Brazil are explained by the bad quality of contractual guarantees and the high costs and slowness of credit recovery through judicial means. The weak contract enforcement in the country works as a factor that intensifies adverse selection and moral hazard problems in credit markets, reducing the volume of credit and increasing its cost. Thus, the additional evidence that lending rate increases overshoot the increases in policy rates in Brazil may, at least partially, be explained by the weak rule of law found in the country. The weak rule of law would work as a factor that exacerbates the effect of an increase in policy rates on lending rates, intensifying the adverse effects of money contractions on output. In our sample period, which goes from 2002 to 2011, Brazil scores on average -0.30 in the rule of law indicator. The average score of the countries in our sample is 0.79, placing Brazil below the average. Thus, the empirical relevance of the rule of law indicator is also consistent with the Brazilian case study and in accordance with our expectations.

11 Conclusions

As elucidated by North (1990), the incentives and constraints imposed by the set of institutions shape human interaction, changing the costs of transformation and exchange and determining the economic performance. This dissertation states that the behavior of banks and investors varies according to the rules of the game and demonstrates that the level of institutional development may have an important role on the outcomes of monetary policies.

This research presents a framework to explain how the traditional channels of monetary policy transmission are altered by the level of institutional development, allowing the construction of three hypotheses. The first hypothesis is that institutional development matters for the effects of monetary policies on output. The second hypothesis is that increases in central bank discount rates have more adverse effects on output in countries with low institutional development than in countries with high institutional development. The third hypothesis is that decreases in central bank discount rates are more effective in terms of output promotion in countries with high institutional development than in countries with low institutional development. To the best of our knowledge, this is the first time that a research establishes a relationship between the level of institutional development and the asymmetric effects of monetary policies on output.

This research provides empirical evidence that the effects of monetary policies on real output are dependent upon institutional development. There is strong support in favor of hypothesis 1 and 2, overall sustaining the argument that the asymmetric effects of monetary policies on output may have deep institutional causes and indicating that these asymmetries increase with the worsening of the institutional environment.

The results presented in this dissertation indicate that government effectiveness and rule of law are the most relevant aspects of the institutional development for the effectiveness of monetary policies. Government effectiveness is a broad indicator, which measures, among other things, the overall quality of policy formulation. Especial consideration should be given to the rule of law indicator because of its clear connection with the theoretical arguments and with the country examples. In addition, rule of law is a specific indicator, which evaluates, among other things, the quality of contract enforcement, property rights and the courts. The specificity of this indicator offers clear policy recommendations, suggesting that fundamental institutional improvements should be focused on the efficiency of the judiciary system and the quality of law enforcement.

On the theoretical side, we recognize that the framework presented in this dissertation is not complete. Future research should add other mechanisms through which institutional development may affect the outcomes of monetary policies, building a really comprehensive theory.

On the empirical side, institutions explain better the effectiveness of contractionary policies than the effectiveness of expansionary policies. Future research could use alternative econometric models or specifications in order to search for support for the hypothesis 3 of this dissertation. However, it is important to mention that, in general, the empirical literature finds that monetary expansions do not have a statistically significant effect on output. This occurrence may be due to the fact that money expansions tend to have a smaller effect on output than money contractions, making the statistical detection of the impact of money expansions a difficult task.

Finally, the endogeneity of institutional development with respect to output growth

could be pointed out as a drawback of this investigation. Future research could solve this issue, even though, the current associated literature tolerates this potential weakness simply by taking institutions as a given or relying on the argument that the issue should be minimized by the fact that institutions do not vary a lot neither over time nor across countries.

Appendix A - Tables

Table A.1 Worldwide Governance Indicators - World Bank

Name of the Indicator	Definition
Voice and Accountability	Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
Political Stability and Absence of Violence/Terrorism	Reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
Government Effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Regulatory Quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of Law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Source: Kaufmann et al. (2010)

Table A.2 Countries and Institutional Development Indicators

Country	Rule of Law	Voice and Account-ability	Political Stability	Government Effective-ness	Regulatory Quality	Control of Corruption
Russia	-0.88	-0.79	-0.98	-0.40	-0.30	-0.93
Bolivia	-0.84	-0.05	-0.69	-0.51	-0.60	-0.61
Ukraine	-0.82	-0.21	-0.20	-0.68	-0.51	-0.87
Indonesia	-0.73	-0.18	-1.32	-0.32	-0.45	-0.80
Peru	-0.66	0.02	-0.94	-0.40	0.26	-0.25
Colombia	-0.54	-0.27	-1.85	-0.06	0.13	-0.22
Philippines	-0.50	-0.02	-1.48	-0.06	-0.15	-0.69
Macedonia	-0.40	0.03	-0.69	-0.19	0.06	-0.35
Brazil	-0.30	0.47	-0.08	0.00	0.11	-0.01
Bulgaria	-0.13	0.54	0.28	0.07	0.62	-0.13
Egypt	-0.09	-1.11	-0.73	-0.41	-0.35	-0.55
Thailand	-0.02	-0.27	-0.82	0.28	0.25	-0.29
Croatia	0.05	0.49	0.55	0.51	0.48	0.08
Turkey	0.07	-0.14	-0.84	0.21	0.24	-0.07
South Africa	0.09	0.61	-0.07	0.54	0.57	0.28
Italy	0.45	1.03	0.49	0.54	0.93	0.23
Slovak Republic	0.49	0.92	0.88	0.82	1.07	0.29
Costa Rica	0.49	0.97	0.66	0.25	0.47	0.51

Countries and Institutional Development Indicators - Continued

Malaysia	0.52	-0.45	0.25	1.11	0.53	0.19
Poland	0.53	0.94	0.65	0.53	0.83	0.32
Lithuania	0.60	0.87	0.75	0.69	1.03	0.18
Botswana	0.62	0.54	0.95	0.59	0.58	0.96
Latvia	0.65	0.78	0.60	0.62	0.97	0.17
Greece	0.74	0.97	0.33	0.66	0.83	0.22
Hungary	0.85	1.03	0.85	0.82	1.15	0.49
Czech Republic	0.87	0.97	0.93	0.97	1.17	0.35
Israel	0.90	0.63	-1.42	1.22	1.06	0.88
Republic of Korea	0.92	0.67	0.27	1.07	0.82	0.45
Slovenia	0.96	1.05	1.02	1.02	0.80	0.93
Cyprus	1.05	1.05	0.43	1.35	1.29	1.07
Portugal	1.11	1.27	0.95	1.04	1.06	1.07
Spain	1.15	1.17	0.04	1.23	1.23	1.16
Japan	1.27	1.00	0.96	1.35	1.03	1.27
Belgium	1.32	1.40	0.83	1.71	1.31	1.39
France	1.42	1.27	0.52	1.58	1.21	1.39
Malta	1.48	1.21	1.28	1.07	1.19	0.94
China, Hong Kong	1.53	0.46	1.02	1.73	1.90	1.88
United States	1.56	1.19	0.23	1.56	1.54	1.50

Countries and Institutional Development Indicators - Continued

Germany	1.65	1.37	0.86	1.57	1.53	1.80
Ireland	1.67	1.38	1.17	1.53	1.72	1.59
United Kingdom	1.68	1.36	0.37	1.69	1.72	1.78
Canada	1.74	1.47	0.99	1.89	1.61	1.99
Netherlands	1.76	1.56	0.98	1.86	1.77	2.12
Australia	1.77	1.43	0.90	1.80	1.66	2.01
Switzerland	1.84	1.56	1.26	1.98	1.63	2.09
Iceland	1.85	1.51	1.35	1.85	1.37	2.21
New Zealand	1.86	1.55	1.21	1.79	1.74	2.36
Austria	1.86	1.38	1.16	1.83	1.57	1.92
Sweden	1.89	1.56	1.24	1.99	1.64	2.22
Norway	1.92	1.58	1.27	1.89	1.37	2.05
Denmark	1.93	1.62	1.11	2.22	1.83	2.45
Finland	1.95	1.57	1.51	2.16	1.74	2.39

Table A.3 Variables: Definitions and Sources

Variable	Definitions	Sources
Seasonally adjusted real GDP growth (*gy*)	First difference of the log of real GDP (nominal GDP divided by its deflator index) multiplied by 100. Seasonally adjusted series are used if available at IFS-IMF dataset. For countries with only non-seasonally adjusted series available, the real GDP growth was seasonally adjusted running the X-13ARIMA-SEATS seasonal adjustment program with Win X-13, a software downloaded from United States Census Bureau website.	International Financial Statistics (IFS) of the International Monetary Fund. Gross Domestic Product (national currency): lines 99B..ZF, 99B.CZF, 99B..ZW and 99B.CZW. GDP Deflator (index number): lines 99BIPZF and 99BIRZF.
Growth rate of central bank discount rate (*gdisc*)	First difference of the log of central bank discount rate multiplied by 100	International Financial Statistics (IFS) of the International Monetary Fund. End of period central bank discount rate (percent per annum): line 60...ZF

Variables: Definitions and Sources - Continued

Institutional development (*inst*)	Voice and accountability (*voice*); political stability and absence of violence/terrorism (*pol*); government effectiveness (*gov*); regulatory quality (*reg*); rule of law (*law*) and control of corruption (*cor*). See table A.1 for a detailed description.	Worldwide Governance Indicators of the World Bank
Openness (*open*)	Sum of imports and exports as a fraction of GDP	International Financial Statistics (IFS) of the International Monetary Fund. Exports of goods and services (national currency): lines 90C..ZF, 90C..ZW, 90C.CZF and 90C.CZW. Imports of goods and services (national currency): lines 98C..ZF, 98C..ZW, 98C.CZF and 98C.CZW. Gross Domestic Product (national currency): lines 99B..ZF, 99B.CZF, 99B..ZW and 99B.CZW.
Financial development (*fd*)	Number of publicly listed companies per capita (10K).	Financial Structure Dataset of the World Bank
Inflation rate (*infl*)	First difference of the log of consumer prices multiplied by 100	International Financial Statistics (IFS) of the International Monetary Fund. Consumer prices (index number): line 64..ZF

Table A.4 Summary Statistics

Variable		Mean	Std. Dev.	Min.	Max.	Observations
gy	overall	0.7133773	1.721495	-13.70777	14.34498	N = 2057
	between		0.3935956	-0.0027007	1.53357	n = 52
	within		1.676704	-14.02253	13.88359	T-bar = 39.5577
disc	overall	5.825964	6.005052	.1	60	N = 2059
	between		5.384658	.29375	29.675	n = 52
	within		2.719403	-9.849036	36.15096	T-bar = 39.5962
gdisc	overall	-2.118901	17.08174	-194.591	138.6294	N = 2056
	between		1.851234	-7.627487	2.746531	n = 52
	within		16.98281	-192.0304	133.764	T-bar = 39.5385
$gdisc^{+}$	overall	2.830423	7.692708	0	138.6294	N = 2056
	between		1.832518	0.5087674	8.958798	n = 52
	within		7.473059	-6.128375	136.4226	T-bar = 39.5385
$gdisc^{-}$	overall	-4.949324	14.30304	-194.591	0	N = 2056
	between		2.394985	-12.1423	-1.257379	n = 52
	within		14.10429	-192.3777	7.19298	T-bar = 39.5385
$infl$	overall	.9441286	1.232014	-3.505993	10.19058	N = 2080
	between		.6602746	-.0454557	2.840966	n = 52
	within		1.044066	-4.438955	8.948063	T = 40
reg	overall	0.909343	0.6943166	-0.9810643	1.997333	N = 2080
	between		0.6900828	-0.5987369	1.904597	n = 52
	within		0.1216333	0.3613317	1.457831	T = 40
law	overall	0.7916931	0.8878175	-1.141194	2.001923	N = 2080
	between		0.8907391	-0.8818133	1.945267	n = 52
	within		0.0984247	0.4187481	1.195257	T = 40
voice	overall	0.7885088	0.6945141	-1.21094	1.826408	N = 2080
	between		0.6932615	-1.110253	1.619776	n = 52
	within		0.1037022	0.3579492	1.40835	T = 40
pol	overall	0.3652498	0.8745086	-2.378574	1.665204	N = 2080
	between		0.8602766	-1.847313	1.513949	n = 52
	within		0.1963992	-0.4421261	1.62662	T = 40
gov	overall	0.9259247	0.8197556	-0.8272157	2.344899	N = 2080
	between		0.8178974	-0.6754873	2.21921	n = 52
	within		0.1248681	0.5705643	1.597796	T = 40
cor	overall	0.7961205	1.00268	-1.133944	2.55743	N = 2080
	between		1.001948	-0.9300395	2.448949	n = 52
	within		0.1424715	0.1588729	1.30748	T = 40
open	overall	0.940674	0.5837193	0.1993954	4.751972	N = 2064
	between		0.5749247	0.256585	3.874996	n = 52
	within		0.1207371	-0.3250407	1.81765	T-bar = 39.6923

Summary Statistics - Continued

fd	overall	0.3018376	0.3620997	0.013489	1.98245	N = 1872
	between		0.3509993	0.015796	1.609068	n = 52
	within		0.1010957	-0.3871238	1.375229	T = 36

gy: seasonally adjusted real GDP growth; *disc*: central bank discount rate; *gdisc*: growth rate of central bank discount rate; $gdisc^{+}$: positive growth rates in central bank discount rates; $gdisc^{-}$: negative growth rates in central bank discount rates; $infl$: inflation rate; *reg*: regulatory quality; *law*: rule of law; *voice*: voice and accountability; *pol*: political stability; *gov*: government effectiveness; *cor*: control of corruption; *open*: openness and fd: financial development.

Table A.5 Choosing the Number of Lags - Evaluation of Hypothesis 1

Lags	AIC=-2lnL+2k	N=Number of Observations	AICn=(-2lnL+2k)/N	Model Selection
		regulatory quality		
1	7479.663	1981	3.775701	
2	7245.375	1928	3.757975	
3	6968.874	1875	3.716733	
4	6732.372	1822	3.695045	2
5	6534.159	1769	3.693702	1
6	6365.429	1716	3.709457	
7	6189.209	1663	3.721713	
8	5959.333	1610	3.701449	3
		control of corruption		
1	7487.027	1981	3.779418	
2	7251.44	1928	3.761120	
3	6976.126	1875	3.720601	
4	6740.241	1822	3.699364	3
5	6538.378	1769	3.696087	2
6	6364.053	1716	3.708656	
7	6184.332	1663	3.718781	
8	5950.081	1610	3.695702	1
		political stability		
1	7477.869	1981	3.774795	
2	7248.001	1928	3.759337	
3	6971.432	1875	3.718097	
4	6731.72	1822	3.694687	2
5	6526.99	1769	3.689650	3
6	6357.116	1716	3.704613	
7	6174.062	1663	3.712605	
8	5936.669	1610	3.687372	1
		rule of law		
1	7484.243	1981	3.778013	
2	7251.256	1928	3.761025	
3	6974.679	1875	3.719829	
4	6739.687	1822	3.699060	2
5	6541.408	1769	3.697800	1
6	6373.75	1716	3.714307	
7	6197.993	1663	3.726995	
8	5966.517	1610	3.705911	3
		voice and accountability		
1	7485.667	1981	3.778731	
2	7245.76	1928	3.758174	
3	6969.53	1875	3.717083	
4	6733.723	1822	3.695786	2
5	6535.503	1769	3.694462	1
6	6368.77	1716	3.711404	
7	6191.01	1663	3.722796	
8	5959.762	1610	3.701716	3
		government effectiveness		
1	7484.425	1981	3.778104	
2	7250.167	1928	3.760460	
3	6974.891	1875	3.719942	
4	6740.022	1822	3.699244	2

Choosing the Number of Lags - Evaluation of Hypothesis 1 - Continued

5	6542.047	1769	3.698161	1
6	6372.108	1716	3.713350	
7	6194.066	1663	3.724634	
8	5963.142	1610	3.703815	3

The AIC criterion is not appropriate because the models do not have the same number of observations. The AICn criterion is appropriate for our case because it penalizes the loss of observations due to the inclusion of additional lags.

Table A.6 Choosing the Number of Lags - Evaluation of Hypotheses 2 and 3 - I

Lags	AIC=-2lnL+2k	N=Number of Observations	AICn=(-2lnL+2k)/N	Model Selection
		regulatory quality		
1	7474.801	1981	3.773246	
2	7234.249	1928	3.752204	
3	6962.553	1875	3.713362	
4	6726.205	1822	3.691660	2
5	6527.861	1769	3.690142	1
6	6362.28	1716	3.707622	
7	6183.353	1663	3.718192	
8	5954.521	1610	3.698460	3
		control of corruption		
1	7481.52	1981	3.776638	
2	7241.54	1928	3.755985	
3	6971.295	1875	3.718024	
4	6737.209	1822	3.697700	3
5	6533.684	1769	3.693434	1
6	6362.132	1716	3.707536	
7	6181.672	1663	3.717181	
8	5950.291	1610	3.695833	2
		political stability		
1	7471.426	1981	3.771543	
2	7239.839	1928	3.755103	
3	6967.805	1875	3.716163	
4	6731.165	1822	3.694383	3
5	6525.491	1769	3.688802	2
6	6358.335	1716	3.705323	
7	6171.035	1663	3.710785	
8	5934.804	1610	3.686214	1
		rule of law		
1	7479.024	1981	3.775378	
2	7240.019	1928	3.755197	
3	6967.816	1875	3.716169	
4	6734.465	1822	3.696194	2
5	6535.664	1769	3.694553	1
6	6371.2	1716	3.712821	
7	6194.239	1663	3.724738	
8	5963.144	1610	3.703816	3
		voice and accountability		
1	7479.631	1981	3.775685	
2	7238.391	1928	3.754352	
3	6967.849	1875	3.716186	
4	6733.677	1822	3.695761	2
5	6534.375	1769	3.693824	1
6	6370.502	1716	3.712414	
7	6190.202	1663	3.722310	
8	5959.583	1610	3.701604	3
		government effectiveness		
1	7478.346	1981	3.775036	
2	7238.158	1928	3.754231	

Choosing the Number of Lags - Evaluation of Hypotheses 2 and 3 - I - Continued

3	6967.083	1875	3.715778	
4	6733.698	1822	3.695773	2
5	6534.675	1769	3.693994	1
6	6367.919	1716	3.710909	
7	6189.508	1663	3.721893	
8	5961.185	1610	3.702599	3

The AIC criterion is not appropriate because the models do not have the same number of observations. The AICn criterion is appropriate for our case because it penalizes the loss of observations due to the inclusion of additional lags.

Table A.7 Prais-Winsten Regressions - 5 Lags - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
*gy*1	0.112	0.119	0.119	0.115	0.113	0.119
	(0.0752)	(0.0751)	(0.0739)	(0.0756)	(0.0758)	(0.0754)
*gy*2	0.0554	0.0636	0.0602	0.0556	0.0552	0.0602
	(0.0715)	(0.0715)	(0.0707)	(0.0721)	(0.0723)	(0.0718)
*gy*3	-0.0455	-0.0429	-0.0477	-0.0468	-0.0491	-0.0434
	(0.0682)	(0.0684)	(0.0673)	(0.0687)	(0.0691)	(0.0685)
*gy*4	-0.0210	-0.0214	-0.0278	-0.0215	-0.0279	-0.0183
	(0.0680)	(0.0684)	(0.0673)	(0.0687)	(0.0692)	(0.0684)
*gy*5	0.123+	0.126+	0.123+	0.119+	0.119+	0.123+
	(0.0645)	(0.0647)	(0.0642)	(0.0650)	(0.0653)	(0.0648)
*gdisc*1+	-0.0102	-0.00337	-0.00172	-0.00533	-0.00743	-0.00870
	(0.0107)	(0.00821)	(0.00637)	(0.00835)	(0.0104)	(0.0100)
*gdisc*2+	-0.0234*	-0.0175*	-0.00577	-0.0161*	-0.0182+	-0.0211*
	(0.0105)	(0.00803)	(0.00648)	(0.00804)	(0.0100)	(0.00969)
*gdisc*3+	-0.00887	-0.00606	-0.00533	-0.00794	-0.00234	-0.00933
	(0.0106)	(0.00819)	(0.00639)	(0.00806)	(0.0103)	(0.00968)
*gdisc*4+	-0.0101	-0.00132	0.00432	-0.00333	-0.00184	-0.00536
	(0.0110)	(0.00814)	(0.00614)	(0.00816)	(0.0105)	(0.00977)
*gdisc*5+	-0.0152	-0.00952	-0.00502	-0.00996	-0.0133	-0.0113
	(0.0109)	(0.00816)	(0.00591)	(0.00826)	(0.0104)	(0.00983)
*inst*1 ∗ *gdisc*1+	0.00917	0.00257	0.00237	0.00475	0.00748	0.00652
	(0.00745)	(0.00466)	(0.00571)	(0.00530)	(0.00859)	(0.00603)
*inst*2 ∗ *gdisc*2+	0.0219*	0.0161*	0.0103+	0.0164*	0.0213*	0.0182*
	(0.00727)	(0.00459)	(0.00569)	(0.00514)	(0.00836)	(0.00587)
*inst*3 ∗ *gdisc*3+	0.00275	0.000532	-0.00297	0.00236	-0.00258	0.00318
	(0.00751)	(0.00461)	(0.00555)	(0.00513)	(0.00852)	(0.00584)
*inst*4 ∗ *gdisc*4+	0.0123	0.00418	-0.00148	0.00647	0.00660	0.00749
	(0.00876)	(0.00514)	(0.00564)	(0.00578)	(0.00979)	(0.00640)
*inst*5 ∗ *gdisc*5+	0.0141+	0.00932+	0.00865	0.0102+	0.0159+	0.0103
	(0.00853)	(0.00507)	(0.00543)	(0.00578)	(0.00966)	(0.00635)
*gdisc*1−	-0.00692	0.00246	0.00471	0.00116	0.00207	-0.00132
	(0.00589)	(0.00451)	(0.00305)	(0.00458)	(0.00530)	(0.00526)
*gdisc*2−	-0.00831	-0.00784+	-0.00469	-0.00718	-0.0130*	-0.00686
	(0.00610)	(0.00473)	(0.00304)	(0.00479)	(0.00543)	(0.00553)
*gdisc*3−	-0.00611	-0.00487	-0.00630*	-0.00534	-0.00322	-0.00548

Prais-Winsten Regressions - 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.00595)	(0.00457)	(0.00302)	(0.00465)	(0.00524)	(0.00540)
$gdisc4-$	0.000950	0.00131	-0.00203	0.00176	-0.000219	0.00206
	(0.00593)	(0.00454)	(0.00305)	(0.00463)	(0.00519)	(0.00535)
$gdisc5-$	-0.00595	-0.00695	-0.00761*	-0.00721	-0.00898+	-0.00615
	(0.00603)	(0.00478)	(0.00335)	(0.00477)	(0.00540)	(0.00545)
$inst1*gdisc1-$	0.0135*	0.00634*	0.0110*	0.00789*	0.00913*	0.00887*
	(0.00409)	(0.00254)	(0.00299)	(0.00292)	(0.00403)	(0.00330)
$inst2*gdisc2-$	-0.000389	-0.000657	-0.00601+	-0.00124	0.00438	-0.00151
	(0.00421)	(0.00269)	(0.00331)	(0.00306)	(0.00422)	(0.00346)
$inst3*gdisc3-$	0.00218	0.00102	0.00371	0.00164	0.000203	0.00143
	(0.00414)	(0.00267)	(0.00329)	(0.00299)	(0.00414)	(0.00341)
$inst4*gdisc4-$	-0.00392	-0.00393	-0.00269	-0.00419	-0.00330	-0.00440
	(0.00413)	(0.00265)	(0.00333)	(0.00297)	(0.00413)	(0.00339)
$inst5*gdisc5-$	-0.00101	-0.0000185	0.00167	0.000302	0.00234	-0.000650
	(0.00398)	(0.00262)	(0.00313)	(0.00288)	(0.00406)	(0.00330)
$inst1$	-0.453	-0.621	0.631	-0.557	-1.002	-0.181
	(0.771)	(0.916)	(0.567)	(0.927)	(1.078)	(0.584)
$inst2$	1.390	-0.0722	-0.612	1.597	1.507	0.545
	(0.983)	(1.155)	(0.713)	(1.225)	(1.351)	(0.706)
$inst3$	-0.382	0.401	0.266	-1.563	-0.990	0.0471
	(0.986)	(1.173)	(0.716)	(1.254)	(1.365)	(0.722)
$inst4$	0.0571	1.144	0.733	0.386	0.425	-0.505
	(1.007)	(1.188)	(0.733)	(1.283)	(1.358)	(0.731)
$inst5$	-0.989	-1.111	-1.212*	-0.179	-0.311	-0.227
	(0.800)	(0.963)	(0.571)	(0.981)	(1.080)	(0.609)
$trend$	-0.0247+	-0.0245+	-0.0261*	-0.0245+	-0.0258*	-0.0245+
	(0.0126)	(0.0126)	(0.0129)	(0.0126)	(0.0128)	(0.0126)
$Constant$	1.408*	1.279*	1.188*	1.329*	1.382*	1.363*
	(0.374)	(0.363)	(0.340)	(0.368)	(0.375)	(0.374)
$\sum_{j=1}^{J}\phi_j$	-0.0677	-0.0378	-0.0135	-0.0426	-0.0431	-0.0557
	[0.000609]	[0.0105]	[0.199]	[0.00436]	[0.0110]	[0.00230]
$\sum_{j=1}^{J}\Theta_j$	0.0602	0.0327	0.0168	0.0402	0.0487	0.0457
	[0.0000597]	[0.000608]	[0.0643]	[0.000277]	[0.00333]	[0.000146]
$\sum_{j=1}^{J}\lambda_j$	-0.0263	-0.0159	-0.0159	-0.0168	-0.0233	-0.0178
	[0.0199]	[0.0443]	[0.0139]	[0.0477]	[0.0194]	[0.0635]
$\sum_{j=1}^{J}\psi_j$	0.0104	0.00276	0.00772	0.00440	0.0128	0.00373
	[0.177]	[0.557]	[0.0726]	[0.408]	[0.114]	[0.546]
$\sum_{j=1}^{J}\gamma_j$	0.225	0.244	0.227	0.221	0.211	0.240
	[0.144]	[0.117]	[0.135]	[0.160]	[0.191]	[0.120]

Prais-Winsten Regressions - 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

$\frac{(\sum_{j=1}^{J}\phi_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	-0.0873	-0.0500	-0.0175	-0.0548	-0.0546	-0.0733
	[0.003]	[0.024]	[0.213]	[0.013]	[0.024]	[0.009]
$\frac{(\sum_{j=1}^{J}\Theta_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0776	0.0433	0.0218	0.0516	0.0617	0.0601
	[0.001]	[0.004]	[0.077]	[0.002]	[0.010]	[0.002]
$\frac{(\sum_{j=1}^{J}\lambda_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	-0.0340	-0.0210	-0.0206	-0.0216	-0.0295	-0.0234
	[0.027]	[0.057]	[0.030]	[0.063]	[0.018]	[0.077]
$\frac{(\sum_{j=1}^{J}\psi_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0134	0.00365	0.00998	0.00565	0.0162	0.00491
	[0.171]	[0.551]	[0.071]	[0.403]	[0.080]	[0.542]
N	1769	1769	1769	1769	1769	1769
R^2	0.145	0.140	0.143	0.140	0.139	0.140

Results estimated for equation 2. The number after each variable name represents the lag j specified in equation 2. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtpcse$, $pairwise\ corr(psar1)$ was used to estimate Prais-Winsten regressions with correlated panels corrected standard errors (PCSEs)

Table A.8 Estimated Total Effect for Specific Values of Institutional Development - Prais-Winsten Regressions with 5 Lags - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0610*			
			(0.0294)			
-1.5			-0.0501*			
			(0.0242)			
-1	-0.165*	-0.0933*	-0.0393*	-0.106*	-0.116*	-0.133*
	(0.0513)	(0.0350)	(0.0195)	(0.0369)	(0.0461)	(0.0462)
-0.5	-0.126*	-0.0717*	-0.0284+	-0.0806*	-0.0854*	-0.103*
	(0.0403)	(0.0283)	(0.0158)	(0.0292)	(0.0348)	(0.0370)
0	-0.0873*	-0.0500*	-0.0175	-0.0548*	-0.0546*	-0.0733*
	(0.0296)	(0.0221)	(0.0141)	(0.0220)	(0.0241)	(0.0282)
0.5	-0.0485*	-0.0284+	-0.00661	-0.0290+	-0.0237	-0.0433*
	(0.0200)	(0.0170)	(0.0148)	(0.0160)	(0.0155)	(0.0202)
1	-0.00966	-0.00673	0.00428	-0.00317	0.00710	-0.0132
	(0.0135)	(0.0141)	(0.0178)	(0.0131)	(0.0134)	(0.0144)
1.5	0.0292+	0.0149	0.0152	0.0226	0.0379+	0.0169
	(0.0152)	(0.0148)	(0.0222)	(0.0151)	(0.0201)	(0.0139)
2	0.0680*	0.0366+		0.0484*	0.0688*	0.0469*
	(0.0233)	(0.0187)		(0.0207)	(0.0303)	(0.0192)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0405*			
			(0.0163)			
-1.5			-0.0355*			
			(0.0141)			
-1	-0.0474*	-0.0247	-0.0306*	-0.0272	-0.0457*	-0.0283
	(0.0240)	(0.0154)	(0.0121)	(0.0168)	(0.0202)	(0.0198)
-0.5	-0.0407*	-0.0229+	-0.0256*	-0.0244+	-0.0376*	-0.0258
	(0.0195)	(0.0130)	(0.0105)	(0.0141)	(0.0161)	(0.0164)
0	-0.0340*	-0.0210+	-0.0206*	-0.0216+	-0.0295*	-0.0234+
	(0.0153)	(0.0111)	(0.00946)	(0.0116)	(0.0125)	(0.0132)
0.5	-0.0273*	-0.0192*	-0.0156+	-0.0188+	-0.0215*	-0.0209*
	(0.0117)	(0.00966)	(0.00914)	(0.00975)	(0.00964)	(0.0107)
1	-0.0206*	-0.0174+	-0.0106	-0.0159+	-0.0134	-0.0185*

Estimated Total Effect for Specific Values of Institutional Development - Prais-Winsten Regressions with 5 Lags - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.00923)	(0.00912)	(0.00963)	(0.00882)	(0.00854)	(0.00924)
1.5	-0.0139	-0.0156	-0.00561	-0.0131	-0.00532	-0.0160+
	(0.00906)	(0.00958)	(0.0108)	(0.00912)	(0.00978)	(0.00946)
2	-0.00714	-0.0137		-0.0103	0.00276	-0.0135
	(0.0113)	(0.0109)		(0.0106)	(0.0127)	(0.0112)
N	1769	1769	1769	1769	1769	1769

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j + \sum_{j=1}^{J}\psi_j inst_{i,t-j}\right) / \left(1 - \sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.7 (equation 2).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.9 Prais-Winsten Regressions - 5 Lags with Openness - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.106	0.116	0.115	0.111	0.109	0.115
	(0.0746)	(0.0742)	(0.0732)	(0.0747)	(0.0745)	(0.0745)
$gy2$	0.0432	0.0538	0.0502	0.0451	0.0469	0.0498
	(0.0706)	(0.0705)	(0.0698)	(0.0710)	(0.0708)	(0.0707)
$gy3$	-0.0464	-0.0404	-0.0461	-0.0452	-0.0452	-0.0414
	(0.0674)	(0.0673)	(0.0665)	(0.0677)	(0.0676)	(0.0675)
$gy4$	-0.0284	-0.0252	-0.0327	-0.0264	-0.0296	-0.0232
	(0.0677)	(0.0677)	(0.0668)	(0.0681)	(0.0679)	(0.0678)
$gy5$	0.124+	0.130*	0.126*	0.123+	0.126+	0.127*
	(0.0646)	(0.0645)	(0.0642)	(0.0649)	(0.0647)	(0.0647)
$gdisc1+$	-0.00639	0.00184	0.00437	-0.000494	-0.00413	-0.00404
	(0.0109)	(0.00945)	(0.00804)	(0.00938)	(0.0104)	(0.0110)
$gdisc2+$	-0.0243*	-0.0217*	-0.00795	-0.0196*	-0.0211*	-0.0260*
	(0.0104)	(0.00910)	(0.00789)	(0.00892)	(0.00990)	(0.0105)
$gdisc3+$	-0.00708	-0.00519	-0.00434	-0.00706	-0.00522	-0.00717
	(0.0107)	(0.00950)	(0.00802)	(0.00912)	(0.0103)	(0.0106)
$gdisc4+$	-0.0167	-0.00893	-0.00410	-0.0122	-0.0120	-0.0148
	(0.0113)	(0.00958)	(0.00758)	(0.00934)	(0.0107)	(0.0110)
$gdisc5+$	-0.00975	-0.00473	0.000559	-0.00464	-0.0119	-0.00564
	(0.0112)	(0.00935)	(0.00746)	(0.00932)	(0.0109)	(0.0109)
$inst1*gdisc1+$	0.0103	0.00258	0.00266	0.00479	0.00733	0.00658
	(0.00746)	(0.00461)	(0.00572)	(0.00526)	(0.00860)	(0.00596)
$inst2*gdisc2+$	0.0228*	0.0167*	0.0111+	0.0173*	0.0215*	0.0194*
	(0.00736)	(0.00458)	(0.00575)	(0.00517)	(0.00851)	(0.00585)
$inst3*gdisc3+$	0.00275	0.000213	-0.00378	0.00215	-0.000699	0.00248
	(0.00758)	(0.00461)	(0.00559)	(0.00518)	(0.00860)	(0.00585)
$inst4*gdisc4+$	0.0138	0.00582	-0.000640	0.00843	0.00885	0.00994
	(0.00865)	(0.00511)	(0.00554)	(0.00574)	(0.00975)	(0.00638)
$inst5*gdisc5+$	0.0142+	0.00863+	0.00869	0.00973+	0.0180+	0.00949
	(0.00851)	(0.00504)	(0.00538)	(0.00577)	(0.00965)	(0.00635)
$gdisc1-$	-0.00858	-0.00173	0.00126	-0.00389	-0.0130*	-0.00481
	(0.00572)	(0.00450)	(0.00307)	(0.00471)	(0.00638)	(0.00526)
$gdisc2-$	-0.00732	-0.00597	-0.00376	-0.00498	-0.00821	-0.00530
	(0.00597)	(0.00480)	(0.00316)	(0.00499)	(0.00676)	(0.00556)

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$gdisc3-$	-0.00600	-0.00508	-0.00671*	-0.00555	-0.00536	-0.00561
	(0.00584)	(0.00470)	(0.00322)	(0.00490)	(0.00671)	(0.00547)
$gdisc4-$	-0.000499	-0.000509	-0.00365	-0.000109	-0.00213	0.000140
	(0.00584)	(0.00469)	(0.00326)	(0.00489)	(0.00663)	(0.00544)
$gdisc5-$	-0.00548	-0.00595	-0.00625+	-0.00599	-0.00880	-0.00521
	(0.00574)	(0.00474)	(0.00345)	(0.00483)	(0.00664)	(0.00533)
$inst1*gdisc1-$	0.0117*	0.00503*	0.00937*	0.00684*	0.0141*	0.00715*
	(0.00418)	(0.00251)	(0.00296)	(0.00286)	(0.00453)	(0.00326)
$inst2*gdisc2-$	0.000662	-0.000245	-0.00559+	-0.00110	0.00209	-0.000977
	(0.00432)	(0.00266)	(0.00331)	(0.00299)	(0.00480)	(0.00341)
$inst3*gdisc3-$	0.00184	0.000371	0.00319	0.000835	0.000235	0.000749
	(0.00420)	(0.00260)	(0.00328)	(0.00289)	(0.00472)	(0.00332)
$inst4*gdisc4-$	-0.00385	-0.00369	-0.00284	-0.00355	-0.00226	-0.00389
	(0.00418)	(0.00259)	(0.00334)	(0.00287)	(0.00471)	(0.00330)
$inst5*gdisc5-$	-0.000817	-0.000273	0.00199	-0.000284	0.00193	-0.000954
	(0.00395)	(0.00248)	(0.00314)	(0.00273)	(0.00456)	(0.00314)
$inst1$	-0.362	-0.546	0.664	-0.536	-0.941	-0.109
	(0.767)	(0.904)	(0.560)	(0.907)	(1.047)	(0.583)
$inst2$	1.227	-0.153	-0.685	1.526	1.535	0.417
	(0.978)	(1.142)	(0.708)	(1.195)	(1.316)	(0.697)
$inst3$	-0.217	0.456	0.337	-1.428	-0.928	0.0761
	(0.982)	(1.159)	(0.716)	(1.225)	(1.324)	(0.712)
$inst4$	-0.0686	0.995	0.621	0.245	0.210	-0.502
	(1.001)	(1.175)	(0.730)	(1.256)	(1.318)	(0.722)
$inst5$	-1.029	-1.033	-1.172*	-0.161	-0.256	-0.242
	(0.799)	(0.952)	(0.568)	(0.963)	(1.043)	(0.606)
$trend$	-0.0263*	-0.0253*	-0.0270*	-0.0255*	-0.0262*	-0.0254*
	(0.0124)	(0.0125)	(0.0127)	(0.0125)	(0.0124)	(0.0124)
$open1$	1.287	1.301	1.184	1.286	1.266	1.225
	(0.839)	(0.847)	(0.844)	(0.843)	(0.843)	(0.850)
$open2$	-1.756*	-1.779*	-1.740*	-1.764*	-1.772*	-1.807*
	(0.883)	(0.890)	(0.878)	(0.890)	(0.881)	(0.895)
$open3$	0.959	0.917	0.815	0.931	0.823	0.949
	(0.853)	(0.857)	(0.843)	(0.857)	(0.848)	(0.863)
$open4$	-1.066	-1.062	-1.005	-1.091	-1.112	-1.064
	(0.857)	(0.858)	(0.851)	(0.859)	(0.850)	(0.865)

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$open5$	0.798	0.752	0.925	0.800	0.902	0.859
	(0.847)	(0.851)	(0.848)	(0.848)	(0.842)	(0.857)
$open1 * gdisc1+$	-0.00578	-0.00634	-0.00737	-0.00571	-0.00350	-0.00552
	(0.00931)	(0.00942)	(0.00960)	(0.00930)	(0.00915)	(0.00930)
$open2 * gdisc2+$	0.00182	0.00582	0.00345	0.00469	0.00483	0.00567
	(0.00952)	(0.00953)	(0.00965)	(0.00944)	(0.00956)	(0.00940)
$open3 * gdisc3+$	-0.00228	-0.000864	-0.000972	-0.00107	0.000503	-0.00187
	(0.0100)	(0.0101)	(0.0102)	(0.0100)	(0.0100)	(0.00998)
$open4 * gdisc4+$	0.00762	0.00833	0.0106	0.00987	0.0110	0.00922
	(0.00986)	(0.0100)	(0.00996)	(0.00988)	(0.00979)	(0.00997)
$open5 * gdisc5+$	-0.00753	-0.00588	-0.00819	-0.00686	-0.00565	-0.00678
	(0.00959)	(0.00980)	(0.00979)	(0.00969)	(0.00958)	(0.00974)
$open1 * gdisc1-$	0.00347+	0.00474*	0.00385+	0.00521*	0.00843*	0.00476*
	(0.00210)	(0.00212)	(0.00213)	(0.00203)	(0.00230)	(0.00207)
$open2 * gdisc2-$	-0.00218	-0.00233	-0.00104	-0.00208	-0.00183	-0.00203
	(0.00230)	(0.00228)	(0.00227)	(0.00221)	(0.00250)	(0.00224)
$open3 * gdisc3-$	0.00119	0.00167	0.00177	0.00181	0.00242	0.00179
	(0.00224)	(0.00223)	(0.00224)	(0.00218)	(0.00249)	(0.00220)
$open4 * gdisc4-$	0.00110	0.00105	0.00148	0.000689	0.000456	0.000942
	(0.00220)	(0.00220)	(0.00221)	(0.00215)	(0.00247)	(0.00216)
$open5 * gdisc5-$	-0.000220	-0.000248	-0.000840	-0.0000916	0.000504	-0.000124
	(0.00209)	(0.00211)	(0.00213)	(0.00204)	(0.00233)	(0.00206)
Constant	1.316*	1.198*	1.069*	1.236*	1.287*	1.276*
	(0.350)	(0.342)	(0.323)	(0.345)	(0.349)	(0.351)
$\sum_{j=1}^{J} \phi_j$	-0.0642	-0.0388	-0.0115	-0.0440	-0.0544	-0.0576
	[0.00189]	[0.0255]	[0.422]	[0.0112]	[0.00516]	[0.00507]
$\sum_{j=1}^{J} \Theta_j$	0.0637	0.0340	0.0180	0.0424	0.0550	0.0479
	[0.0000321]	[0.000468]	[0.0536]	[0.000166]	[0.00116]	[0.0000918]
$\sum_{j=1}^{J} \lambda_j$	-0.0279	-0.0192	-0.0191	-0.0205	-0.0375	-0.0208
	[0.0134]	[0.0232]	[0.00768]	[0.0241]	[0.00304]	[0.0364]
$\sum_{j=1}^{J} \psi_j$	0.00949	0.00119	0.00611	0.00275	0.0161	0.00207
	[0.222]	[0.794]	[0.155]	[0.596]	[0.0673]	[0.729]
$\sum_{j=1}^{J} \gamma_j$	0.199	0.235	0.212	0.207	0.207	0.227
	[0.202]	[0.131]	[0.165]	[0.190]	[0.191]	[0.143]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0802	-0.0506	-0.0146	-0.0555	-0.0686	-0.0744
	[0.004]	[0.034]	[0.418]	[0.017]	[0.010]	[0.011]
$\frac{\left(\sum_{j=1}^{J} \Theta_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.0795	0.0444	0.0229	0.0534	0.0694	0.0620
	[0.000]	[0.003]	[0.066]	[0.001]	[0.005]	[0.001]

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$\frac{(\sum_{j=1}^{J}\lambda_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	-0.0348	-0.0251	-0.0243	-0.0259	-0.0472	-0.0269
	[0.017]	[0.033]	[0.020]	[0.035]	[0.003]	[0.045]
$\frac{(\sum_{j=1}^{J}\psi_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0118	0.00156	0.00776	0.00346	0.0203	0.00268
	[0.208]	[0.791]	[0.148]	[0.591]	[0.044]	[0.726]
N	1769	1769	1769	1769	1769	1769
R^2	0.159	0.152	0.156	0.154	0.156	0.153

Results estimated for equation 2. The number after each variable name represents the lag j specified in equation 2. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command *xtpcse*, *pairwise corr*$(psar1)$ was used to estimate Prais-Winsten regressions with correlated panels corrected standard errors (PCSEs)

Table A.10 Estimated Total Effect for Specific Values of Institutional Development - Prais-Winsten Regressions with 5 Lags and Openness - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0603*			
			(0.0285)			
-1.5			-0.0488*			
			(0.0240)			
-1	-0.160*	-0.0951*	-0.0374+	-0.109*	-0.138*	-0.136*
	(0.0479)	(0.0350)	(0.0203)	(0.0368)	(0.0479)	(0.0459)
-0.5	-0.120*	-0.0728*	-0.0260	-0.0823*	-0.103*	-0.105*
	(0.0376)	(0.0290)	(0.0182)	(0.0296)	(0.0367)	(0.0372)
0	-0.0802*	-0.0506*	-0.0146	-0.0555*	-0.0686*	-0.0744*
	(0.0279)	(0.0238)	(0.0180)	(0.0233)	(0.0266)	(0.0291)
0.5	-0.0404*	-0.0284	-0.00314	-0.0288	-0.0339+	-0.0435+
	(0.0200)	(0.0201)	(0.0198)	(0.0187)	(0.0192)	(0.0223)
1	-0.000628	-0.00623	0.00828	-0.00213	0.000811	-0.0125
	(0.0165)	(0.0188)	(0.0233)	(0.0171)	(0.0180)	(0.0181)
1.5	0.0391*	0.0160	0.0197	0.0246	0.0355	0.0185
	(0.0198)	(0.0203)	(0.0277)	(0.0195)	(0.0241)	(0.0184)
2	0.0789*	0.0382		0.0513*	0.0702*	0.0495*
	(0.0277)	(0.0241)		(0.0246)	(0.0337)	(0.0232)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0398*			
			(0.0160)			
-1.5			-0.0359*			
			(0.0140)			
-1	-0.0466*	-0.0267+	-0.0320*	-0.0293+	-0.0675*	-0.0296
	(0.0229)	(0.0156)	(0.0124)	(0.0172)	(0.0246)	(0.0195)
-0.5	-0.0407*	-0.0259+	-0.0282*	-0.0276+	-0.0574*	-0.0282+
	(0.0186)	(0.0135)	(0.0111)	(0.0146)	(0.0201)	(0.0163)
0	-0.0348*	-0.0251*	-0.0243*	-0.0259*	-0.0472*	-0.0269*
	(0.0146)	(0.0118)	(0.0104)	(0.0123)	(0.0159)	(0.0134)
0.5	-0.0289*	-0.0244*	-0.0204+	-0.0241*	-0.0371*	-0.0256*
	(0.0112)	(0.0106)	(0.0104)	(0.0105)	(0.0123)	(0.0111)
1	-0.0230*	-0.0236*	-0.0165	-0.0224*	-0.0270*	-0.0242*

Estimated Total Effect for Specific Values of Institutional Development - Prais-Winsten Regressions with 5 Lags and Openness - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.00891)	(0.0102)	(0.0111)	(0.00943)	(0.0100)	(0.00976)
1.5	-0.0170+	-0.0228*	-0.0126	-0.0207*	-0.0168+	-0.0229*
	(0.00885)	(0.0106)	(0.0123)	(0.00944)	(0.00998)	(0.00984)
2	-0.0111	-0.0220+		-0.0189+	-0.00670	-0.0215+
	(0.0110)	(0.0117)		(0.0105)	(0.0122)	(0.0113)
N	1769	1769	1769	1769	1769	1769

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.9 (equation 2).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.11 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 4 Lags with Openness - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0655	0.0721	0.0659	0.0690	0.0682	0.0682
	(0.107)	(0.108)	(0.109)	(0.108)	(0.109)	(0.107)
$gy2$	0.178*	0.181*	0.172*	0.180*	0.181*	0.180*
	(0.0408)	(0.0415)	(0.0425)	(0.0423)	(0.0408)	(0.0414)
$gy3$	-0.0384+	-0.0353	-0.0443+	-0.0370	-0.0350	-0.0362
	(0.0221)	(0.0217)	(0.0224)	(0.0226)	(0.0226)	(0.0224)
$gy4$	-0.0749*	-0.0759+	-0.0829*	-0.0735+	-0.0740+	-0.0743+
	(0.0364)	(0.0380)	(0.0391)	(0.0385)	(0.0381)	(0.0375)
$gdisc1+$	-0.0151+	-0.00448	0.00263	-0.00697	-0.00976	-0.0119
	(0.00901)	(0.00861)	(0.00529)	(0.00865)	(0.00890)	(0.00931)
$gdisc2+$	-0.0287*	-0.0224*	-0.00770	-0.0225*	-0.0257*	-0.0291*
	(0.00885)	(0.00946)	(0.00705)	(0.00921)	(0.0102)	(0.0112)
$gdisc3+$	-0.0103	-0.00592	-0.00163	-0.00864	-0.00736	-0.00929
	(0.0123)	(0.00929)	(0.00671)	(0.00966)	(0.0113)	(0.0116)
$gdisc4+$	-0.0190*	-0.00949	-0.00287	-0.0136+	-0.0155*	-0.0162+
	(0.00818)	(0.00731)	(0.00690)	(0.00741)	(0.00752)	(0.00835)
$inst1 * gdisc1+$	0.0152*	0.00500	0.00325	0.00791+	0.0108+	0.0102*
	(0.00529)	(0.00371)	(0.00409)	(0.00436)	(0.00574)	(0.00472)
$inst2 * gdisc2+$	0.0253*	0.0164*	0.0125*	0.0186*	0.0249*	0.0205*
	(0.00655)	(0.00516)	(0.00538)	(0.00603)	(0.00866)	(0.00657)
$inst3 * gdisc3+$	0.00397	0.000328	-0.00247	0.00263	0.000432	0.00281
	(0.0116)	(0.00671)	(0.00649)	(0.00776)	(0.0116)	(0.00861)
$inst4 * gdisc4+$	0.0157*	0.00734*	0.00134	0.00972*	0.0135*	0.0111*
	(0.00435)	(0.00247)	(0.00323)	(0.00285)	(0.00451)	(0.00355)
$gdisc1-$	-0.00223	0.00221	0.00502+	0.000466	-0.00749	0.000346
	(0.00399)	(0.00315)	(0.00263)	(0.00322)	(0.00679)	(0.00357)
$gdisc2-$	-0.00607	-0.00681	-0.00524	-0.00475	-0.00832	-0.00456
	(0.00643)	(0.00562)	(0.00392)	(0.00518)	(0.00686)	(0.00601)
$gdisc3-$	-0.00455	-0.00418	-0.00539	-0.00438	-0.00198	-0.00398
	(0.00442)	(0.00380)	(0.00323)	(0.00380)	(0.00537)	(0.00394)
$gdisc4-$	0.00443	0.00288	-0.00205	0.00310	0.00254	0.00408
	(0.00750)	(0.00578)	(0.00363)	(0.00626)	(0.00965)	(0.00632)
$inst1 * gdisc1-$	0.00950*	0.00500*	0.0109*	0.00663*	0.0128*	0.00646*
	(0.00353)	(0.00189)	(0.00405)	(0.00232)	(0.00616)	(0.00249)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 4 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$inst2 * gdisc2-$	-0.00109	-0.000107	-0.00442	-0.00195	0.00137	-0.00201
	(0.00388)	(0.00239)	(0.00339)	(0.00239)	(0.00442)	(0.00291)
$inst3 * gdisc3-$	0.000792	0.00000429	0.00180	0.000300	-0.00242	-0.000125
	(0.00241)	(0.00156)	(0.00243)	(0.00179)	(0.00365)	(0.00180)
$inst4 * gdisc4-$	-0.00591	-0.00445	-0.00126	-0.00424	-0.00408	-0.00517
	(0.00573)	(0.00365)	(0.00500)	(0.00408)	(0.00691)	(0.00396)
$inst1$	-0.153	0.700	1.246*	-0.853	-1.012*	-0.171
	(0.719)	(0.434)	(0.290)	(0.853)	(0.448)	(0.497)
$inst2$	0.990	-0.639	-0.804+	1.823+	1.856	0.531
	(0.907)	(0.870)	(0.402)	(1.014)	(1.179)	(0.695)
$inst3$	0.0419	0.595	0.417	-1.430	-0.918	0.107
	(0.738)	(0.705)	(0.659)	(1.070)	(1.136)	(0.498)
$inst4$	-1.022	-0.317	-0.341	0.140	0.557	-0.0915
	(0.784)	(0.646)	(0.612)	(0.499)	(0.563)	(0.275)
$trend$	-0.0258*	-0.0242*	-0.0274*	-0.0252*	-0.0245*	-0.0247*
	(0.00794)	(0.00809)	(0.00913)	(0.00794)	(0.00834)	(0.00794)
$open1$	1.494	1.484	1.557	1.481	1.496	1.504
	(1.148)	(1.160)	(1.184)	(1.160)	(1.192)	(1.143)
$open2$	-1.769	-1.861	-1.934	-1.796	-1.825	-1.784
	(1.687)	(1.693)	(1.742)	(1.702)	(1.717)	(1.707)
$open3$	0.951	0.970	0.893	0.935	0.834	0.944
	(0.972)	(0.986)	(0.919)	(0.992)	(0.945)	(0.986)
$open4$	-0.608	-0.639	-0.560	-0.651	-0.619	-0.624
	(0.607)	(0.612)	(0.550)	(0.611)	(0.575)	(0.595)
$open1 * gdisc1+$	-0.00246	-0.00152	-0.00414	-0.00166	-0.000575	-0.00107
	(0.00572)	(0.00591)	(0.00553)	(0.00604)	(0.00606)	(0.00554)
$open2 * gdisc2+$	-0.0000378	0.00349	0.000884	0.00256	0.00253	0.00376
	(0.00645)	(0.00712)	(0.00693)	(0.00676)	(0.00616)	(0.00699)
$open3 * gdisc3+$	-0.00164	-0.00112	-0.00400	-0.000968	0.000870	-0.00115
	(0.0110)	(0.0104)	(0.0110)	(0.0104)	(0.0101)	(0.0102)
$open4 * gdisc4+$	0.00585	0.00581	0.00714	0.00803	0.00866	0.00714
	(0.00731)	(0.00770)	(0.00812)	(0.00798)	(0.00779)	(0.00770)
$open1 * gdisc1-$	0.00202	0.00312+	0.00144	0.00332*	0.00614*	0.00297+
	(0.00199)	(0.00170)	(0.00215)	(0.00160)	(0.00125)	(0.00163)
$open2 * gdisc2-$	-0.00265	-0.00293	-0.00222	-0.00287	-0.00293+	-0.00275
	(0.00209)	(0.00188)	(0.00161)	(0.00180)	(0.00165)	(0.00178)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 4 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$open3 * gdisc3-$	0.000212	0.000760	0.000801	0.000532	0.000585	0.000625
	(0.00134)	(0.00139)	(0.00168)	(0.00139)	(0.00145)	(0.00143)
$open4 * gdisc4-$	0.000951	0.000771	0.000506	0.000237	-0.000518	0.000673
	(0.00132)	(0.00116)	(0.00152)	(0.00119)	(0.00193)	(0.00113)
Constant	1.248+	0.897+	1.065*	1.449*	0.832	0.764
	(0.661)	(0.486)	(0.512)	(0.561)	(0.621)	(0.469)
$\sum_{j=1}^{J} \phi_j$	-0.0731	-0.0423	-0.00957	-0.0517	-0.0584	-0.0666
	[0.000271]	[0.00636]	[0.214]	[0.00126]	[0.00184]	[0.00160]
$\sum_{j=1}^{J} \Theta_j$	0.0602	0.0290	0.0146	0.0389	0.0496	0.0446
	[0.000992]	[0.0122]	[0.136]	[0.00407]	[0.00546]	[0.00383]
$\sum_{j=1}^{J} \lambda_j$	-0.00842	-0.00589	-0.00766	-0.00557	-0.0153	-0.00411
	[0.383]	[0.419]	[0.260]	[0.451]	[0.248]	[0.585]
$\sum_{j=1}^{J} \psi_j$	0.00329	0.000441	0.00706	0.000743	0.00766	-0.000850
	[0.597]	[0.911]	[0.104]	[0.849]	[0.381]	[0.841]
$\sum_{j=1}^{J} \gamma_j$	0.130	0.141	0.111	0.139	0.140	0.138
	[0.282]	[0.246]	[0.370]	[0.257]	[0.248]	[0.256]
$\frac{(\sum_{j=1}^{J} \phi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0840	-0.0493	-0.0108	-0.0600	-0.0679	-0.0772
	[0.005]	[0.022]	[0.228]	[0.009]	[0.007]	[0.013]
$\frac{(\sum_{j=1}^{J} \Theta_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.0692	0.0338	0.0165	0.0451	0.0577	0.0518
	[0.011]	[0.039]	[0.161]	[0.020]	[0.018]	[0.023]
$\frac{(\sum_{j=1}^{J} \lambda_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.00968	-0.00687	-0.00862	-0.00646	-0.0177	-0.00477
	[0.406]	[0.441]	[0.302]	[0.475]	[0.273]	[0.596]
$\frac{(\sum_{j=1}^{J} \psi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.00378	0.000514	0.00794	0.000862	0.00891	-0.000987
	[0.598]	[0.910]	[0.108]	[0.849]	[0.383]	[0.842]
N	1822	1822	1822	1822	1822	1822
within R^2	0.1254	0.1209	0.1234	0.1222	0.1246	0.1224

Results estimated for equation 2. The number after each variable name represents the lag *j* specified in equation 2. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.

In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$

P-values in brackets

A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.

The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.12 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 4 Lags and Openness - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0437			
			(0.0295)			
-1.5			-0.0355			
			(0.0239)			
-1	-0.153*	-0.0831*	-0.0272	-0.105*	-0.126*	-0.129*
	(0.0537)	(0.0361)	(0.0184)	(0.0403)	(0.0472)	(0.0516)
-0.5	-0.119*	-0.0662*	-0.0190	-0.0826*	-0.0968*	-0.103*
	(0.0409)	(0.0284)	(0.0132)	(0.0311)	(0.0356)	(0.0407)
0	-0.0840*	-0.0493*	-0.0108	-0.0600*	-0.0679*	-0.0772*
	(0.0283)	(0.0209)	(0.00883)	(0.0221)	(0.0243)	(0.0300)
0.5	-0.0494*	-0.0324*	-0.00253	-0.0374*	-0.0391*	-0.0513*
	(0.0165)	(0.0139)	(0.00696)	(0.0136)	(0.0138)	(0.0195)
1	-0.0148	-0.0155+	0.00571	-0.0149+	-0.0102	-0.0254*
	(0.00906)	(0.00893)	(0.00928)	(0.00762)	(0.00807)	(0.0105)
1.5	0.0198	0.00140	0.0140	0.00771	0.0186	0.000452
	(0.0153)	(0.00967)	(0.0138)	(0.0105)	(0.0147)	(0.00904)
2	0.0545*	0.0183		0.0303	0.0475+	0.0263
	(0.0270)	(0.0153)		(0.0184)	(0.0254)	(0.0172)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0245			
			(0.0153)			
-1.5			-0.0205			
			(0.0132)			
-1	-0.0135	-0.00738	-0.0166	-0.00732	-0.0267	-0.00378
	(0.0176)	(0.0121)	(0.0113)	(0.0122)	(0.0255)	(0.0126)
-0.5	-0.0116	-0.00712	-0.0126	-0.00689	-0.0222	-0.00427
	(0.0145)	(0.0103)	(0.00960)	(0.0105)	(0.0207)	(0.0106)
0	-0.00968	-0.00687	-0.00862	-0.00646	-0.0177	-0.00477
	(0.0115)	(0.00885)	(0.00826)	(0.00897)	(0.0160)	(0.00894)
0.5	-0.00779	-0.00661	-0.00465	-0.00603	-0.0133	-0.00526
	(0.00911)	(0.00776)	(0.00749)	(0.00784)	(0.0117)	(0.00769)
1	-0.00590	-0.00635	-0.000676	-0.00560	-0.00883	-0.00575

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 4 Lags and Openness - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.00762)	(0.00724)	(0.00746)	(0.00726)	(0.00838)	(0.00710)
1.5	-0.00401	-0.00610	0.00329	-0.00517	-0.00438	-0.00625
	(0.00766)	(0.00741)	(0.00818)	(0.00736)	(0.00735)	(0.00733)
2	-0.00211	-0.00584		-0.00474	0.0000805	-0.00674
	(0.00920)	(0.00823)		(0.00811)	(0.00945)	(0.00832)
N	1822	1822	1822	1822	1822	1822

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.11 (equation 2).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.13 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 8 Lags with Openness - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0763	0.0881	0.0714	0.0822	0.0800	0.0814
	(0.101)	(0.101)	(0.101)	(0.101)	(0.102)	(0.101)
$gy2$	0.161*	0.165*	0.153*	0.162*	0.167*	0.163*
	(0.0474)	(0.0473)	(0.0476)	(0.0486)	(0.0470)	(0.0478)
$gy3$	-0.00500	-0.0109	-0.0223	-0.00548	-0.00327	-0.00476
	(0.0248)	(0.0236)	(0.0251)	(0.0248)	(0.0250)	(0.0249)
$gy4$	-0.100*	-0.104+	-0.115*	-0.101+	-0.0997*	-0.102*
	(0.0478)	(0.0525)	(0.0525)	(0.0511)	(0.0495)	(0.0496)
$gy5$	0.101+	0.0976+	0.0893+	0.101+	0.103+	0.0997+
	(0.0537)	(0.0510)	(0.0528)	(0.0538)	(0.0534)	(0.0528)
$gy6$	-0.00684	-0.0105	-0.0197	-0.00919	-0.00710	-0.00868
	(0.0376)	(0.0364)	(0.0381)	(0.0379)	(0.0377)	(0.0373)
$gy7$	-0.0358	-0.0429	-0.0501	-0.0363	-0.0390	-0.0359
	(0.0623)	(0.0659)	(0.0636)	(0.0650)	(0.0649)	(0.0641)
$gy8$	-0.196*	-0.201*	-0.206*	-0.200*	-0.198*	-0.198*
	(0.0395)	(0.0413)	(0.0384)	(0.0407)	(0.0406)	(0.0405)
$gdisc1+$	-0.00688	0.00239	0.00581	-0.00148	-0.00671	-0.00555
	(0.00721)	(0.00659)	(0.00541)	(0.00763)	(0.00770)	(0.00794)
$gdisc2+$	-0.0297*	-0.0252*	-0.00779	-0.0239*	-0.0278*	-0.0314*
	(0.00908)	(0.00983)	(0.00797)	(0.00896)	(0.00985)	(0.0119)
$gdisc3+$	-0.00796	-0.00374	-0.00180	-0.00608	-0.00303	-0.00538
	(0.0148)	(0.0112)	(0.00790)	(0.0116)	(0.0138)	(0.0143)
$gdisc4+$	-0.0119*	-0.00254	0.00187	-0.00909+	-0.00605	-0.0104+
	(0.00580)	(0.00573)	(0.00654)	(0.00494)	(0.00676)	(0.00546)
$gdisc5+$	-0.00346	0.00194	0.0123	0.00378	-0.00827	0.000876
	(0.0126)	(0.00791)	(0.00772)	(0.00819)	(0.0158)	(0.0118)
$gdisc6+$	-0.00978	-0.00510	-0.00243	-0.00803	-0.00346	-0.0104
	(0.00922)	(0.00652)	(0.00502)	(0.00674)	(0.0102)	(0.00972)
$gdisc7+$	-0.00363	-0.00881	-0.0143*	-0.00937	-0.000518	-0.00810
	(0.0112)	(0.00808)	(0.00535)	(0.00969)	(0.0116)	(0.0114)
$gdisc8+$	0.00282	-0.00632	-0.00897+	-0.00414	-0.00160	-0.00227
	(0.00708)	(0.00672)	(0.00477)	(0.00734)	(0.00878)	(0.00710)
$inst1 * gdisc1+$	0.00838*	0.000544	0.00206	0.00392	0.00714	0.00550+
	(0.00388)	(0.00231)	(0.00341)	(0.00282)	(0.00438)	(0.00305)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 8 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$inst2 * gdisc2+$	0.0261*	0.0179*	0.0140*	0.0204*	0.0277*	0.0223*
	(0.00649)	(0.00533)	(0.00487)	(0.00593)	(0.00905)	(0.00682)
$inst3 * gdisc3+$	0.00206	-0.000306	-0.00520	0.000697	-0.00219	0.00127
	(0.0117)	(0.00712)	(0.00702)	(0.00762)	(0.0118)	(0.00879)
$inst4 * gdisc4+$	0.0100+	0.00293	-0.00366	0.00626+	0.00481	0.00694+
	(0.00507)	(0.00303)	(0.00478)	(0.00357)	(0.00715)	(0.00399)
$inst5 * gdisc5+$	0.0136	0.00876	0.00797	0.00836	0.0205	0.00893
	(0.0118)	(0.00643)	(0.0107)	(0.00663)	(0.0191)	(0.00883)
$inst6 * gdisc6+$	0.00856	0.00559	0.00482	0.00702	0.00347	0.00804
	(0.00930)	(0.00554)	(0.00564)	(0.00578)	(0.0122)	(0.00710)
$inst7 * gdisc7+$	-0.0141	-0.00773	-0.0124*	-0.00876	-0.0177	-0.00785
	(0.0105)	(0.00601)	(0.00522)	(0.00731)	(0.0114)	(0.00779)
$inst8 * gdisc8+$	-0.0159*	-0.00517	-0.00709	-0.00862+	-0.0107+	-0.00802+
	(0.00671)	(0.00375)	(0.00463)	(0.00455)	(0.00631)	(0.00448)
$gdisc1-$	-0.00675	-0.00123	0.00126	-0.00399	-0.0127+	-0.00408
	(0.00445)	(0.00306)	(0.00228)	(0.00326)	(0.00694)	(0.00336)
$gdisc2-$	-0.00649	-0.00619	-0.00425	-0.00401	-0.00762	-0.00464
	(0.00540)	(0.00518)	(0.00405)	(0.00474)	(0.00677)	(0.00582)
$gdisc3-$	-0.00674	-0.00611	-0.00808*	-0.00688+	-0.00360	-0.00649
	(0.00432)	(0.00399)	(0.00301)	(0.00409)	(0.00578)	(0.00425)
$gdisc4-$	0.00565	0.00392	-0.00213	0.00419	0.00271	0.00469
	(0.00847)	(0.00637)	(0.00353)	(0.00682)	(0.00998)	(0.00700)
$gdisc5-$	-0.00275	-0.00581	-0.00605*	-0.00399	-0.00558	-0.00357
	(0.00468)	(0.00348)	(0.00239)	(0.00366)	(0.00555)	(0.00367)
$gdisc6-$	-0.00166	-0.00137	-0.00261	-0.00308	-0.00225	-0.00227
	(0.00413)	(0.00253)	(0.00181)	(0.00339)	(0.00438)	(0.00337)
$gdisc7-$	0.00640	0.00394	0.000518	0.00564	0.00562	0.00567
	(0.00672)	(0.00514)	(0.00370)	(0.00604)	(0.00768)	(0.00614)
$gdisc8-$	-0.000562	0.00236	0.000146	0.000554	-0.00269	0.000651
	(0.00395)	(0.00281)	(0.00212)	(0.00338)	(0.00485)	(0.00390)
$inst1 * gdisc1-$	0.0104*	0.00536*	0.0116*	0.00732*	0.0142*	0.00707*
	(0.00390)	(0.00183)	(0.00402)	(0.00244)	(0.00605)	(0.00238)
$inst2 * gdisc2-$	-0.000405	-0.000583	-0.00541	-0.00211	0.00128	-0.00175
	(0.00375)	(0.00261)	(0.00342)	(0.00239)	(0.00445)	(0.00321)
$inst3 * gdisc3-$	0.00143	0.000616	0.00325	0.00102	-0.00251	0.000501
	(0.00258)	(0.00188)	(0.00285)	(0.00209)	(0.00406)	(0.00237)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 8 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$inst4 * gdisc4-$	-0.00603	-0.00481	-0.000876	-0.00419	-0.00341	-0.00491
	(0.00638)	(0.00399)	(0.00488)	(0.00444)	(0.00707)	(0.00440)
$inst5 * gdisc5-$	-0.00217	0.000343	0.00172	-0.00122	-0.000152	-0.00154
	(0.00339)	(0.00199)	(0.00269)	(0.00238)	(0.00390)	(0.00230)
$inst6 * gdisc6-$	0.000448	0.0000494	0.00116	0.00112	0.000121	0.000183
	(0.00324)	(0.00171)	(0.00358)	(0.00232)	(0.00322)	(0.00238)
$inst7 * gdisc7-$	-0.00399	-0.00262	-0.000265	-0.00338	-0.00345	-0.00340
	(0.00362)	(0.00228)	(0.00272)	(0.00294)	(0.00411)	(0.00293)
$inst8 * gdisc8-$	0.00347	0.000376	0.00190	0.00181	0.00431	0.00155
	(0.00333)	(0.00232)	(0.00264)	(0.00286)	(0.00416)	(0.00330)
$inst1$	0.498	0.264	1.449*	0.252	-0.663*	0.141
	(0.717)	(0.495)	(0.376)	(0.861)	(0.306)	(0.455)
$inst2$	0.180	0.407	-1.064*	0.432	0.413	-0.0444
	(0.951)	(0.753)	(0.528)	(0.958)	(0.344)	(0.568)
$inst3$	0.301	0.196	0.802	-1.072	0.0737	0.401
	(0.787)	(0.695)	(0.622)	(1.291)	(0.418)	(0.456)
$inst4$	-0.528	0.872	0.595	-0.254	0.369	-0.459
	(0.770)	(0.612)	(0.572)	(1.485)	(0.946)	(0.634)
$inst5$	-1.116	-2.762*	-1.014	0.649	0.363	-0.372
	(0.765)	(0.746)	(0.781)	(1.461)	(1.052)	(0.698)
$inst6$	0.00166	1.980*	0.712	-0.451	-0.478	1.059+
	(0.551)	(0.835)	(0.470)	(0.905)	(0.599)	(0.572)
$inst7$	0.696	-0.126	-0.0479	0.298	-0.0347	-0.111
	(0.897)	(0.949)	(0.340)	(0.846)	(0.828)	(0.561)
$inst8$	0.0414	-0.458	-0.822*	-0.261	0.510	0.0262
	(0.916)	(0.428)	(0.326)	(0.944)	(0.627)	(0.517)
$trend$	-0.0376*	-0.0370*	-0.0464*	-0.0374*	-0.0363*	-0.0360*
	(0.0107)	(0.0108)	(0.0128)	(0.0107)	(0.0108)	(0.0102)
$open1$	1.829	1.680	1.670	1.762	1.722	1.758
	(1.577)	(1.538)	(1.577)	(1.559)	(1.598)	(1.527)
$open2$	-4.155	-4.073	-4.226	-4.113	-4.173	-4.080
	(2.914)	(2.907)	(2.895)	(2.913)	(2.928)	(2.925)
$open3$	1.364	1.328	1.315	1.414	1.287	1.408
	(1.993)	(2.038)	(1.951)	(2.060)	(1.985)	(2.048)
$open4$	0.0350	0.0741	-0.0539	-0.103	-0.111	0.000913
	(0.895)	(0.892)	(0.912)	(0.907)	(0.867)	(0.877)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 8 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$open5$	0.986	1.018	1.281	1.087	1.160	1.059
	(0.685)	(0.715)	(0.773)	(0.717)	(0.732)	(0.716)
$open6$	1.737	1.792	1.871	1.666	1.702	1.720
	(1.856)	(1.822)	(1.815)	(1.847)	(1.824)	(1.841)
$open7$	0.298	0.228	0.119	0.277	0.244	0.279
	(1.883)	(1.813)	(1.929)	(1.903)	(1.872)	(1.865)
$open8$	-2.568+	-2.546+	-2.309+	-2.574+	-2.527+	-2.596+
	(1.379)	(1.333)	(1.353)	(1.386)	(1.410)	(1.381)
$open1 * gdisc1+$	-0.00188	-0.00134	-0.00412	-0.00149	0.00142	-0.000433
	(0.00472)	(0.00436)	(0.00476)	(0.00462)	(0.00467)	(0.00450)
$open2 * gdisc2+$	0.000914	0.00607	0.000603	0.00366	0.00380	0.00510
	(0.00814)	(0.00884)	(0.00912)	(0.00834)	(0.00712)	(0.00841)
$open3 * gdisc3+$	-0.000187	-0.000655	-0.00220	0.000259	-0.000418	-0.000641
	(0.00959)	(0.00929)	(0.00922)	(0.00895)	(0.00841)	(0.00934)
$open4 * gdisc4+$	0.00395	0.00302	0.00525	0.00636	0.00555	0.00590
	(0.00662)	(0.00661)	(0.00605)	(0.00604)	(0.00698)	(0.00634)
$open5 * gdisc5+$	-0.00711	-0.00575	-0.0106	-0.00737	-0.00370	-0.00680
	(0.0136)	(0.0134)	(0.0150)	(0.0146)	(0.0122)	(0.0135)
$open6 * gdisc6+$	0.00783	0.00718	0.00798	0.00898	0.00780	0.00851
	(0.00755)	(0.00739)	(0.00683)	(0.00756)	(0.00809)	(0.00731)
$open7 * gdisc7+$	0.0112	0.0105	0.0148*	0.0116+	0.00952	0.0108
	(0.00755)	(0.00735)	(0.00584)	(0.00689)	(0.00797)	(0.00749)
$open8 * gdisc8+$	0.0105	0.00992	0.00939	0.00994	0.00861	0.00892
	(0.00769)	(0.00823)	(0.00711)	(0.00793)	(0.00969)	(0.00760)
$open1 * gdisc1-$	0.00181	0.00277	0.00132	0.00319+	0.00633*	0.00293
	(0.00231)	(0.00195)	(0.00247)	(0.00175)	(0.00125)	(0.00185)
$open2 * gdisc2-$	-0.00477+	-0.00466+	-0.00399+	-0.00500+	-0.00499+	-0.00468+
	(0.00283)	(0.00272)	(0.00216)	(0.00261)	(0.00259)	(0.00255)
$open3 * gdisc3-$	0.00182	0.00220	0.00258	0.00208	0.00221	0.00225
	(0.00154)	(0.00166)	(0.00175)	(0.00156)	(0.00162)	(0.00166)
$open4 * gdisc4-$	0.000896	0.00107	0.00111	0.0000272	-0.000386	0.000591
	(0.00174)	(0.00147)	(0.00169)	(0.00148)	(0.00190)	(0.00137)
$open5 * gdisc5-$	0.00131	0.000994	0.000956	0.00119	0.00138	0.00127
	(0.000788)	(0.000892)	(0.000997)	(0.000858)	(0.00134)	(0.000928)
$open6 * gdisc6-$	-0.00425*	-0.00416+	-0.00414+	-0.00425*	-0.00397*	-0.00410*
	(0.00204)	(0.00210)	(0.00224)	(0.00191)	(0.00189)	(0.00200)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - 8 Lags with Openness - Evaluating Hypotheses 2 and 3 - I - Continued

$open7 * gdisc7-$	-0.000998	-0.00133	-0.00176	-0.00165	-0.00247	-0.00150
	(0.00157)	(0.00167)	(0.00170)	(0.00173)	(0.00257)	(0.00176)
$open8 * gdisc8-$	-0.00667*	-0.00585*	-0.00605*	-0.00614*	-0.00504*	-0.00610*
	(0.00245)	(0.00235)	(0.00200)	(0.00227)	(0.00205)	(0.00244)
Constant	1.868*	1.629*	1.820*	2.344*	1.608*	1.251*
	(0.827)	(0.571)	(0.704)	(0.834)	(0.773)	(0.521)
$\sum_{j=1}^{J} \phi_j$	-0.0705	-0.0473	-0.0153	-0.0583	-0.0574	-0.0727
	[0.00611]	[0.0223]	[0.234]	[0.00623]	[0.0285]	[0.00559]
$\sum_{j=1}^{J} \Theta_j$	0.0387	0.0225	0.000561	0.0293	0.0330	0.0371
	[0.0132]	[0.0257]	[0.953]	[0.0103]	[0.0842]	[0.00384]
$\sum_{j=1}^{J} \lambda_j$	-0.0129	-0.0105	-0.0212	-0.0116	-0.0261	-0.0100
	[0.424]	[0.362]	[0.0192]	[0.320]	[0.160]	[0.423]
$\sum_{j=1}^{J} \psi_j$	0.00319	-0.00127	0.0130	0.000380	0.0104	-0.00230
	[0.747]	[0.824]	[0.0100]	[0.948]	[0.379]	[0.726]
$\sum_{j=1}^{J} \gamma_j$	-0.00598	-0.0186	-0.0998	-0.00691	0.00274	-0.00426
	[0.967]	[0.899]	[0.515]	[0.963]	[0.985]	[0.977]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0701	-0.0465	-0.0139	-0.0579	-0.0576	-0.0724
	[0.005]	[0.020]	[0.255]	[0.003]	[0.023]	[0.007]
$\frac{\left(\sum_{j=1}^{J} \Theta_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.0385	0.0221	0.000510	0.0291	0.0331	0.0370
	[0.013]	[0.033]	[0.954]	[0.008]	[0.088]	[0.008]
$\frac{\left(\sum_{j=1}^{J} \lambda_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0128	-0.0103	-0.0193	-0.0115	-0.0262	-0.01000
	[0.416]	[0.338]	[0.011]	[0.309]	[0.136]	[0.407]
$\frac{\left(\sum_{j=1}^{J} \psi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.00317	-0.00124	0.0119	0.000377	0.0104	-0.00229
	[0.746]	[0.826]	[0.007]	[0.948]	[0.356]	[0.730]
N	1610	1610	1610	1610	1610	1610
within R^2	0.2002	0.2021	0.2113	0.1969	0.2012	0.1973

Results estimated for equation 2. The number after each variable name represents the lag j specified in equation 2. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.

In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$

P-values in brackets

A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.

The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.14 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 8 Lags and Openness - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0149			
			(0.0272)			
-1.5			-0.0147			
			(0.0231)			
-1	-0.109*	-0.0685*	-0.0144	-0.0870*	-0.0906*	-0.109*
	(0.0375)	(0.0283)	(0.0191)	(0.0280)	(0.0421)	(0.0383)
-0.5	-0.0893*	-0.0575*	-0.0142	-0.0725*	-0.0741*	-0.0909*
	(0.0304)	(0.0237)	(0.0154)	(0.0232)	(0.0331)	(0.0319)
0	-0.0701*	-0.0465*	-0.0139	-0.0579*	-0.0576*	-0.0724*
	(0.0236)	(0.0193)	(0.0121)	(0.0186)	(0.0245)	(0.0257)
0.5	-0.0508*	-0.0354*	-0.0137	-0.0434*	-0.0411*	-0.0539*
	(0.0173)	(0.0154)	(0.00967)	(0.0145)	(0.0169)	(0.0197)
1	-0.0316*	-0.0244+	-0.0134	-0.0288*	-0.0245+	-0.0354*
	(0.0123)	(0.0122)	(0.00887)	(0.0113)	(0.0123)	(0.0145)
1.5	-0.0124	-0.0134	-0.0132	-0.0143	-0.00800	-0.0169
	(0.0107)	(0.0106)	(0.0101)	(0.0101)	(0.0141)	(0.0109)
2	0.00687	-0.00233		0.000262	0.00852	0.00155
	(0.0137)	(0.0113)		(0.0114)	(0.0206)	(0.0109)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0430*			
			(0.0123)			
-1.5			-0.0370*			
			(0.0106)			
-1	-0.0160	-0.00904	-0.0311*	-0.0119	-0.0366	-0.00771
	(0.0249)	(0.0156)	(0.00915)	(0.0163)	(0.0281)	(0.0179)
-0.5	-0.0144	-0.00967	-0.0252*	-0.0117	-0.0314	-0.00885
	(0.0202)	(0.0131)	(0.00798)	(0.0137)	(0.0227)	(0.0149)
0	-0.0128	-0.0103	-0.0193*	-0.0115	-0.0262	-0.01000
	(0.0156)	(0.0106)	(0.00725)	(0.0112)	(0.0173)	(0.0120)
0.5	-0.0112	-0.0109	-0.0133+	-0.0113	-0.0210+	-0.0111
	(0.0113)	(0.00843)	(0.00710)	(0.00888)	(0.0122)	(0.00933)
1	-0.00965	-0.0115+	-0.00740	-0.0111	-0.0158*	-0.0123+

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with 8 Lags and Openness - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.00759)	(0.00672)	(0.00757)	(0.00705)	(0.00767)	(0.00726)
1.5	-0.00806	-0.0122*	-0.00147	-0.0109+	-0.0106+	-0.0134*
	(0.00598)	(0.00592)	(0.00855)	(0.00609)	(0.00565)	(0.00633)
2	-0.00648	-0.0128+		-0.0107	-0.00539	-0.0146*
	(0.00784)	(0.00639)		(0.00641)	(0.00822)	(0.00701)
N	1610	1610	1610	1610	1610	1610

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j + \sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j + \sum_{j=1}^{J}\psi_j inst_{i,t-j}\right) / \left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.13 (equation 2).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.15 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
*gy*1	0.0768	0.0863	0.0582	0.0808	0.0855	0.0807
	(0.108)	(0.111)	(0.0968)	(0.110)	(0.115)	(0.109)
*gy*2	0.165*	0.173*	0.147*	0.165*	0.178*	0.167*
	(0.0437)	(0.0448)	(0.0498)	(0.0455)	(0.0431)	(0.0441)
*gy*3	-0.0402*	-0.0506*	-0.0169	-0.0409*	-0.0566*	-0.0386*
	(0.0186)	(0.0210)	(0.0272)	(0.0187)	(0.0203)	(0.0188)
*gy*4	-0.0734+	-0.0819+	-0.135*	-0.0739	-0.0670	-0.0723+
	(0.0427)	(0.0458)	(0.0539)	(0.0444)	(0.0441)	(0.0428)
*gy*5	0.118*	0.105*	0.0757	0.116*	0.120*	0.118*
	(0.0524)	(0.0512)	(0.0505)	(0.0520)	(0.0527)	(0.0515)
*gy*6			-0.0283			
			(0.0416)			
*gy*7			-0.0419			
			(0.0776)			
*gy*8			-0.207*			
			(0.0478)			
*gdisc*1+	-0.01000	0.00165	0.00580	-0.00290	-0.00727	-0.00493
	(0.00892)	(0.00789)	(0.00390)	(0.00923)	(0.00769)	(0.00897)
*gdisc*2+	-0.0318*	-0.0209*	-0.00876	-0.0256*	-0.0257*	-0.0321*
	(0.0109)	(0.00971)	(0.0103)	(0.0113)	(0.00958)	(0.0138)
*gdisc*3+	-0.00742	0.000624	0.00309	-0.00413	-0.00423	-0.00569
	(0.0146)	(0.0112)	(0.00891)	(0.0114)	(0.0143)	(0.0135)
*gdisc*4+	-0.0157*	-0.00484	0.00659	-0.0129+	-0.00451	-0.0150+
	(0.00720)	(0.00739)	(0.00931)	(0.00750)	(0.00804)	(0.00817)
*gdisc*5+	-0.00112	0.00113	0.0183*	0.000649	-0.0157	-0.0000365
	(0.00628)	(0.00670)	(0.00826)	(0.00542)	(0.0185)	(0.00684)
*gdisc*6+			-0.00769			
			(0.00769)			
*gdisc*7+			-0.00804			
			(0.00583)			
*gdisc*8+			-0.00624			
			(0.00471)			
$inst1 * gdisc1+$	0.0106	-0.00500	-0.000943	0.00219	0.00854	0.00353
	(0.00707)	(0.00541)	(0.00419)	(0.00519)	(0.00515)	(0.00555)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

$inst2 * gdisc2+$	0.0323*	0.0213*	0.0129*	0.0238*	0.0277*	0.0258*
	(0.00895)	(0.00645)	(0.00452)	(0.00738)	(0.0104)	(0.00900)
$inst3 * gdisc3+$	0.00502	0.000272	-0.00624	0.00274	-0.00184	0.00328
	(0.0167)	(0.00952)	(0.00801)	(0.0110)	(0.0121)	(0.0122)
$inst4 * gdisc4+$	0.0167*	0.00509	-0.00188	0.0117*	0.00724	0.0133*
	(0.00652)	(0.00312)	(0.00456)	(0.00367)	(0.00597)	(0.00437)
$inst5 * gdisc5+$	0.00469	0.00200	-0.00287	0.00298	0.0181	0.00372
	(0.00575)	(0.00254)	(0.00506)	(0.00428)	(0.0174)	(0.00457)
$inst6 * gdisc6+$			0.00817			
			(0.00506)			
$inst7 * gdisc7+$			-0.0101+			
			(0.00510)			
$inst8 * gdisc8+$			-0.00515			
			(0.00438)			
$gdisc1-$	-0.00530	0.00201	0.000124	-0.00147	-0.00796	-0.00269
	(0.00530)	(0.00315)	(0.00325)	(0.00377)	(0.00563)	(0.00355)
$gdisc2-$	-0.00619	-0.0119+	-0.00700+	-0.00614	-0.0122+	-0.00521
	(0.00502)	(0.00684)	(0.00361)	(0.00417)	(0.00661)	(0.00484)
$gdisc3-$	-0.00214	-0.00535	-0.00900*	-0.00358	-0.00345	-0.00280
	(0.00372)	(0.00382)	(0.00368)	(0.00334)	(0.00350)	(0.00354)
$gdisc4-$	0.00117	0.00162	-0.00287	0.000590	0.00168	0.00122
	(0.00682)	(0.00611)	(0.00388)	(0.00593)	(0.00717)	(0.00574)
$gdisc5-$	-0.00416	-0.00639	-0.00793*	-0.00610	-0.00724+	-0.00496
	(0.00491)	(0.00446)	(0.00352)	(0.00481)	(0.00364)	(0.00527)
$gdisc6-$			-0.00377+			
			(0.00189)			
$gdisc7-$			-0.00344			
			(0.00349)			
$gdisc8-$			-0.000810			
			(0.00276)			
$inst1 * gdisc1-$	0.0124*	0.00648*	0.0127*	0.00819*	0.0131*	0.00889*
	(0.00478)	(0.00225)	(0.00291)	(0.00291)	(0.00563)	(0.00289)
$inst2 * gdisc2-$	-0.00346	-0.000191	-0.00482	-0.00309	0.00235	-0.00388
	(0.00375)	(0.00224)	(0.00310)	(0.00224)	(0.00412)	(0.00248)
$inst3 * gdisc3-$	-0.00397+	-0.00150	0.00155	-0.00247+	-0.00127	-0.00345+
	(0.00202)	(0.00139)	(0.00202)	(0.00133)	(0.00302)	(0.00172)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

$inst4 * gdisc4-$	-0.00420	-0.00336	-0.00140	-0.00302	-0.00408	-0.00368
	(0.00545)	(0.00393)	(0.00469)	(0.00385)	(0.00651)	(0.00358)
$inst5 * gdisc5-$	-0.00356	-0.000397	0.00162	-0.00148	-0.000125	-0.00255
	(0.00341)	(0.00172)	(0.00189)	(0.00205)	(0.00241)	(0.00233)
$inst6 * gdisc6-$			0.00205			
			(0.00304)			
$inst7 * gdisc7-$			-0.000628			
			(0.00219)			
$inst8 * gdisc8-$			-0.000622			
			(0.00214)			
$inst1$	-0.378	0.421	1.525*	-1.289	-1.361*	-0.0311
	(0.766)	(0.397)	(0.345)	(0.957)	(0.541)	(0.454)
$inst2$	1.064	-0.669	-1.224*	1.882+	1.997	0.402
	(0.973)	(0.888)	(0.569)	(0.981)	(1.208)	(0.611)
$inst3$	-0.0716	0.694	1.341*	-1.586	-0.972	0.0320
	(0.730)	(0.789)	(0.638)	(1.038)	(1.120)	(0.380)
$inst4$	-0.564	0.853	0.333	-0.0721	0.323	-0.640
	(0.775)	(0.545)	(0.638)	(1.329)	(1.018)	(0.580)
$inst5$	-0.585	-1.183*	-0.945	0.331	0.284	0.469
	(0.595)	(0.479)	(0.773)	(1.244)	(0.907)	(0.589)
$inst6$			0.468			
			(0.421)			
$inst7$			-0.00395			
			(0.360)			
$inst8$			-1.007*			
			(0.278)			
$trend$	-0.0253+	-0.0274+	-0.0621*	-0.0248+	-0.0240*	-0.0247+
	(0.0138)	(0.0151)	(0.0239)	(0.0139)	(0.00916)	(0.0138)
$open1$	2.096+	0.331	2.033	2.104+	-0.0299	2.150*
	(1.081)	(0.466)	(1.559)	(1.055)	(0.451)	(1.054)
$open2$	-2.522		-4.547	-2.534		-2.519
	(1.865)		(3.093)	(1.876)		(1.884)
$open3$	1.183		1.869	1.184		1.181
	(1.153)		(2.248)	(1.164)		(1.154)
$open4$	-1.529+		-0.937	-1.599+		-1.519+
	(0.811)		(0.946)	(0.809)		(0.812)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

$open5$	0.455		1.653+	0.406		0.375
	(0.479)		(0.876)	(0.498)		(0.508)
$open6$			1.661			
			(2.166)			
$open7$			0.299			
			(2.294)			
$open8$			-1.958			
			(1.181)			
$open1 * gdisc1+$	-0.00504	-0.00759	-0.00905	-0.00593	-0.00244	-0.00590
	(0.00617)	(0.00670)	(0.00578)	(0.00636)	(0.00567)	(0.00600)
$open2 * gdisc2+$	0.00492		0.00361	0.00832		0.00922
	(0.00916)		(0.0118)	(0.00951)		(0.0101)
$open3 * gdisc3+$	0.00617		0.00194	0.00688		0.00634
	(0.0109)		(0.0104)	(0.0105)		(0.0104)
$open4 * gdisc4+$	0.00401		0.00509	0.00766		0.00715
	(0.00648)		(0.00689)	(0.00721)		(0.00676)
$open5 * gdisc5+$	0.00650		0.00237	0.00667		0.00677
	(0.00880)		(0.0103)	(0.00959)		(0.00938)
$open6 * gdisc6+$			0.00125			
			(0.00757)			
$open7 * gdisc7+$			0.0125*			
			(0.00543)			
$open8 * gdisc8+$			0.00972			
			(0.00963)			
$open1 * gdisc1-$	0.00747*	0.00567*	0.00400*	0.00821*	0.00689*	0.00769*
	(0.00256)	(0.00147)	(0.00192)	(0.00293)	(0.000917)	(0.00277)
$open2 * gdisc2-$	-0.00890		-0.00953+	-0.00929		-0.00957
	(0.00564)		(0.00568)	(0.00580)		(0.00574)
$open3 * gdisc3-$	-0.00298+		-0.00224	-0.00342*		-0.00302+
	(0.00155)		(0.00292)	(0.00158)		(0.00161)
$open4 * gdisc4-$	0.00149		0.00437	0.00141		0.00109
	(0.00318)		(0.00392)	(0.00294)		(0.00311)
$open5 * gdisc5-$	-0.00000282		0.00230	0.0000561		-0.000199
	(0.00260)		(0.00194)	(0.00273)		(0.00266)
$open6 * gdisc6-$			-0.0107*			
			(0.00388)			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

$open7 * gdisc7-$			-0.00213 (0.00341)		
$open8 * gdisc8-$			-0.00785 (0.00538)		
$fd1$	-0.137 (0.925)	-0.135 (0.888)	0.729 (1.432)	-0.206 (0.919)	-0.253 (0.921)
$fd2$	0.337 (1.165)	0.445 (1.046)	-0.135 (1.093)	0.401 (1.121)	0.386 (1.142)
$fd3$	-1.153 (1.213)	-0.342 (0.594)	-3.302* (1.100)	-1.143 (1.234)	-1.159 (1.206)
$fd4$	1.990 (2.582)		3.381+ (1.899)	1.802 (2.495)	1.885 (2.482)
$fd5$	-0.728 (2.009)		-3.625 (2.491)	-0.586 (1.939)	-0.678 (1.957)
$fd6$			1.879 (1.983)		
$fd7$			1.694 (1.508)		
$fd8$			-0.697 (0.864)		
$fd1 * gdisc1+$	0.00531 (0.0196)	0.0201 (0.0199)	0.0197 (0.0156)	0.0112 (0.0191)	0.0102 (0.0190)
$fd2 * gdisc2+$	-0.00629 (0.0124)	0.00387 (0.0117)	0.00989 (0.0142)	-0.00262 (0.0100)	-0.00514 (0.0103)
$fd3 * gdisc3+$	-0.0140 (0.0199)	-0.00896 (0.0197)	-0.00386 (0.0138)	-0.0153 (0.0194)	-0.0132 (0.0205)
$fd4 * gdisc4+$	-0.0143 (0.0126)		-0.0143 (0.0127)	-0.0140 (0.0103)	-0.0176 (0.0112)
$fd5 * gdisc5+$	-0.0161 (0.0163)		-0.0115 (0.0182)	-0.0152 (0.0164)	-0.0168 (0.0159)
$fd6 * gdisc6+$			0.0255 (0.0194)		
$fd7 * gdisc7+$			-0.0129 (0.00990)		
$fd8 * gdisc8+$			-0.00475 (0.0118)		

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

$fd1 * gdisc1-$	-0.0139+	-0.00565	-0.00507	-0.0112		-0.0113
	(0.00779)	(0.00613)	(0.00574)	(0.00765)		(0.00757)
$fd2 * gdisc2-$	0.0159	0.00249	0.0112	0.0154		0.0167
	(0.0106)	(0.00286)	(0.00925)	(0.0108)		(0.0108)
$fd3 * gdisc3-$	0.0121*	0.00605*	0.0118*	0.0120*		0.0120*
	(0.00467)	(0.00278)	(0.00447)	(0.00446)		(0.00463)
$fd4 * gdisc4-$	-0.00165		-0.00789	-0.00276		-0.00149
	(0.00812)		(0.00855)	(0.00825)		(0.00835)
$fd5 * gdisc5-$	0.00556		-0.000508	0.00419		0.00529
	(0.00637)		(0.00562)	(0.00594)		(0.00579)
$fd6 * gdisc6-$			0.0144*			
			(0.00648)			
$fd7 * gdisc7-$			0.00352			
			(0.00575)			
$fd8 * gdisc8-$			0.00427			
			(0.00940)			
Constant	1.678*	0.686	1.739*	1.895*	0.807*	1.004
	(0.824)	(0.557)	(0.754)	(0.724)	(0.364)	(0.668)
$\sum_{j=1}^{J} \phi_j$	-0.0660	-0.0223	0.00302	-0.0449	-0.0574	-0.0577
	[0.00165]	[0.0358]	[0.843]	[0.00776]	[0.0218]	[0.00603]
$\sum_{j=1}^{J} \Theta_j$	0.0693	0.0237	-0.00611	0.0434	0.0598	0.0496
	[0.00282]	[0.0321]	[0.586]	[0.0131]	[0.0107]	[0.0111]
$\sum_{j=1}^{J} \lambda_j$	-0.0166	-0.0200	-0.0347	-0.0167	-0.0292	-0.0144
	[0.210]	[0.142]	[0.0405]	[0.151]	[0.0532]	[0.205]
$\sum_{j=1}^{J} \psi_j$	-0.00277	0.00103	0.0104	-0.00188	0.00999	-0.00467
	[0.740]	[0.854]	[0.0254]	[0.732]	[0.341]	[0.412]
$\sum_{j=1}^{J} \gamma_j$	0.246	0.231	-0.148	0.247	0.260	0.255
	[0.0733]	[0.0837]	[0.406]	[0.0724]	[0.0615]	[0.0618]
$\frac{(\sum_{j=1}^{J} \phi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0876	-0.0290	0.00263	-0.0596	-0.0776	-0.0775
	[0.011]	[0.037]	[0.841]	[0.023]	[0.041]	[0.030]
$\frac{(\sum_{j=1}^{J} \Theta_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.0920	0.0308	-0.00532	0.0576	0.0808	0.0666
	[0.020]	[0.069]	[0.573]	[0.041]	[0.029]	[0.048]
$\frac{(\sum_{j=1}^{J} \lambda_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0220	-0.0260	-0.0302	-0.0222	-0.0395	-0.0194
	[0.255]	[0.191]	[0.016]	[0.209]	[0.095]	[0.254]
$\frac{(\sum_{j=1}^{J} \psi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.00368	0.00134	0.00908	-0.00249	0.0135	-0.00627
	[0.742]	[0.854]	[0.013]	[0.734]	[0.351]	[0.427]
N	1619	1619	1460	1619	1769	1619
within R^2	0.1479	0.1333	0.2295	0.1461	0.1344	0.1445

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

Results estimated for equation 2. The number after each variable name represents the lag *j* specified in equation 2. The variable *open* is openness and the variable *fd* is financial development, as detailed in the table A.3. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.16 Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			0.0133			
			(0.0270)			
-1.5			0.0106			
			(0.0229)			
-1	-0.180*	-0.0598*	0.00796	-0.117*	-0.158*	-0.144*
	(0.0702)	(0.0242)	(0.0190)	(0.0513)	(0.0713)	(0.0664)
-0.5	-0.134*	-0.0444*	0.00530	-0.0884*	-0.118*	-0.111*
	(0.0514)	(0.0178)	(0.0156)	(0.0381)	(0.0539)	(0.0504)
0	-0.0876*	-0.0290*	0.00263	-0.0596*	-0.0776*	-0.0775*
	(0.0332)	(0.0136)	(0.0131)	(0.0255)	(0.0371)	(0.0348)
0.5	-0.0416*	-0.0136	-0.0000281	-0.0308*	-0.0372+	-0.0442*
	(0.0172)	(0.0138)	(0.0119)	(0.0149)	(0.0220)	(0.0206)
1	0.00439	0.00178	-0.00269	-0.00203	0.00319	-0.0109
	(0.0151)	(0.0182)	(0.0125)	(0.0132)	(0.0153)	(0.0133)
1.5	0.0504+	0.0172	-0.00535	0.0268	0.0436+	0.0224
	(0.0299)	(0.0247)	(0.0147)	(0.0225)	(0.0251)	(0.0217)
2	0.0964*	0.0326		0.0556	0.0840*	0.0556
	(0.0480)	(0.0321)		(0.0348)	(0.0408)	(0.0361)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0484*			
			(0.0172)			
-1.5			-0.0438*			
			(0.0158)			
-1	-0.0184	-0.0273	-0.0393*	-0.0197	-0.0530	-0.0131
	(0.0257)	(0.0239)	(0.0145)	(0.0206)	(0.0362)	(0.0198)
-0.5	-0.0202	-0.0267	-0.0348*	-0.0209	-0.0462	-0.0163
	(0.0220)	(0.0216)	(0.0132)	(0.0187)	(0.0295)	(0.0180)
0	-0.0220	-0.0260	-0.0302*	-0.0222	-0.0395+	-0.0194
	(0.0191)	(0.0196)	(0.0121)	(0.0174)	(0.0232)	(0.0168)
0.5	-0.0239	-0.0253	-0.0257*	-0.0234	-0.0327+	-0.0225
	(0.0176)	(0.0182)	(0.0111)	(0.0169)	(0.0175)	(0.0165)
1	-0.0257	-0.0247	-0.0211*	-0.0247	-0.0260+	-0.0257

Estimated Total Effect for Specific Values of Institutional Development - Fixed-Effects Regressions with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - I - Continued

	(0.0178)	(0.0175)	(0.0104)	(0.0171)	(0.0134)	(0.0171)
1.5	-0.0275	-0.0240	-0.0166	-0.0259	-0.0192	-0.0288
	(0.0196)	(0.0175)	(0.00995)	(0.0180)	(0.0123)	(0.0186)
2	-0.0294	-0.0233		-0.0272	-0.0125	-0.0319
	(0.0227)	(0.0182)		(0.0196)	(0.0151)	(0.0207)
N	1619	1619	1460	1619	1769	1619

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.15 (equation 2).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.17 A First Alternative Measure for the Discount Rate Growth Variable

	$gdisc$
$gdisc1$	0.238*
	(0.0534)
$gy1$	1.821*
	(0.354)
$gy2$	0.945*
	(0.267)
$infl1$	2.406*
	(0.433)
$infl2$	-1.606*
	(0.473)
Constant	-4.368*
	(0.729)
N	1932
within R^2	0.155

Results estimated for equation 3. The number after each variable name represents the lag j specified in equation 3. Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$

The Stata command $xtreg, fe\ vce(cluster)$ was used to estimate the fixed-effects regression with standard errors that are robust to disturbances being heteroscedastic and autocorrelated.

Table A.18 Choosing the Number of Lags - Evaluation of Hypotheses 2 and 3 - II

Lags	AIC=-2lnL+2k	N=Number of Observations	AICn=(-2lnL+2k)/N	Model Selection
		regulatory quality		
4	6387.618	1719	3.715892	1
5	6198.241	1666	3.720433	
6	6034.923	1613	3.741428	
7	5878.41	1560	3.768212	
8	5659.469	1507	3.755454	
		control of corruption		
4	6389.156	1719	3.716787	1
5	6193.355	1666	3.717500	
6	6024.814	1613	3.735161	
7	5865.249	1560	3.759775	
8	5647.066	1507	3.747224	
		political stability		
4	6382.889	1719	3.713141	
5	6184.139	1666	3.711968	1
6	6021.059	1613	3.732833	
7	5859.752	1560	3.756251	
8	5634.64	1507	3.738978	
		rule of law		
4	6391.963	1719	3.718419	1
5	6201.46	1666	3.722365	
6	6039.028	1613	3.743973	
7	5882.216	1560	3.770651	
8	5663.076	1507	3.757847	
		voice and accountability		
4	6391.03	1719	3.717877	1
5	6200.653	1666	3.721881	
6	6037.792	1613	3.743206	
7	5879.234	1560	3.768740	
8	5663.575	1507	3.758179	
		government effectiveness		
4	6389.015	1719	3.716704	1
5	6197.599	1666	3.720047	
6	6033.398	1613	3.740482	
7	5875.04	1560	3.766051	
8	5655.286	1507	3.752678	

The AIC criterion is not appropriate because the models do not have the same number of observations. The AICn criterion is appropriate for our case because it penalizes the loss of observations due to the inclusion of additional lags.

Table A.19 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0736	0.0747	0.0841	0.0787	0.0809	0.0736
	(0.113)	(0.115)	(0.109)	(0.116)	(0.117)	(0.113)
$gy2$	0.172*	0.173*	0.160*	0.179*	0.180*	0.173*
	(0.0479)	(0.0478)	(0.0511)	(0.0461)	(0.0462)	(0.0475)
$gy3$	-0.0493	-0.0462	-0.0574+	-0.0450	-0.0441	-0.0489
	(0.0372)	(0.0364)	(0.0289)	(0.0308)	(0.0299)	(0.0365)
$gy4$	-0.103*	-0.104*	-0.107*	-0.0904*	-0.0900*	-0.103*
	(0.0435)	(0.0449)	(0.0438)	(0.0414)	(0.0402)	(0.0433)
$gy5$			0.107*			
			(0.0523)			
$\omega 1+$	-0.0195	-0.0168	-0.00805	-0.0132	-0.00937	-0.0257
	(0.0149)	(0.0151)	(0.0126)	(0.0146)	(0.0121)	(0.0170)
$\omega 2+$	0.00450	0.00380	0.0114+	0.00261	0.00630	0.00710
	(0.00720)	(0.00713)	(0.00633)	(0.00602)	(0.00746)	(0.00793)
$\omega 3+$	0.00256	0.00840	0.00243	-0.00359	-0.00566	0.00554
	(0.0244)	(0.0179)	(0.0134)	(0.0176)	(0.0209)	(0.0227)
$\omega 4+$	-0.0228*	-0.0109	-0.0106+	-0.0124*	-0.0158*	-0.0205*
	(0.00791)	(0.00694)	(0.00561)	(0.00565)	(0.00708)	(0.00755)
$\omega 5+$			0.0119+			
			(0.00682)			
$inst1 * \omega 1+$	0.00433	0.00111	-0.00418	0.00941	0.00882	0.00873
	(0.00898)	(0.00596)	(0.00614)	(0.00580)	(0.00588)	(0.00768)
$inst2 * \omega 2+$	0.00539	0.00722*	0.00638	0.00512*	0.00211	0.00185
	(0.00503)	(0.00214)	(0.00433)	(0.00250)	(0.00446)	(0.00327)
$inst3 * \omega 3+$	0.00896	0.00236	-0.00106	0.000916	0.00338	0.00399
	(0.0185)	(0.0103)	(0.00784)	(0.0105)	(0.0151)	(0.0137)
$inst4 * \omega 4+$	0.0193*	0.00761*	0.00235	0.00985*	0.0156*	0.0154*
	(0.00463)	(0.00239)	(0.00535)	(0.00282)	(0.00484)	(0.00259)
$inst5 * \omega 5+$			-0.00637			
			(0.00615)			
$\omega 1-$	0.00952+	0.0144*	0.0126*	0.0128*	0.0101	0.0136*
	(0.00479)	(0.00467)	(0.00322)	(0.00575)	(0.00652)	(0.00547)
$\omega 2-$	-0.0186	-0.0193+	-0.0140*	-0.0150	-0.0227+	-0.0202+
	(0.0118)	(0.0104)	(0.00661)	(0.00954)	(0.0121)	(0.0115)
$\omega 3-$	-0.0113	-0.0117	-0.0107	-0.00863	-0.00570	-0.0108

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - Continued

	(0.0113)	(0.0102)	(0.00654)	(0.00778)	(0.00448)	(0.0116)
$\omega 4-$	0.00819	0.00900	0.000370	0.00671	0.00543	0.00876
	(0.0101)	(0.00722)	(0.00397)	(0.00742)	(0.00638)	(0.00844)
$\omega 5-$			-0.0143*			
			(0.00401)			
$inst1 * \omega 1-$	0.00652*	0.00219	0.00927*	0.00140	0.00321	0.00265
	(0.00303)	(0.00180)	(0.00232)	(0.00242)	(0.00541)	(0.00267)
$inst2 * \omega 2-$	0.00295	0.00360	0.00163	0.00329	0.0115	0.00423
	(0.00561)	(0.00327)	(0.00333)	(0.00371)	(0.00745)	(0.00426)
$inst3 * \omega 3-$	0.000598	0.00111	-0.000607	0.00343	0.00118	-0.0000466
	(0.00470)	(0.00338)	(0.00122)	(0.00417)	(0.00238)	(0.00459)
$inst4 * \omega 4-$	-0.00663	-0.00731	-0.00760	-0.00586	-0.00668	-0.00678
	(0.00711)	(0.00477)	(0.00586)	(0.00485)	(0.00559)	(0.00543)
$inst5 * \omega 5-$			0.00377+			
			(0.00220)			
$inst1$	0.302	0.468	1.346*	-0.135	-1.048*	-0.114
	(0.709)	(0.506)	(0.450)	(0.784)	(0.464)	(0.510)
$inst2$	0.459	-0.561	-1.150*	0.934	1.608+	0.442
	(0.815)	(0.958)	(0.520)	(0.655)	(0.907)	(0.577)
$inst3$	-0.0443	0.629	0.949	-1.398	-1.042	0.269
	(0.678)	(0.755)	(0.622)	(1.103)	(1.087)	(0.395)
$inst4$	-1.193	-0.316	0.406	0.342	0.592	-0.474+
	(0.799)	(0.620)	(0.495)	(0.595)	(0.565)	(0.267)
$inst5$			-1.278			
			(0.787)			
$trend$	-0.0316+	-0.0310+	-0.0344+	-0.0278*	-0.0278*	-0.0312+
	(0.0159)	(0.0158)	(0.0175)	(0.00947)	(0.00966)	(0.0161)
$open1$	0.0400	0.0433	1.936	-0.266	-0.294	0.0900
	(0.557)	(0.541)	(1.214)	(0.457)	(0.477)	(0.547)
$open2$			-2.877			
			(2.046)			
$open3$			1.670			
			(1.074)			
$open4$			-1.929*			
			(0.651)			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - Continued

$open5$			0.603			
			(0.517)			
$open1 * \omega1+$	-0.00925	-0.00956	-0.0171*	-0.00240	-0.00544	-0.00632
	(0.00654)	(0.00663)	(0.00828)	(0.00559)	(0.00496)	(0.00669)
$open2 * \omega2+$			-0.00150			
			(0.00787)			
$open3 * \omega3+$			0.0152+			
			(0.00822)			
$open4 * \omega4+$			0.00780			
			(0.00593)			
$open5 * \omega5+$			0.00749			
			(0.00646)			
$open1 * \omega1-$	0.0102*	0.0102*	0.00751*	0.00359*	0.00450*	0.0100*
	(0.00282)	(0.00288)	(0.00254)	(0.00148)	(0.00154)	(0.00282)
$open2 * \omega2-$			-0.00978			
			(0.00589)			
$open3 * \omega3-$			-0.00360			
			(0.00227)			
$open4 * \omega4-$			0.00246			
			(0.00276)			
$open5 * \omega5-$			0.00384*			
			(0.00163)			
$fd1$	0.237	0.208	-0.0521			0.212
	(0.949)	(0.915)	(1.016)			(0.941)
$fd2$	-0.0358	-0.00849	0.450			-0.0276
	(1.135)	(1.079)	(1.325)			(1.108)
$fd3$	-0.114	-0.160	-0.473			-0.164
	(0.617)	(0.589)	(0.804)			(0.597)
$fd1 * \omega1+$	0.0368	0.0379	0.0435+			0.0320
	(0.0269)	(0.0262)	(0.0258)			(0.0241)
$fd2 * \omega2+$	0.00154	0.000182	-0.00442			0.00304
	(0.0125)	(0.00958)	(0.00970)			(0.0109)
$fd3 * \omega3+$	-0.0186	-0.0166	-0.0174			-0.0149
	(0.0148)	(0.0132)	(0.0182)			(0.0125)
$fd1 * \omega1-$	-0.0192*	-0.0167+	-0.0173+			-0.0166+

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - Continued

	(0.00843)	(0.00871)	(0.00895)			(0.00827)
$fd2 * \omega 2-$	0.00568	0.00527	0.0168			0.00595
	(0.00572)	(0.00599)	(0.0122)			(0.00591)
$fd3 * \omega 3-$	0.0111*	0.0114*	0.0164*			0.0117*
	(0.00522)	(0.00562)	(0.00734)			(0.00528)
Constant	1.719*	1.104+	1.638*	1.736*	1.442*	1.144
	(0.807)	(0.630)	(0.805)	(0.549)	(0.435)	(0.745)
$\sum_{j=1}^{J} \phi_j$	-0.0352	-0.0155	0.00706	-0.0266	-0.0246	-0.0336
	[0.0235]	[0.229]	[0.593]	[0.0320]	[0.195]	[0.0131]
$\sum_{j=1}^{J} \Theta_j$	0.0379	0.0183	-0.00288	0.0253	0.0299	0.0300
	[0.0246]	[0.0625]	[0.740]	[0.00585]	[0.0452]	[0.00380]
$\sum_{j=1}^{J} \lambda_j$	-0.0122	-0.00757	-0.0260	-0.00408	-0.0129	-0.00852
	[0.484]	[0.597]	[0.0772]	[0.677]	[0.388]	[0.574]
$\sum_{j=1}^{J} \psi_j$	0.00344	-0.000407	0.00646	0.00226	0.00924	0.0000510
	[0.639]	[0.933]	[0.250]	[0.624]	[0.385]	[0.992]
$\sum_{j=1}^{J} \gamma_j$	0.0927	0.0975	0.186	0.123	0.127	0.0946
	[0.416]	[0.406]	[0.123]	[0.297]	[0.286]	[0.411]
$\frac{(\sum_{j=1}^{J} \phi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0388	-0.0171	0.00867	-0.0303	-0.0281	-0.0371
	[0.029]	[0.209]	[0.594]	[0.030]	[0.185]	[0.013]
$\frac{(\sum_{j=1}^{J} \Theta_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.0418	0.0203	-0.00354	0.0288	0.0343	0.0331
	[0.045]	[0.072]	[0.739]	[0.016]	[0.054]	[0.012]
$\frac{(\sum_{j=1}^{J} \lambda_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	-0.0134	-0.00839	-0.0320	-0.00464	-0.0148	-0.00941
	[0.493]	[0.601]	[0.106]	[0.684]	[0.404]	[0.580]
$\frac{(\sum_{j=1}^{J} \psi_j)}{(1-\sum_{j=1}^{J} \gamma_j)}$	0.00379	-0.000451	0.00795	0.00257	0.0106	0.0000564
	[0.643]	[0.933]	[0.282]	[0.628]	[0.394]	[0.992]
N	1569	1569	1516	1719	1719	1569
within R^2	0.1268	0.1256	0.1664	0.1140	0.1150	0.1251

Results estimated for equation 4. The number after each variable name represents the lag j specified in equation 4. The variable *open* is openness and the variable *fd* is financial development, as detailed in the table A.3. Total effects are presented in the bottom of the table. In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.20 Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			0.0158			
			(0.0306)			
-1.5			0.0140			
			(0.0261)			
-1	-0.0807*	-0.0374*	0.0122	-0.0591*	-0.0624+	-0.0702*
	(0.0336)	(0.0183)	(0.0220)	(0.0209)	(0.0355)	(0.0221)
-0.5	-0.0598*	-0.0273+	0.0104	-0.0447*	-0.0452	-0.0536*
	(0.0247)	(0.0151)	(0.0186)	(0.0167)	(0.0278)	(0.0176)
0	-0.0388*	-0.0171	0.00867	-0.0303*	-0.0281	-0.0371*
	(0.0173)	(0.0135)	(0.0162)	(0.0136)	(0.0209)	(0.0145)
0.5	-0.0179	-0.00699	0.00690	-0.0159	-0.0110	-0.0206
	(0.0140)	(0.0140)	(0.0152)	(0.0125)	(0.0159)	(0.0138)
1	0.00298	0.00315	0.00513	-0.00146	0.00615	-0.00401
	(0.0173)	(0.0165)	(0.0161)	(0.0140)	(0.0148)	(0.0158)
1.5	0.0239	0.0133	0.00336	0.0130	0.0233	0.0125
	(0.0247)	(0.0202)	(0.0185)	(0.0173)	(0.0183)	(0.0198)
2	0.0448	0.0234		0.0274	0.0404	0.0291
	(0.0335)	(0.0246)		(0.0217)	(0.0245)	(0.0247)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0479			
			(0.0293)			
-1.5			-0.0439			
			(0.0264)			
-1	-0.0172	-0.00793	-0.0399+	-0.00722	-0.0254	-0.00946
	(0.0260)	(0.0191)	(0.0238)	(0.0161)	(0.0294)	(0.0208)
-0.5	-0.0153	-0.00816	-0.0360+	-0.00593	-0.0201	-0.00944
	(0.0226)	(0.0174)	(0.0214)	(0.0137)	(0.0234)	(0.0187)
0	-0.0134	-0.00839	-0.0320	-0.00464	-0.0148	-0.00941
	(0.0195)	(0.0159)	(0.0194)	(0.0114)	(0.0176)	(0.0169)
0.5	-0.0115	-0.00861	-0.0280	-0.00336	-0.00951	-0.00938
	(0.0167)	(0.0148)	(0.0180)	(0.00921)	(0.0121)	(0.0153)
1	-0.00965	-0.00883	-0.0241	-0.00207	-0.00422	-0.00935

Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - Continued

	(0.0146)	(0.0142)	(0.0172)	(0.00739)	(0.00766)	(0.0142)
1.5	-0.00775	-0.00906	-0.0201	-0.000785	0.00107	-0.00932
	(0.0134)	(0.0139)	(0.0172)	(0.00621)	(0.00683)	(0.0135)
2	-0.00585	-0.00929		0.000502	0.00637	-0.00929
	(0.0133)	(0.0142)		(0.00603)	(0.0105)	(0.0135)
N	1569	1569	1516	1719	1719	1569

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.19 (equation 4).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.21 A Second Alternative Measure for the Discount Rate Growth Variable

	gdisc
$gdisc1$	0.245*
	(0.0523)
$gy1$	1.820*
	(0.366)
$gy2$	1.068*
	(0.268)
Constant	-3.720*
	(0.452)
N	1932
within R^2	0.130

Results estimated for equation 5. The number after each variable name represents the lag *j* specified in equation 5. Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
The Stata command $xtreg, fe\ vce(cluster)$ was used to estimate the fixed-effects regression with standard errors that are robust to disturbances being heteroscedastic and autocorrelated.

Table A.22 Choosing the Number of Lags - Evaluation of Hypotheses 2 and 3 - II - A Second Alternative Specification

Lags	AIC=-2lnL+2k	N=Number of Observations	AICn=(-2lnL+2k)/N	Model Selection
		regulatory quality		
4	6385.07	1719	3.714410	1
5	6196.602	1666	3.719449	
6	6033.103	1613	3.740299	
7	5876.917	1560	3.767254	
8	5659.766	1507	3.755651	
		control of corruption		
4	6387.303	1719	3.715709	1
5	6191.843	1666	3.716592	
6	6022.388	1613	3.733657	
7	5862.799	1560	3.758204	
8	5646.904	1507	3.747116	
		political stability		
4	6380.292	1719	3.711630	
5	6180.29	1666	3.709658	1
6	6016.75	1613	3.730161	
7	5855.987	1560	3.753838	
8	5629.754	1507	3.735736	
		rule of law		
4	6389.983	1719	3.717268	1
5	6200.288	1666	3.721661	
6	6037.969	1613	3.743316	
7	5881.475	1560	3.770176	
8	5663.766	1507	3.758305	
		voice and accountability		
4	6389.04	1719	3.716719	1
5	6197.901	1666	3.720229	
6	6035.037	1613	3.741498	
7	5876.485	1560	3.766978	
8	5661.143	1507	3.756565	
		government effectiveness		
4	6388.094	1719	3.716169	1
5	6197.695	1666	3.720105	
6	6033.314	1613	3.740430	
7	5875.298	1560	3.766217	
8	5658.166	1507	3.754589	

The AIC criterion is not appropriate because the models do not have the same number of observations. The AICn criterion is appropriate for our case because it penalizes the loss of observations due to the inclusion of additional lags.

Table A.23 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0751	0.0763	0.0888	0.0771	0.0790	0.0753
	(0.115)	(0.116)	(0.116)	(0.116)	(0.117)	(0.115)
$gy2$	0.170*	0.173*	0.175*	0.173*	0.175*	0.171*
	(0.0457)	(0.0453)	(0.0482)	(0.0460)	(0.0457)	(0.0453)
$gy3$	-0.0521	-0.0502	-0.0667*	-0.0489	-0.0482	-0.0524
	(0.0347)	(0.0342)	(0.0314)	(0.0344)	(0.0338)	(0.0351)
$gy4$	-0.101*	-0.103*	-0.107*	-0.0984*	-0.0977*	-0.101*
	(0.0446)	(0.0465)	(0.0503)	(0.0456)	(0.0442)	(0.0453)
$gy5$			0.0943			
			(0.0578)			
$\omega 1+$	-0.0134	-0.0106	-0.00503	-0.0103	-0.0117	-0.0174+
	(0.00802)	(0.00792)	(0.00595)	(0.00755)	(0.00799)	(0.00896)
$\omega 2+$	-0.00960+	-0.00855+	-0.000140	-0.00696	-0.00259	-0.00812
	(0.00572)	(0.00429)	(0.00532)	(0.00461)	(0.00454)	(0.00583)
$\omega 3+$	-0.0204	-0.0137	-0.00672	-0.0150	-0.0168	-0.0197
	(0.0177)	(0.0120)	(0.00848)	(0.0126)	(0.0160)	(0.0153)
$\omega 4+$	-0.0147*	-0.00561	0.00152	-0.00726	-0.00774	-0.0106+
	(0.00558)	(0.00490)	(0.00534)	(0.00535)	(0.00720)	(0.00566)
$\omega 5+$			0.00786			
			(0.0105)			
$inst1 * \omega 1+$	0.00715+	0.00408	0.0000280	0.00423	0.00539	0.00914*
	(0.00386)	(0.00328)	(0.00406)	(0.00325)	(0.00469)	(0.00345)
$inst2 * \omega 2+$	0.0126*	0.0115*	0.00949+	0.0105*	0.00754	0.0101*
	(0.00554)	(0.00315)	(0.00477)	(0.00416)	(0.00484)	(0.00471)
$inst3 * \omega 3+$	0.0116	0.00545	-0.000489	0.00711	0.0103	0.00980
	(0.0127)	(0.00710)	(0.00722)	(0.00819)	(0.0126)	(0.00937)
$inst4 * \omega 4+$	0.0137*	0.00516*	-0.00232	0.00710*	0.00920*	0.00907*
	(0.00385)	(0.00187)	(0.00507)	(0.00252)	(0.00451)	(0.00274)
$inst5 * \omega 5+$			0.00275			
			(0.00967)			
$\omega 1-$	0.00669	0.0135*	0.0106*	0.0121*	0.0123*	0.0130*
	(0.00575)	(0.00410)	(0.00288)	(0.00410)	(0.00533)	(0.00460)
$\omega 2-$	-0.0140	-0.0151+	-0.0122*	-0.0138+	-0.0227*	-0.0147
	(0.00902)	(0.00808)	(0.00579)	(0.00817)	(0.0103)	(0.00899)

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

$\omega 3-$	-0.00782	-0.00632	-0.00662*	-0.00559	-0.00286	-0.00583
	(0.00769)	(0.00589)	(0.00310)	(0.00547)	(0.00355)	(0.00707)
$\omega 4-$	0.000320	0.00290	-0.00102	0.00155	0.0000792	0.00142
	(0.00872)	(0.00659)	(0.00414)	(0.00701)	(0.00642)	(0.00753)
$\omega 5-$			-0.0122*			
			(0.00272)			
$inst1 * \omega 1-$	0.00856*	0.00366	0.0119*	0.00492+	0.00570	0.00394
	(0.00391)	(0.00236)	(0.00403)	(0.00264)	(0.00548)	(0.00279)
$inst2 * \omega 2-$	0.00224	0.00310	-0.000609	0.00212	0.0114+	0.00286
	(0.00379)	(0.00252)	(0.00345)	(0.00297)	(0.00647)	(0.00335)
$inst3 * \omega 3-$	0.00341	0.00227	0.00225	0.00163	-0.00130	0.00180
	(0.00459)	(0.00304)	(0.00188)	(0.00290)	(0.00202)	(0.00398)
$inst4 * \omega 4-$	-0.00188	-0.00400	-0.00353	-0.00293	-0.00291	-0.00266
	(0.00587)	(0.00407)	(0.00570)	(0.00460)	(0.00555)	(0.00460)
$inst5 * \omega 5-$			0.00523*			
			(0.00253)			
$inst1$	0.237	0.271	1.343*	-0.0895	-1.055*	-0.195
	(0.639)	(0.478)	(0.426)	(0.835)	(0.443)	(0.506)
$inst2$	0.507	-0.308	-1.089*	0.976	1.683+	0.465
	(0.809)	(0.920)	(0.522)	(0.686)	(0.913)	(0.639)
$inst3$	-0.0711	0.595	0.647	-1.399	-1.134	0.200
	(0.696)	(0.735)	(0.676)	(1.104)	(1.111)	(0.451)
$inst4$	-0.946	-0.349	0.692	0.256	0.636	-0.231
	(0.760)	(0.642)	(0.588)	(0.524)	(0.518)	(0.287)
$inst5$			-1.184			
			(0.797)			
$trend$	-0.0284*	-0.0276*	-0.0313*	-0.0283*	-0.0284*	-0.0276*
	(0.00961)	(0.00945)	(0.0114)	(0.00953)	(0.00952)	(0.00957)
$Constant$	1.577*	1.146*	1.069*	1.531*	1.198*	1.103*
	(0.380)	(0.227)	(0.210)	(0.548)	(0.423)	(0.358)
$\sum_{j=1}^{J} \phi_j$	-0.0581	-0.0384	-0.00251	-0.0395	-0.0389	-0.0558
	[0.00441]	[0.00576]	[0.882]	[0.00186]	[0.0142]	[0.00157]
$\sum_{j=1}^{J} \Theta_j$	0.0451	0.0262	0.00945	0.0290	0.0324	0.0381
	[0.00966]	[0.00622]	[0.476]	[0.00838]	[0.0344]	[0.00344]
$\sum_{j=1}^{J} \lambda_j$	-0.0148	-0.00504	-0.0214	-0.00579	-0.0131	-0.00614
	[0.366]	[0.664]	[0.0501]	[0.639]	[0.373]	[0.636]
$\sum_{j=1}^{J} \psi_j$	0.0123	0.00504	0.0152	0.00574	0.0129	0.00593
	[0.130]	[0.324]	[0.00746]	[0.286]	[0.193]	[0.326]

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$\sum_{j=1}^{J}\gamma_j$	0.0922	0.0967	0.184	0.103	0.108	0.0923
	[0.413]	[0.398]	[0.149]	[0.367]	[0.343]	[0.411]
$\frac{(\sum_{j=1}^{J}\phi_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	-0.0640	-0.0425	-0.00308	-0.0441	-0.0436	-0.0615
	[0.017]	[0.016]	[0.882]	[0.010]	[0.030]	[0.009]
$\frac{(\sum_{j=1}^{J}\Theta_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0496	0.0290	0.0116	0.0323	0.0364	0.0420
	[0.030]	[0.022]	[0.489]	[0.026]	[0.059]	[0.016]
$\frac{(\sum_{j=1}^{J}\lambda_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	-0.0163	-0.00557	-0.0263	-0.00646	-0.0147	-0.00677
	[0.387]	[0.670]	[0.086]	[0.648]	[0.389]	[0.643]
$\frac{(\sum_{j=1}^{J}\psi_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0136	0.00558	0.0186	0.00641	0.0144	0.00654
	[0.153]	[0.329]	[0.014]	[0.306]	[0.202]	[0.337]
N	1719	1719	1666	1719	1719	1719
within R^2	0.1164	0.1152	0.1380	0.1139	0.1143	0.1148

Results estimated for equation 4. The number after each variable name represents the lag j specified in equation 4. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.24 Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0263			
			(0.0508)			
-1.5			-0.0205			
			(0.0428)			
-1	-0.114*	-0.0715*	-0.0147	-0.0764*	-0.0800*	-0.103*
	(0.0470)	(0.0276)	(0.0350)	(0.0286)	(0.0367)	(0.0385)
-0.5	-0.0889*	-0.0570*	-0.00888	-0.0602*	-0.0618*	-0.0825*
	(0.0363)	(0.0221)	(0.0275)	(0.0222)	(0.0278)	(0.0305)
0	-0.0640*	-0.0425*	-0.00308	-0.0441*	-0.0436*	-0.0615*
	(0.0260)	(0.0171)	(0.0207)	(0.0164)	(0.0195)	(0.0228)
0.5	-0.0392*	-0.0280*	0.00271	-0.0279*	-0.0254+	-0.0405*
	(0.0167)	(0.0130)	(0.0153)	(0.0120)	(0.0129)	(0.0158)
1	-0.0144	-0.0135	0.00851	-0.0118	-0.00725	-0.0195+
	(0.0113)	(0.0111)	(0.0135)	(0.0109)	(0.0113)	(0.0113)
1.5	0.0104	0.000965	0.0143	0.00436	0.0109	0.00155
	(0.0149)	(0.0123)	(0.0163)	(0.0138)	(0.0163)	(0.0121)
2	0.0352	0.0155		0.0205	0.0291	0.0225
	(0.0238)	(0.0159)		(0.0191)	(0.0241)	(0.0176)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0636*			
			(0.0281)			
-1.5			-0.0542*			
			(0.0247)			
-1	-0.0299	-0.0111	-0.0449*	-0.0129	-0.0292	-0.0133
	(0.0278)	(0.0182)	(0.0213)	(0.0199)	(0.0276)	(0.0210)
-0.5	-0.0231	-0.00836	-0.0356+	-0.00966	-0.0220	-0.0100
	(0.0233)	(0.0156)	(0.0181)	(0.0170)	(0.0222)	(0.0177)
0	-0.0163	-0.00557	-0.0263+	-0.00646	-0.0147	-0.00677
	(0.0187)	(0.0130)	(0.0150)	(0.0141)	(0.0170)	(0.0145)
0.5	-0.00955	-0.00279	-0.0170	-0.00325	-0.00754	-0.00350
	(0.0143)	(0.0106)	(0.0123)	(0.0113)	(0.0120)	(0.0114)
1	-0.00276	-0.0000549	-0.00767	-0.0000513	-0.000327	-0.000231

Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

	(0.0101)	(0.00846)	(0.0101)	(0.00867)	(0.00782)	(0.00858)
1.5	0.00403	0.00279	0.00165	0.00315	0.00688	0.00304
	(0.00648)	(0.00675)	(0.00897)	(0.00652)	(0.00642)	(0.00625)
2	0.0108*	0.00558		0.00636	0.0141	0.00631
	(0.00516)	(0.00602)		(0.00540)	(0.00913)	(0.00521)
N	1719	1719	1666	1719	1719	1719

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.23 (equation 4).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.25 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0751	0.0765	0.0900	0.0775	0.0794	0.0754
	(0.115)	(0.117)	(0.114)	(0.117)	(0.118)	(0.116)
$gy2$	0.170*	0.175*	0.169*	0.175*	0.177*	0.172*
	(0.0457)	(0.0460)	(0.0494)	(0.0467)	(0.0465)	(0.0458)
$gy3$	-0.0521	-0.0479	-0.0600*	-0.0467	-0.0453	-0.0509
	(0.0347)	(0.0310)	(0.0249)	(0.0313)	(0.0304)	(0.0319)
$gy4$	-0.101*	-0.0998*	-0.104*	-0.0955*	-0.0940*	-0.0989*
	(0.0446)	(0.0458)	(0.0480)	(0.0449)	(0.0437)	(0.0445)
$gy5$			0.109+			
			(0.0562)			
$\omega 1+$	-0.0134	-0.00784	0.00346	-0.00699	-0.00298	-0.0151
	(0.00802)	(0.00976)	(0.00631)	(0.00930)	(0.00801)	(0.0106)
$\omega 2+$	-0.00960+	-0.00845*	0.00928+	-0.00681	-0.00235	-0.00797
	(0.00572)	(0.00420)	(0.00481)	(0.00452)	(0.00447)	(0.00564)
$\omega 3+$	-0.0204	-0.0138	-0.00699	-0.0152	-0.0178	-0.0196
	(0.0177)	(0.0121)	(0.00858)	(0.0126)	(0.0159)	(0.0153)
$\omega 4+$	-0.0147*	-0.00563	-0.00779	-0.00729	-0.00821	-0.0106+
	(0.00558)	(0.00500)	(0.00587)	(0.00551)	(0.00735)	(0.00585)
$\omega 5+$			0.00872			
			(0.00772)			
$inst1 * \omega 1+$	0.00715+	0.00426	0.000331	0.00426	0.00313	0.00939*
	(0.00386)	(0.00317)	(0.00405)	(0.00316)	(0.00517)	(0.00343)
$inst2 * \omega 2+$	0.0126*	0.0113*	0.00959*	0.0103*	0.00719	0.00991*
	(0.00554)	(0.00317)	(0.00442)	(0.00418)	(0.00478)	(0.00468)
$inst3 * \omega 3+$	0.0116	0.00541	-0.000611	0.00704	0.0109	0.00968
	(0.0127)	(0.00706)	(0.00714)	(0.00807)	(0.0123)	(0.00927)
$inst4 * \omega 4+$	0.0137*	0.00516*	-0.00218	0.00713*	0.00963*	0.00910*
	(0.00385)	(0.00190)	(0.00504)	(0.00262)	(0.00471)	(0.00286)
$inst5 * \omega 5+$			0.00304			
			(0.00983)			
$\omega 1-$	0.00669	0.0108*	0.00834*	0.00885+	0.00177	0.0107*
	(0.00575)	(0.00451)	(0.00335)	(0.00442)	(0.00797)	(0.00502)
$\omega 2-$	-0.0140	-0.0149+	-0.00737	-0.0137+	-0.0225*	-0.0147

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

	(0.00902)	(0.00800)	(0.00602)	(0.00812)	(0.0108)	(0.00897)
$\omega 3-$	-0.00782	-0.00615	-0.00625	-0.00540	-0.00262	-0.00574
	(0.00769)	(0.00590)	(0.00378)	(0.00536)	(0.00347)	(0.00703)
$\omega 4-$	0.000320	0.00301	-0.000683	0.00160	-0.000761	0.00153
	(0.00872)	(0.00655)	(0.00382)	(0.00693)	(0.00623)	(0.00748)
$\omega 5-$			-0.0141*			
			(0.00289)			
$inst1 * \omega 1-$	0.00856*	0.00257	0.0111*	0.00418	0.00949	0.00260
	(0.00391)	(0.00234)	(0.00428)	(0.00262)	(0.00721)	(0.00285)
$inst2 * \omega 2-$	0.00224	0.00317	0.000633	0.00225	0.0117+	0.00302
	(0.00379)	(0.00265)	(0.00338)	(0.00306)	(0.00679)	(0.00354)
$inst3 * \omega 3-$	0.00341	0.00225	0.00107	0.00162	-0.00125	0.00181
	(0.00459)	(0.00301)	(0.00192)	(0.00283)	(0.00204)	(0.00395)
$inst4 * \omega 4-$	-0.00188	-0.00414	-0.00361	-0.00304	-0.00232	-0.00282
	(0.00587)	(0.00412)	(0.00583)	(0.00461)	(0.00537)	(0.00464)
$inst5 * \omega 5-$			0.00413+			
			(0.00243)			
$inst1$	0.237	0.269	1.340*	-0.113	-1.084*	-0.195
	(0.639)	(0.490)	(0.421)	(0.819)	(0.452)	(0.500)
$inst2$	0.507	-0.312	-1.127*	0.951	1.655+	0.441
	(0.809)	(0.921)	(0.524)	(0.686)	(0.915)	(0.625)
$inst3$	-0.0711	0.580	0.659	-1.388	-1.073	0.196
	(0.696)	(0.734)	(0.666)	(1.114)	(1.109)	(0.448)
$inst4$	-0.946	-0.317	0.650	0.270	0.644	-0.208
	(0.760)	(0.617)	(0.574)	(0.540)	(0.561)	(0.284)
$inst5$			-1.147			
			(0.749)			
$trend$	-0.0284*	-0.0268*	-0.0290*	-0.0275*	-0.0275*	-0.0271*
	(0.00961)	(0.00935)	(0.0106)	(0.00938)	(0.00963)	(0.00947)
$open1$		-0.225	1.254	-0.225	-0.253	-0.151
		(0.443)	(1.217)	(0.447)	(0.471)	(0.442)
$open2$			-2.173			
			(1.788)			
$open3$			1.292			
			(0.962)			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

$open4$			-1.478*			
			(0.721)			
$open5$			0.467			
			(0.476)			
$open1 * \omega1+$		-0.00302	-0.0103	-0.00339	-0.00686	-0.00269
		(0.00703)	(0.00754)	(0.00663)	(0.00553)	(0.00653)
$open2 * \omega2+$			-0.0113			
			(0.00726)			
$open3 * \omega3+$			0.00168			
			(0.00984)			
$open4 * \omega4+$			0.0107			
			(0.00663)			
$open5 * \omega5+$			-0.000797			
			(0.00722)			
$open1 * \omega1-$		0.00347*	0.00118	0.00345*	0.00577*	0.00345*
		(0.00151)	(0.00239)	(0.00140)	(0.00132)	(0.00142)
$open2 * \omega2-$			-0.00589*			
			(0.00227)			
$open3 * \omega3-$			-0.000285			
			(0.00247)			
$open4 * \omega4-$			-0.000264			
			(0.00313)			
$open5 * \omega5-$			0.00399*			
			(0.00145)			
Constant	1.577*	1.325*	1.606*	1.739*	1.395*	1.235*
	(0.380)	(0.444)	(0.523)	(0.546)	(0.435)	(0.498)
$\sum_{j=1}^{J} \phi_j$	-0.0581	-0.0357	0.00669	-0.0363	-0.0313	-0.0533
	[0.00441]	[0.00405]	[0.553]	[0.000816]	[0.0351]	[0.000376]
$\sum_{j=1}^{J} \phi_j$	0.0451	0.0262	0.0102	0.0287	0.0308	0.0381
	[0.00966]	[0.00449]	[0.450]	[0.00652]	[0.0396]	[0.00216]
$\sum_{j=1}^{J} \lambda_j$	-0.0148	-0.00727	-0.0200	-0.00860	-0.0242	-0.00823
	[0.366]	[0.477]	[0.0511]	[0.441]	[0.186]	[0.476]
$\sum_{j=1}^{J} \psi_j$	0.0123	0.00386	0.0133	0.00501	0.0176	0.00460
	[0.130]	[0.458]	[0.0164]	[0.349]	[0.156]	[0.439]
$\sum_{j=1}^{J} \gamma_j$	0.0922	0.104	0.204	0.111	0.117	0.0976
	[0.413]	[0.368]	[0.112]	[0.337]	[0.315]	[0.389]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0640	-0.0399	0.00840	-0.0408	-0.0355	-0.0590

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

	[0.017]	[0.008]	[0.546]	[0.003]	[0.046]	[0.003]
$\frac{(\sum_{j=1}^{J}\Theta_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0496	0.0292	0.0128	0.0323	0.0349	0.0422
	[0.030]	[0.020]	[0.466]	[0.024]	[0.064]	[0.015]
$\frac{(\sum_{j=1}^{J}\lambda_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	-0.0163	-0.00812	-0.0252	-0.00967	-0.0274	-0.00912
	[0.387]	[0.491]	[0.093]	[0.464]	[0.216]	[0.490]
$\frac{(\sum_{j=1}^{J}\psi_j)}{(1-\sum_{j=1}^{J}\gamma_j)}$	0.0136	0.00431	0.0167	0.00563	0.0199	0.00510
	[0.153]	[0.458]	[0.032]	[0.366]	[0.177]	[0.444]
N	1719	1719	1666	1719	1719	1719
within R^2	0.1164	0.1162	0.1476	0.1149	0.1169	0.1157

Results estimated for equation 4. The number after each variable name represents the lag j specified in equation 4. The variable *open* is openness, as detailed in the table A.3. Total effects are presented in the bottom of the table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.26 Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0171			
			(0.0456)			
-1.5			-0.0108			
			(0.0371)			
-1	-0.114*	-0.0691*	-0.00437	-0.0731*	-0.0704*	-0.101*
	(0.0470)	(0.0236)	(0.0288)	(0.0241)	(0.0335)	(0.0341)
-0.5	-0.0889*	-0.0545*	0.00201	-0.0569*	-0.0529*	-0.0801*
	(0.0363)	(0.0186)	(0.0209)	(0.0181)	(0.0250)	(0.0264)
0	-0.0640*	-0.0399*	0.00840	-0.0408*	-0.0355*	-0.0590*
	(0.0260)	(0.0144)	(0.0138)	(0.0131)	(0.0173)	(0.0191)
0.5	-0.0392*	-0.0253*	0.0148	-0.0246*	-0.0181	-0.0379*
	(0.0167)	(0.0120)	(0.00985)	(0.0106)	(0.0119)	(0.0132)
1	-0.0144	-0.0107	0.0212+	-0.00847	-0.000606	-0.0168
	(0.0113)	(0.0124)	(0.0124)	(0.0122)	(0.0124)	(0.0110)
1.5	0.0104	0.00393	0.0276	0.00768	0.0168	0.00426
	(0.0149)	(0.0154)	(0.0191)	(0.0168)	(0.0183)	(0.0144)
2	0.0352	0.0185		0.0238	0.0343	0.0254
	(0.0238)	(0.0199)		(0.0226)	(0.0262)	(0.0208)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0586*			
			(0.0268)			
-1.5			-0.0502*			
			(0.0234)			
-1	-0.0299	-0.0124	-0.0419*	-0.0153	-0.0473	-0.0142
	(0.0278)	(0.0168)	(0.0202)	(0.0188)	(0.0360)	(0.0193)
-0.5	-0.0231	-0.0103	-0.0335+	-0.0125	-0.0373	-0.0117
	(0.0233)	(0.0142)	(0.0173)	(0.0159)	(0.0289)	(0.0162)
0	-0.0163	-0.00812	-0.0252+	-0.00967	-0.0274	-0.00912
	(0.0187)	(0.0117)	(0.0147)	(0.0131)	(0.0219)	(0.0131)
0.5	-0.00955	-0.00596	-0.0168	-0.00685	-0.0174	-0.00657
	(0.0143)	(0.00946)	(0.0127)	(0.0104)	(0.0151)	(0.0103)
1	-0.00276	-0.00385	-0.00845	-0.00404	-0.00745	-0.00402

Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

	(0.0101)	(0.00769)	(0.0117)	(0.00806)	(0.00901)	(0.00783)
1.5	0.00403	-0.00166	-0.0000952	-0.00122	0.00251	-0.00147
	(0.00648)	(0.00666)	(0.0119)	(0.00636)	(0.00642)	(0.00621)
2	0.0108*	0.000495		0.00160	0.0125	0.00108
	(0.00516)	(0.00684)		(0.00591)	(0.0103)	(0.00613)
N	1719	1719	1666	1719	1719	1719

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.25 (equation 4).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Table A.27 Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification

Dependent Variable: Real GDP Growth

	reg	*cor*	*pol*	*law*	*voice*	*gov*
$gy1$	0.0722	0.0746	0.0851	0.0775	0.0794	0.0730
	(0.114)	(0.116)	(0.111)	(0.117)	(0.118)	(0.114)
$gy2$	0.166*	0.168*	0.160*	0.175*	0.177*	0.168*
	(0.0489)	(0.0486)	(0.0510)	(0.0467)	(0.0465)	(0.0487)
$gy3$	-0.0509	-0.0488	-0.0597+	-0.0467	-0.0453	-0.0517
	(0.0373)	(0.0371)	(0.0312)	(0.0313)	(0.0304)	(0.0381)
$gy4$	-0.110*	-0.111*	-0.116*	-0.0955*	-0.0940*	-0.110*
	(0.0481)	(0.0496)	(0.0486)	(0.0449)	(0.0437)	(0.0476)
$gy5$			0.103+			
			(0.0524)			
$\omega 1+$	-0.00856	-0.00773	-0.00438	-0.00699	-0.00298	-0.0147
	(0.00947)	(0.0107)	(0.0107)	(0.00930)	(0.00801)	(0.0107)
$\omega 2+$	-0.00633	-0.00605	0.00823	-0.00681	-0.00235	-0.00530
	(0.00706)	(0.00729)	(0.00516)	(0.00452)	(0.00447)	(0.00777)
$\omega 3+$	-0.0173	-0.00840	-0.00502	-0.0152	-0.0178	-0.0126
	(0.0188)	(0.0122)	(0.00982)	(0.0126)	(0.0159)	(0.0160)
$\omega 4+$	-0.0154+	-0.00623	-0.00704	-0.00729	-0.00821	-0.0155*
	(0.00816)	(0.00787)	(0.00652)	(0.00551)	(0.00735)	(0.00765)
$\omega 5+$			0.0123+			
			(0.00670)			
$inst1 * \omega 1+$	-0.00531	-0.00597	-0.00582	0.00426	0.00313	-0.0000324
	(0.0109)	(0.00683)	(0.00618)	(0.00316)	(0.00517)	(0.00753)
$inst2 * \omega 2+$	0.0105	0.0113*	0.00706	0.0103*	0.00719	0.00797
	(0.00745)	(0.00372)	(0.00463)	(0.00418)	(0.00478)	(0.00547)
$inst3 * \omega 3+$	0.0171	0.00668	-0.00115	0.00704	0.0109	0.0129
	(0.0169)	(0.00945)	(0.00750)	(0.00807)	(0.0123)	(0.0117)
$inst4 * \omega 4+$	0.0185*	0.00692*	0.000220	0.00713*	0.00963*	0.0128*
	(0.00459)	(0.00182)	(0.00478)	(0.00262)	(0.00471)	(0.00276)
$inst5 * \omega 5+$			-0.00606			
			(0.00523)			
$\omega 1-$	0.00389	0.0104*	0.0102*	0.00885+	0.00177	0.00867+
	(0.00563)	(0.00414)	(0.00325)	(0.00442)	(0.00797)	(0.00440)
$\omega 2-$	-0.0170+	-0.0177+	-0.0132*	-0.0137+	-0.0225*	-0.0177+

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

	(0.00999)	(0.00906)	(0.00588)	(0.00812)	(0.0108)	(0.00950)
$\omega 3-$	-0.00627	-0.00784	-0.00847	-0.00540	-0.00262	-0.00622
	(0.00811)	(0.00790)	(0.00543)	(0.00536)	(0.00347)	(0.00815)
$\omega 4-$	0.000386	0.00153	-0.00228	0.00160	-0.000761	0.00217
	(0.00997)	(0.00776)	(0.00396)	(0.00693)	(0.00623)	(0.00807)
$\omega 5-$			-0.0143*			
			(0.00397)			
$inst1 * \omega 1-$	0.0114*	0.00542*	0.0120*	0.00418	0.00949	0.00606*
	(0.00489)	(0.00213)	(0.00273)	(0.00262)	(0.00721)	(0.00266)
$inst2 * \omega 2-$	0.00193	0.00262	0.00132	0.00225	0.0117+	0.00280
	(0.00521)	(0.00292)	(0.00308)	(0.00306)	(0.00679)	(0.00367)
$inst3 * \omega 3-$	-0.00237	-0.000457	-0.00137	0.00162	-0.00125	-0.00252
	(0.00304)	(0.00236)	(0.00169)	(0.00283)	(0.00204)	(0.00284)
$inst4 * \omega 4-$	-0.00460	-0.00605	-0.00599	-0.00304	-0.00232	-0.00300
	(0.00686)	(0.00419)	(0.00574)	(0.00461)	(0.00537)	(0.00503)
$inst5 * \omega 5-$			0.00431*			
			(0.00207)			
$inst1$	0.310	0.464	1.399*	-0.113	-1.084*	-0.0646
	(0.712)	(0.494)	(0.428)	(0.819)	(0.452)	(0.511)
$inst2$	0.514	-0.543	-1.250*	0.951	1.655+	0.454
	(0.843)	(0.941)	(0.550)	(0.686)	(0.915)	(0.576)
$inst3$	-0.145	0.663	1.081	-1.388	-1.073	0.195
	(0.706)	(0.748)	(0.685)	(1.114)	(1.109)	(0.403)
$inst4$	-1.160	-0.333	0.386	0.270	0.644	-0.463+
	(0.790)	(0.580)	(0.485)	(0.540)	(0.561)	(0.255)
$inst5$			-1.300			
			(0.800)			
$trend$	-0.0319+	-0.0313+	-0.0358+	-0.0275*	-0.0275*	-0.0313+
	(0.0160)	(0.0157)	(0.0180)	(0.00938)	(0.00963)	(0.0162)
$open1$	0.139	0.149	1.918	-0.225	-0.253	0.147
	(0.521)	(0.509)	(1.212)	(0.447)	(0.471)	(0.513)
$open2$			-2.661			
			(1.985)			
$open3$			1.727			
			(1.079)			

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

$open4$			-1.957*			
			(0.695)			
$open5$			0.527			
			(0.509)			
$open1 * \omega1+$	-0.0112	-0.0127	-0.0168+	-0.00339	-0.00686	-0.00821
	(0.00835)	(0.00865)	(0.00965)	(0.00663)	(0.00553)	(0.00895)
$open2 * \omega2+$			-0.00811			
			(0.00761)			
$open3 * \omega3+$			0.00941			
			(0.00774)			
$open4 * \omega4+$			0.00767			
			(0.00583)			
$open5 * \omega5+$			0.00557			
			(0.00581)			
$open1 * \omega1-$	0.00923*	0.00911*	0.00645*	0.00345*	0.00577*	0.00942*
	(0.00231)	(0.00252)	(0.00182)	(0.00140)	(0.00132)	(0.00235)
$open2 * \omega2-$			-0.00987+			
			(0.00569)			
$open3 * \omega3-$			-0.00405+			
			(0.00207)			
$open4 * \omega4-$			0.00250			
			(0.00272)			
$open5 * \omega5-$			0.00398*			
			(0.00152)			
$fd1$	0.116	0.131	-0.0670			0.217
	(0.980)	(0.926)	(1.056)			(0.932)
$fd2$	-0.00764	0.0375	0.428			0.0131
	(1.119)	(1.070)	(1.259)			(1.107)
$fd3$	-0.999	-1.079	-0.461			-0.199
	(1.047)	(1.028)	(0.737)			(0.592)
$fd4$	1.059	0.991				
	(1.127)	(1.066)				
$fd1 * \omega1+$	0.0405	0.0418	0.0373+			0.0346
	(0.0273)	(0.0264)	(0.0219)			(0.0248)
$fd2 * \omega2+$	0.00277	0.00158	0.00348			0.00448

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

	(0.0132)	(0.0106)	(0.00898)			(0.0118)
$fd3 * \omega 3+$	-0.00372	0.000742	-0.00222			-0.00978
	(0.0133)	(0.0130)	(0.0123)			(0.0114)
$fd4 * \omega 4+$	-0.0117*	-0.00501				
	(0.00526)	(0.00484)				
$fd1 * \omega 1-$	-0.0196*	-0.0161*	-0.0150*			-0.0159*
	(0.00767)	(0.00759)	(0.00676)			(0.00720)
$fd2 * \omega 2-$	0.00544	0.00473	0.0162			0.00541
	(0.00518)	(0.00520)	(0.0100)			(0.00530)
$fd3 * \omega 3-$	0.0107+	0.00995+	0.0146*			0.0116*
	(0.00566)	(0.00578)	(0.00539)			(0.00548)
$fd4 * \omega 4-$	0.00753*	0.00856*				
	0.00359)	(0.00404)				
Constant	1.644*	1.008	1.576+	1.739*	1.395*	1.132
	(0.789)	(0.618)	(0.790)	(0.546)	(0.435)	(0.732)
$\sum_{j=1}^{J} \phi_j$	-0.0476	-0.0284	0.00413	-0.0363	-0.0313	-0.0481
	[0.00305]	[0.00792]	[0.751]	[0.000816]	[0.0351]	[0.000218]
$\sum_{j=1}^{J} \Theta_j$	0.0408	0.0190	-0.00576	0.0287	0.0308	0.0337
	[0.0369]	[0.0717]	[0.576]	[0.00652]	[0.0396]	[0.00489]
$\sum_{j=1}^{J} \lambda_j$	-0.0190	-0.0136	-0.0281	-0.00860	-0.0242	-0.0131
	[0.329]	[0.362]	[0.0545]	[0.441]	[0.186]	[0.407]
$\sum_{j=1}^{J} \psi_j$	0.00641	0.00153	0.0102	0.00501	0.0176	0.00334
	[0.440]	[0.760]	[0.0423]	[0.349]	[0.156]	[0.572]
$\sum_{j=1}^{J} \gamma_j$	0.0776	0.0828	0.172	0.111	0.117	0.0791
	[0.490]	[0.475]	[0.158]	[0.337]	[0.315]	[0.484]
$\frac{\left(\sum_{j=1}^{J} \phi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0516	-0.0310	0.00499	-0.0408	-0.0355	-0.0522
	[0.009]	[0.010]	[0.751]	[0.003]	[0.046]	[0.001]
$\frac{\left(\sum_{j=1}^{J} \Theta_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.0443	0.0207	-0.00696	0.0323	0.0349	0.0366
	[0.066]	[0.099]	[0.567]	[0.024]	[0.064]	[0.018]
$\frac{\left(\sum_{j=1}^{J} \lambda_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	-0.0206	-0.0148	-0.0339	-0.00967	-0.0274	-0.0142
	[0.345]	[0.376]	[0.078]	[0.464]	[0.216]	[0.420]
$\frac{\left(\sum_{j=1}^{J} \psi_j\right)}{\left(1-\sum_{j=1}^{J} \gamma_j\right)}$	0.00695	0.00166	0.0124	0.00563	0.0199	0.00363
	[0.451]	[0.760]	[0.071]	[0.366]	[0.177]	[0.578]
N	1569	1569	1516	1719	1719	1569
within R^2	0.1280	0.1260	0.1656	0.1149	0.1169	0.1238

Results estimated for equation 4. The number after each variable name represents the lag j specified in equation 4. The variable *open* is openness and the variable *fd* is financial development, as detailed in the table A.3. Total effects are presented in the bottom of the

Fixed-Effects Regressions with Driscoll and Kraay Standard Errors - with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

table.
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).
Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$
P-values in brackets
A quadratic trend in time was also included in all models. In all regressions, the quadratic trend was not significant and it was excluded.
The Stata command $xtscc, fe$ was used to estimate fixed-effects regressions with Driscoll and Kraay standard errors.

Table A.28 Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification

$inst_{i,t-j}$	*reg*	*cor*	*pol*	*law*	*voice*	*gov*
			$\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			0.0189			
			(0.0321)			
-1.5			0.0154			
			(0.0269)			
-1	-0.0959*	-0.0516*	0.0119	-0.0731*	-0.0704*	-0.0888*
	(0.0396)	(0.0180)	(0.0222)	(0.0241)	(0.0335)	(0.0267)
-0.5	-0.0737*	-0.0413*	0.00847	-0.0569*	-0.0529*	-0.0705*
	(0.0288)	(0.0139)	(0.0182)	(0.0181)	(0.0250)	(0.0204)
0	-0.0516*	-0.0310*	0.00499	-0.0408*	-0.0355*	-0.0522*
	(0.0191)	(0.0116)	(0.0157)	(0.0131)	(0.0173)	(0.0153)
0.5	-0.0295*	-0.0206	0.00151	-0.0246*	-0.0181	-0.0339*
	(0.0135)	(0.0123)	(0.0152)	(0.0106)	(0.0119)	(0.0129)
1	-0.00735	-0.0103	-0.00197	-0.00847	-0.000606	-0.0157
	(0.0165)	(0.0157)	(0.0171)	(0.0122)	(0.0124)	(0.0146)
1.5	0.0148	0.0000401	-0.00545	0.00768	0.0168	0.00262
	(0.0254)	(0.0204)	(0.0206)	(0.0168)	(0.0183)	(0.0192)
2	0.0369	0.0104		0.0238	0.0343	0.0209
	(0.0359)	(0.0257)		(0.0226)	(0.0262)	(0.0253)
			$\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$			
-2			-0.0586*			
			(0.0278)			
-1.5			-0.0525*			
			(0.0252)			
-1	-0.0275	-0.0165	-0.0463*	-0.0153	-0.0473	-0.0178
	(0.0296)	(0.0203)	(0.0228)	(0.0188)	(0.0360)	(0.0226)
-0.5	-0.0241	-0.0157	-0.0401+	-0.0125	-0.0373	-0.0160
	(0.0255)	(0.0183)	(0.0206)	(0.0159)	(0.0289)	(0.0199)
0	-0.0206	-0.0148	-0.0339+	-0.00967	-0.0274	-0.0142
	(0.0216)	(0.0166)	(0.0189)	(0.0131)	(0.0219)	(0.0175)
0.5	-0.0171	-0.0140	-0.0277	-0.00685	-0.0174	-0.0124
	(0.0180)	(0.0152)	(0.0176)	(0.0104)	(0.0151)	(0.0153)

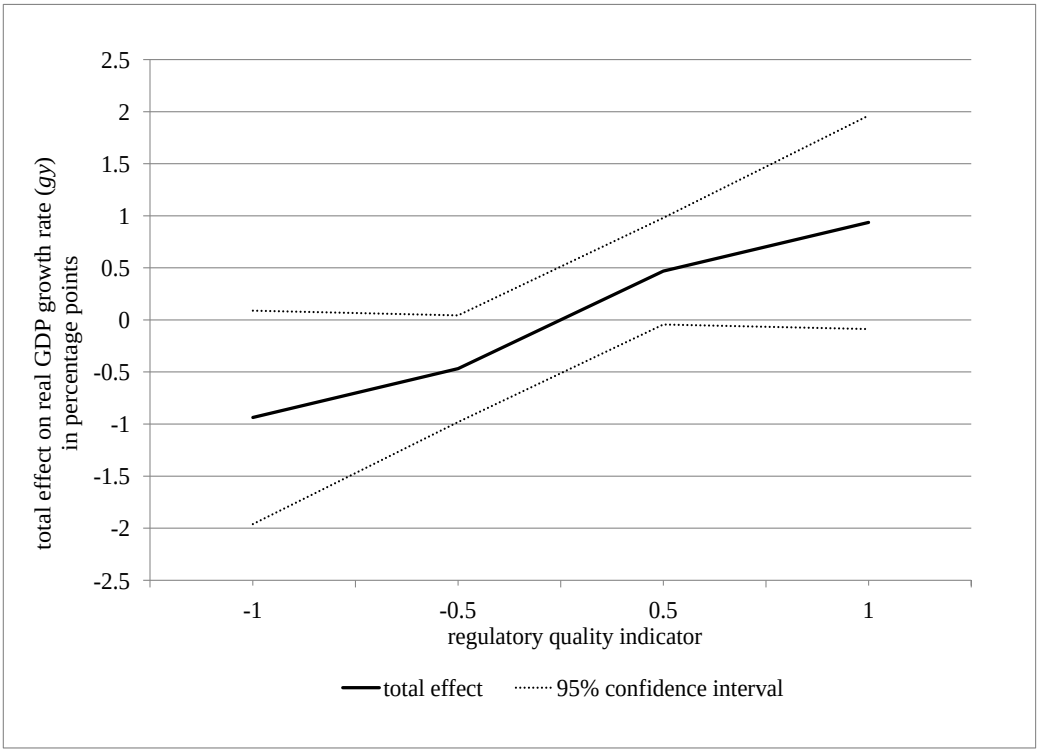
Estimated Total Effect at Specific Values of Institutional Development - Fixed-Effects Regressions with Openness and Financial Development - Evaluating Hypotheses 2 and 3 - II - A Second Alternative Specification - Continued

1	-0.0136	-0.0132	-0.0215	-0.00404	-0.00745	-0.0106
	(0.0149)	(0.0142)	(0.0168)	(0.00806)	(0.00901)	(0.0136)
1.5	-0.0102	-0.0124	-0.0153	-0.00122	0.00251	-0.00877
	(0.0128)	(0.0136)	(0.0168)	(0.00636)	(0.00642)	(0.0125)
2	-0.00670	-0.0115		0.00160	0.0125	-0.00696
	(0.0121)	(0.0135)		(0.00591)	(0.0103)	(0.0123)
N	1569	1569	1516	1719	1719	1569

Total effect and standard error estimated for $\left(\sum_{j=1}^{J}\phi_j+\sum_{j=1}^{J}\Theta_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ and $\left(\sum_{j=1}^{J}\lambda_j+\sum_{j=1}^{J}\psi_j inst_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$ at different levels of $inst_{i,t-j}$. Estimates derived from table A.27 (equation 4).
Standard errors in parentheses
+ $p<0.10$, * $p<0.05$
In each column a different institutional development indicator is used: regulatory quality (*reg*), control of corruption (*cor*), political stability and absence of violence/terrorism (*pol*), rule of law (*law*), voice and accountability (*voice*) and government effectiveness (*gov*).

Appendix B - Figures

Figure B.1 Effect of Institutional Development on Real GDP Growth



The total effects were derived from the fixed-effects model for the regulatory quality indicator with five lags and openness as controls, first column of table 7. The total effect of a given level of institutional development on real GDP growth is given by: $\left(\sum_{j=1}^{J}\tau_j inst_{i,t-j}+\sum_{j=1}^{J}\Theta_j inst_{i,t-j} gdisc^{+}_{i,t-j}\right)/\left(1-\sum_{j=1}^{J}\gamma_j\right)$. The graph is composed by the effects estimated for regulatory quality equal to -1, -0.5, 0.5 and 1 and assuming a 15% increase in central bank discount rates. The estimated effects are significant at the 10% level.

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