

## Central Bank Independence and Economic Growth

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## Abstract

This research aims to estimate the relationship between Central Bank independence and economic growth. Adopting the Arellano-Bover (1995)/Blundell-Bond (1998) two-stage estimation method for dynamic panel models, we analyse a sample of 186 countries from 1970 to 2018. After controlling for the standard economic growth determinants, we consider the legal and the actual independence of Central Banks (measured by an irregular turnover dummy for the Central Bank Governor) as our variables of interest. We find that when an irregular turnover occurs it harms growth and that the legal independence framework is not statistically significant. Furthermore, we conclude that these results are robust for middle-income countries, in countries which had experienced a crisis (among banking, currency and sovereign debt), in countries that do not adopt quantitative easing policy measures and in countries that are not part of monetary unions. The legal independence is a positive factor for growth when restricting to countries belonging to monetary unions. We also find that growth is not affected by Central Bank independence when countries are divided by continents.

**JEL Codes:** C23; E58; O43.

**Keywords:** dynamic inconsistency; Central Bank independence; inflation; economic growth.

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## Sumário

Esta investigação pretende estimar a relação entre a independência dos Bancos Centrais e o crescimento económico de cada país. Recorrendo ao método de estimação de dois estágios de Arellano-Bover (1995)/Blundell-Bond (1998), analisamos uma amostra de 186 países entre 1970 e 2018. Após controlar o crescimento económico com os seus determinantes standard, adotamos um índice de independência legal e uma medida de independência real (expressa através de uma variável binária de rotatividade irregular do Governador do Banco Central) como variáveis de interesse. Os resultados revelam que o crescimento económico é afetado negativamente apenas quando existe rotatividade irregular e que a independência legal não é estatisticamente significativa. Para além disso, conclui-se que estes resultados são robustos em países de rendimento médio, em países que já experienciaram crises (nomeadamente de banca, moeda ou dívida soberana), em países que nunca adotaram medidas de quantitative easing e em países que não fazem parte de uniões monetárias. A independência legal contribui de forma positiva para o crescimento económico apenas nos países que pertencem a uniões monetárias. Também se conclui que o crescimento da economia não é afetado pela independência dos Bancos Centrais quando se dividem os países por continentes.

**Códigos JEL:** C23; E58; O43.

**Palavras-chave:** inconsistência dinâmica; independência do Banco Central; inflação; crescimento económico.

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## List of Abbreviations

**2SLS** – Two-stage least squares  
**AIC** – Akaike Information Criterion  
**ARDL** – Autoregressive Distributed Lagged  
**BIC** – Bayesian Information Criterion  
**CBI** – Central Bank independence  
**CBIM** – Central Bank independence measures  
**CEO** – Chief Executive Officer  
**CIA** – Central Intelligence Agency  
**Cont** – Continents  
**CPI** – Consumer Price Index  
**Debt\_Y** – Debt as a share of Gross Domestic Product  
**EGD** – Economic growth determinants  
**EMS** – European Monetary System  
**G\_Y** – Government Expenditures as a share of Gross Domestic Product  
**GDP** – Gross Domestic Product  
**GLS** – Generalized Least Squares  
**GMM** – Generalized Method of Moments  
**GMT** – Grilli, Masciandaro and Tabellini (1991) index of independence  
**GNI** – Gross Nacional Income  
**GNP** – Gross Nacional Product  
**GovBal\_Y** – General net lending/borrowing as a share of Gross Domestic Product  
**gY** – Real Gross Domestic Product growth rate  
**gYpc** – Real Gross Domestic Product *per capita* growth rate  
**HKI** – Human capital index  
**HQIC** – Hannan-Quinn Information Criterion  
**I\_Y** – Investment as a share of Gross Domestic Product  
***iid*** – Independent and identically distributed  
**IMF** – International Monetary Found  
**Inc\_level** – Income level  
**infl** – Inflation  
**inflsq** – Squared inflation  
**Irreg\_TO** – Irregular Turnover dummy  
**IV** – Instrumental Variables  
**L1** – First lag of the dependent variable  
**L2** – Second lag of the dependent variable  
**LCBI** – Legal Central Bank independence  
**LE** – Life expectancy  
**N** – Cross-sections  
**N/A** – Not available  
**Max** – Maximum  
**Min** – Minimum  
**MU** – Level of monetary integration  
**Obs** – Number of observations  
**OECD** – Organization for Economic Cooperation and Development  
**OLS** – Ordinary Least Squares  
**p.p.** – Percentage point(s)  
**P50** – Median  
**Polity2** – Democracy index

**Pop** – Population  
**QE** – Quantitative easing  
**R&D\_Y** – Research and Development expenditure as a share of Gross Domestic Product  
**RoL** – Rule of law  
**Std.** – Standard deviation  
**SUR** – Seemingly Unrelated Regressions  
**TIR** – Transformed inflation rate  
**TOR** – Actual turnover rate  
**ToT** – Terms of trade  
**U.S.A.** – United States of America  
**USD** – United States of America Dollar  
**UNCTAD** – United Nations Conference on Trade and Development  
**UNESCO** – United Nations Educational, Scientific and Cultural Organization  
**vLE** – Life expectancy variation  
**Y** – Real Gross Domestic Product  
**Ypc** – Real Gross Domestic Product *per capita*

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# 1 Introduction

Can a country's economic growth benefit from Central Bank independence? In this dissertation we assess if, besides the relevance that Central Bank independence (CBI) has on targeting a low inflation rate, it also has a positive influence on economic growth. By preventing the monetary authority of a country from satisfying its Government wishes, Central Bank independence is, by now, a consensual principle to prevent high inflation and rising public debt, i.e., debt monetization, reducing the burden for the next generations. Additionally, economic growth might also be affected, depending on the institutional framework defining the relationship between Central Banks and Governments, namely the degree of independence of the monetary policy institution relative to the second.

Some work has been developed concerning the relationship between CBI and economic growth, but the literature on this subject is still very scarce, with most papers focusing on the link between CBI and inflation. Our contribution to the literature is fourfold. First, we use a panel database that comprises 186 countries, between 1970 and 2018, allowing for a World-wide perspective on this issue. Second, we use two measures of independence: one that was developed by Cukierman *et al.* (1992) and updated by Garriga (2016), consisting on a legal measure of Central Bank independence; and another based on De Haan and Sturm (2001), which was updated by De Haan *et al.* (2008, 2010), measuring the actual level of independence of a Central Bank (given by an irregular turnover dummy of its Governor or Chief Executive Officer). Third, we try to overcome an omitted variables problem that existed in the previous literature, i.e., most studies only used the economic growth rate and a CBI measure in their estimations, thus neglecting the possible effect of the determinants of economic growth identified in the literature. Finally, we perform robustness analysis considering the continents of the world, the income levels, the existence of crises (among banking, currency and sovereign debt ones), the adoption of quantitative easing by countries, and the level of monetary integration. With this purpose, we estimate dynamic panel models using the Arellano-Bover (1995)/Blundell-Bond (1998) method with Windmeijer (2005) standard errors correction.

Results show that only the actual measure of Central Bank independence can be accountable for growth in the entire sample, as well as for the middle-income countries group, in countries which had been through crisis, in non-quantitative easing performing countries, and in countries which are not part of monetary unions. The legal measure of independence positively influences growth only in countries which belong to monetary unions.

Our work is structured in the following way. In section 2 we present the literature review. Section 3 presents some empirical evidence that motivates our work. In section 4 we define our empirical approach, presenting the database and the econometric methodology. In Section 5 we discuss our results for the benchmark model and in Section 6 we perform several robustness analysis. Section 7 concludes.

## 2 Literature Review

Central Bank independence has been the most consensual solution for the dynamic inconsistency problem, which can exist when a non-independent monetary authority is frequently buying Government securities to finance Government expenditures. The increase in money supply needed to buy Government securities leads to inflation even if this was not the original goal of the monetary authority – this inter-temporal inconsistency fosters uncertainty among private agents.

From the moment a Central Bank becomes independent, it is bounded by statutory laws concerning the policy to follow and the instruments to use, even if the independence is residual and the strength of the boundaries defined between the monetary and fiscal authorities is not strong. An increasing degree of Central Bank independence suggests that there will be a higher commitment to a previous defined policy, which should be maintained independently of the needs of Governments. Besides, it is expected that Central Bank credibility will increase and agents will know what to expect from the monetary authority.

In this section, we will explore the connections between CBI and inflation and economic growth, two variables that are usually in the policy functions of Central Banks around the world. First, we explore the relationship between CBI and inflation, presenting theoretical arguments and also empirical evidence. Second, we do the same for the relationship between CBI and economic growth.

## 2.1 The Relationship between Central Bank Independence and Inflation

Central Banks, as monetary authorities of each country or economic area, have, usually, the primary goal of maintaining price stability, when defining interest rates, which are incorporated on individual's decisions and actions. Governments, as fiscal authorities, have as the main objective to improve the quality of life and welfare of its citizens, which they can do by regulating labour and product markets, reinforcing the rule of law, applying expansionary or contractionary fiscal policies, among others. Some policy actions pursued by the Government need financing. If Governments spend more than the revenues (taxes) collected, they may feel the temptation to ask the Central Bank to buy bonds to finance its expenditures. Extra liquidity in the economy and extra spending from the Government usually generates inflation.

### 2.1.1 Theory Behind the Relationship between Central Bank Independence and Inflation

There are several theoretical arguments that can reflect the relationship between Central Bank independence and inflation or its variability, by different mechanisms.

Buchanan and Wagner (1977) and Kydland and Prescott (1977) share, respectively, two lines of reasoning with Barro and Gordon (1983). The first one points that if a Central Banker is independent from Government's discretion, he or she tries to avoid inflationary expectations to occur, leading to lower inflation rates. The second one defends that if a Central Bank governor is appointed for a mandate with a long duration, it means it is insulated from political pressures, when comparing to a short mandate period – in this way, he or she will not be subject to inflationary pressures, delivering low inflation.

Sargent and Wallace (1981) argue that a Central Banker dominated by the fiscal authority will only be concerned about allocating Government's debt into bonds and monetary base. In this situation, the growth rate of the bonds has to be higher than the growth rate of the monetary base, for the monetary authority to be able to fight inflation. When the real stock of bonds grows faster than the economy, there is the need to finance the amount the lender has to receive from the borrower – an increase in money supply will raise inflation and an independent Central Bank should avoid this.

Alesina (1989) reports that, usually, right-wing Governments apply contractionary policies and left-wing Governments behave oppositely. A Central Bank which is independent from political power does not change monetary policy, leading to low variability of inflation, even if Governments often alternate between left and right wings parties. Walsh (1994) complements Alesina (1989) by considering that a Central Bank free from political pressures will not adopt, so easily, expansionary policies to promote Governments hence average inflation will be lower compared with a situation of non-independence.

De Haan and Sturm (1992) state that if economic activity decelerates, tax revenues will also decrease. Besides, the financial losses associated with this slow-down can reduce the Government's ability to pay debt interest, increasing the need for money. An independent Central Bank will not be willing to uphold a decrease in interest rates, for an increase in money supply, which would make prices increase.

Posen (1998) presents an argument where individuals make forward-looking decisions, and there is no trade-off between inflation and unemployment (vertical long-run Phillips curve). An increase in Central Bank independence is the way used by Governments to make a credible commitment to lower inflation.

Mendonça (2006) bases his arguments on the Barro-Gordon model of savings, reflecting the two types of Central Bank behaviour defined by Backus and Driffill (1985) – strong (highly independent) and weak (highly dependent) whether its target is price stability or unemployment, respectively. For this author, a stronger Central Bank, meaning that it has a high credibility, will promote a low and stable inflation rate.

Ferguson (2006) argues that a monetary authority committed to a low inflation rate leads individuals expectations to correspond to that low inflation rate. Prices and wages movements consistent with policies associated with low inflation start to appear and output can benefit from it. Furthermore, the author defends that Central Bank independence makes it possible for the institution to pursue, vigorously, price stability.

After these theoretical arguments, we analyse the empirical evidence on the relationship between Central Bank independence and inflation.

### 2.1.2 Empirical Findings Regarding the Relationship between Central Bank Independence and Inflation

The following authors presented results considering the relationship between Central Bank independence and inflation. A summary of the results is presented in Table 1 below.

Bade and Parkin (1988) studied 12 industrial countries, from 1972 to 1986, developing two measures of Central Bank independence from the Government: political and financial. Inflation was measured by the average change rate of prices for consumers in each country. With first-order auto-regressive models for inflation and with pooled time-series cross-section to regress inflation in terms of CBI, the authors concluded that independence influences negatively inflation.

Grilli *et al.* (1991) estimated four regressions for the periods 1950-1959, 1960-1969, 1970-1979, and 1980-1989 by Seemingly Unrelated Regressions (SUR), and another one by OLS for the entire period, for 18 OECD countries. Measuring inflation by the GNP deflator, the coefficients of each type of CBI considered – political and economic – are always negative, the economic independence has a high significance in high inflation periods (1970-1979, 1980-1989, and also considering the whole period), and political independence is significant just during 1970-1979. When adding 3 political variables to the regressions and summing the two measures of independence into a single one – originating the Grilli, Masciandaro, and Tabellini index, or simply GMT (1991) index –, with the same methods for each period, this new measure continues to have a negative impact on inflation and is considered significant half of the time. For the entire period, the GMT (1991) index is more important than the political variables.

Cukierman *et al.* (1992) considered the period 1950-1989 and 72 countries (21 industrial and 51 developing countries). The authors computed an index for Legal Central Bank independence (LCBI), and a measure for the actual independence of the Central Bank, reflected by the Chief Executive Officer (CEO)'s actual turnover rate (TOR). Inflation – or transformed inflation Rate (TIR) – is measured by the annual real depreciation for a certain amount of money and appears to have a negative relationship with LCBI and TOR in industrial countries (stronger in the first case), and a positive one with TOR in developing ones. In the high range of turnover rates' regressions, turnover is the most relevant variable for inflation. Instrumenting TOR, in a 2SLS method, its coefficient is negative concerning inflation, in industrial countries, and positive in the entire sample and for developing countries. LCBI is only negatively significant in the industrial subsample. The variability of inflation, proxied by the standard deviation of TIR, is positively influenced by turnover in all samples, except in the industrial countries set, on which the LCBI's coefficient is negatively significant. In a related article, Cukierman *et al.* (1993) used a sample of 40 countries, between 1965 and 1989 (although some countries data span is inferior), to study the impact of Central Bank independence in the yearly standard deviation of the *ex post* real deposit rates: these are given by adjusting the average nominal interest rate by the inflation rate, over a determined maturity. LCBI and TOR, proposed by Cukierman *et al.* (1992), were also used by these authors. With a cross-section estimation method, turnover has a positive and robust relationship with the dependent variable in the whole sample, as well as in developing countries. In industrial countries, LCBI is the only one having a negative impact on the variability of *ex post* real deposit rates. Furthermore, to examine the effect of Central Bank independence on the variability of nominal interest rates, the authors used data for the standard deviation of the discount rate from 1970-1989 (54 countries), and the deposit and the bond rates from 1978-1989 (57 countries and 33 countries, respectively). Turnover appears to have a positive impact only on the short-term rates (discount and deposit rates), and LCBI does not show any significance.

De Haan and Sturm (1992) contemplate in their research the period 1961-1987, and three subperiods: 1961-1969, 1970-1978, and 1979-1987. When measuring inflation by the increase of the GDP deflator or by excess money growth, and using the final measure of independence by Grilli *et al.* (1991) for 18 OECD countries, the results show that CBI is negatively related with inflation for all periods, except for 1961-1969. For 14 and 11 OECD countries, the same happens using measures by Alesina (1989) and by Eijffinger and Schaling (1995), respectively. Considering the first two measures of independence, they have a negative relationship with inflation variability (or with the average absolute change on inflation), except for 1979-1987. The relationship is the same for the whole period with the last measure.

Alesina and Summers (1993) analysed Central Bank independence using two indexes. The first one considered only political independence and was initially constructed by Bade and Parkin (1988). The second is the GMT (1991) index

and was converted on the same scale as the first one. The authors made an average of both, to obtain a final measure of independence and used data from the period 1955-1988 for 16 countries. When plotting Central Bank independence against average inflation, results suggest a negative relationship between the two. If the same procedure is adopted for Central Bank independence and inflation variability (given by the variance of average inflation), the relationship is the same, being stronger during the period 1973-1988.

Eijffinger *et al.* (1996) use a panel data model with fixed effects (Hsiao, 1986), to estimate monetary policy reaction functions, regressing inflation with respect to a measure of the actual level of Central Bank independence, for 10 developed countries, from the third quarter of 1977 until the last quarter of 1990. Results suggest a strong negative relationship between the independence of the Central Bank and the average inflation rate and with its variance.

Eijffinger *et al.* (1998) use OLS to regress average inflation on either the Alesina (1988, 1989), the Grilli *et al.* (1991), the Eijffinger and Schaling (1993, 1995), as well as the Cukierman (1992) independence measures to analyse the relationship of each one with the dependent variable. They take 1972 to 1992 as the entire period, for 20 developed countries, and also divide the sample and the previous period on 1972-1982, for 11 EMS (European Monetary System) countries, and on 1983-1992, for 9 non-EMS countries. The relationship was negative for all the measures. The same was made for the variability of inflation given by its variance: it is negatively influenced by Grilli *et al.* (1991) measure in all periods, by Cukierman (1992) index for the entire period and first subperiod, and by Alesina index on the second subperiod; the Eijffinger and Schaling (1993, 1995) index doesn't show significance. Eijffinger *et al.* (1998) also considered inflation elasticities with respect to the Central Bank independence measures referred, finding that all measures are significant in all periods and subsamples, with an exception for the Cukierman (1992) index on the second subperiod.

De Haan and Kooi (2000) developed a new indicator of the turnover of the Central Bank CEO, for 82 developing countries, as a measure of Central Bank independence, from 1980 to 1989 and studied its relationship with inflation, given by TIR from Cukierman *et al.* (1992). This measure of independence is given by the turnover rate of the Central Bank Governor or CEO but is different from Cukierman *et al.* (1992)'s TOR. The new indicator became significant, with negative coefficients, only when the estimated models included countries with high inflation rates. The same happens if the relationship considered is regarding Central Bank independence and inflation variability (measured by the standard deviation of TIR).

Daunfeldt and De Luna (2002) used a non-parametric method to compare long-term inflation trends with Central Bank independence reform dates, in 23 OECD countries, for the period 1975-2002. Inflation was given by the relative change of prices in a year. It was found that low inflation and its stability were attained in countries where there was not any change in statutory laws of their Central Banks. In most of the countries which changed them, price stability was achieved before the changes to CBI occurred.

Obben (2006) utilized a data set from Sousa (2001), which changed the measure of legal Central Bank independence constructed by Cukierman *et al.* (1992), with 29 industrial and emerging market economies, and a second data set from De Haan and Sturm (2001) regarding the turnover of the Central Bank governor, with 56 countries, studying their impact on the average annual rate of inflation. The period considered was 1990-2004. The relationships found were not statistically significant.

Garriga (2016) analysed 182 different countries during the period 1970-2012, with 6,674 observations, from which 5,866 have scores from Cukierman *et al.* (1992) independence index. The author regressed inflation in terms of its lagged values and of Central Bank independence, using a fixed effects (panel) method. Either by using the whole sample or dividing it in high-income and medium and low-income countries, the author found that inflation was always negatively influenced by Central Bank independence.

Table 1: Summary of the Empirical Findings Regarding the Relationship between Central Bank Independence and Inflation

Authors	Periods	Countries	Econometric approach	Dependent variables	Independent variables	Type of Relationship Findings
Bade and Parkin (1988)	1972-1986	12 industrial countries	Pooled cross-section time-series	Consumer prices average change rate	Financial independence and political independence	Negative.
Grilli <i>et al.</i> (1991)	1950-1989	18 OECD countries	Seemingly Unrelated Regressions (SUR) and Ordinary Least Squares (OLS)	GNP deflator	Economic independence, political independence, and GMT (1991) index	Using SUR, economic and political independence influence negatively the GNP deflator, during 1970-1979. Using SUR, during 1980-1989, and OLS in 1950-1989, economic independence has a negative impact on GNP deflator. GMT (1991) index has a negative influence on GNP deflator, for the periods 1950-1959 and 1980-1989 using SUR, and for the period 1950-1989 using OLS.
Cukierman <i>et al.</i> (1992)	1950-1989	72 countries (21 industrial and 51 developing)	One method not referred and 2SLS (instrumenting TOR)	Annual real depreciation for a certain amount of money (TIR) and standard deviation (std.) of TIR	Legal Central Bank independence (LCBI) and Turnover rate (TOR)	Legal Central Bank independence (LCBI) and Turnover rate (TOR) influence negatively the annual real depreciation for a certain amount of money (TIR) in industrial countries using the 2SLS (instrumenting TOR) and with an unspecified method. TOR has a positive impact on TIR, with all methods (instrumenting TOR), in developing countries. In the entire sample, with a 2SLS method (instrumenting TOR), TOR promotes an increase in TIR. Not referring the econometric method, LCBI has a negative impact on the std. of TIR, in industrial countries, and TOR has positive impact on the std. of TIR, in developing countries and in the entire sample.
De Hann and Sturm (1992)	1961-1987	18 OECD countries	Method not referred	Increase of the GDP deflator or the excess money growth and average absolute change on the increase of the GDP deflator or on the excess money growth	GMT (1991) index, Alesina (1989) measure, and Eijffinger and Schaling (1995) measure	For 18 OECD countries, the GMT (1991) index has a negative relationship with the increase of the GDP deflator or the excess money growth during the periods 1970-1978, 1979-1987 and 1961-1987. The same happens in 14 OECD countries, for the Alesina (1989) measure, and in 11 OECD countries, for the Eijffinger and Schaling (1995) measure. In 18 and 14 OECD countries, the GMT (1991) index and the Alesina (1989) measure have a negative relationship with the average absolute change on the increase of GDP deflator or the excess money growth, during the periods 1961-1969, 1970-1978 and 1961-1987. This just happens in 11 OECD countries, for the Eijffinger and Schaling (1995) measure during 1961-1987.

Table 1 (cont.): Summary of the Empirical Findings Regarding the Relationship between Central Bank Independence and Inflation

Authors	Periods	Countries	Econometric approach	Dependent variables	Independent variables	Type of Relationship Findings
Cukierman <i>et al.</i> (1993)	1965-1989	57 countries (industrial and developing)	Cross-section	Yearly std. of <i>ex post</i> real deposit rate, std. of the nominal discount rate, std. of the nominal deposit rate and std. of the nominal bond rate	LCBI and TOR	For 1965-1989, TOR has a positive relationship with the yearly standard deviation of <i>ex post</i> real deposit rates, in 40 countries as well as in developing countries; and LCBI is negatively related with the yearly std. of <i>ex post</i> real deposit rates in industrial countries. During 1970-1989, TOR shows a positive relationship with the nominal discount rate, in 54 countries. Considering 1978-1989, TOR has a positive relationship with the nominal deposit rate, for 57 countries. There is no relationship concerning the nominal bond rate for 33 countries during the last period of the sample. LCBI doesn't show significance.
Alesina and Summers (1993)	1955-1988	16 countries	Plots	Average inflation and variance of average inflation	Average of Bade and Parkin (1988) and GMT (1991) index	Negative.
Eijffinger <i>et al.</i> (1996)	1977-1999	10 developed countries	Panel data model with fixed effects (Hsiao, 1986)	Average inflation rate and variance of average inflation rate	Actual level of CBI	Negative.
Eijffinger <i>et al.</i> (1998)	1972-1992	20 developed countries	OLS	Percentage change of the CPI, its variance and its elasticity	Grilli <i>et al.</i> (1991), Alesina (1988, 1989), Eijffinger and Schaling (1993, 1995) and Cukierman (1992) independence measures.	All the measures show a negative relationship with inflation. Concerning its variability, it is negatively influenced by Grilli <i>et al.</i> (1991) measure, by Cukierman (1992) index either for the entire period and sample as well as for 1972-1982 for 11 EMS countries, and by Alesina index during 1983-1992 for 9 non EMS countries; the Eijffinger and Schaling (1993, 1995) index doesn't show significance. Considering inflation elasticities, all measures are significant, with an exception for Cukierman (1992) index during 1983-1992 for 9 non EMS countries.
De Hann and Kooi (2000)	1980-1989	82 developing countries	Method not referred	TIR and variance of TIR	Central Bank Governor or CEO turnover measure	Turnover only shows a negative relationship with TIR and its variance in the sample including high inflation countries.
Daunfeldt and De Luna (2002)	1975-2002	23 OECD countries	Non-parametric	Relative change on prices in a year	Central Bank Independence reform dates	Unexistent.

Table 1 (cont.): Summary of the Empirical Findings Regarding the Relationship between Central Bank Independence and Inflation

Authors	Periods	Countries	Econometric approach	Dependent variables	Independent variables	Type of Relationship Findings
Obben (2006)	1990-2004	56 countries	Method not referred	Average annual inflation rate	Modified LCBI and turnover rate of the Central Bank governor	Unexistent.
Garriga (2016)	1970-2012	182 countries (high-income, middle-income, and low-income countries)	Fixed effects (panel)	Inflation	LCBI	Negative.



## 2.2 The Relationship between Central Bank Independence and Economic Growth

On this subsection, the theoretical and empirical relationships between inflation and economic growth are addressed. Furthermore, the links connecting Central Bank independence to inflation and then to economic growth are also referred.

### 2.2.1 Theory Behind the Relationship between Central Bank Independence and Economic Growth

Nordhaus (1975), Lindbeck (1976), and Hibbs (1977) defend that if politicians have the ability to influence monetary policy – meaning that the Central Bank is not independent – they can create booms in pre-electoral periods, for Governments to have more votes and win elections. Afterwards, they can also create recessions to compensate for the previous booms, and the interest rate would be jumping from low to high levels and inflation from high to low levels, respectively. Hence, the economy can be affected by this instability.

Rogoff (1985) argues that social welfare is improved when an independent and conservative (more inflation-averse than private agents) Central Banker is appointed since it will have a commitment to price stability and will fight high inflation. Besides, if inflation stability is the main goal of this Central Banker, it would allow for more output variability.

Grimes (1991), Fisher (1991), and De Hann and Sturm (1992) consider that inflation can harm the economy when it shows a lot of variability – the uncertainty caused might not be favourable to economic growth. Mendonça (2006) agrees with this view by arguing that inflation volatility leads to price uncertainty, implying a higher risk-premia for markets. De Hann and Sturm (1992) also state that, due to the Mundell-Tobin effect, low inflation promotes high real interest rates, harming investment and economic growth.

Cukierman *et al.* (1992) express that Central Bank independence promotes the credibility of monetary policy: in a scenario with an independent Central Bank, the authors consider that inflation rates should be lower, resource allocation more efficient, and investment should increase directly.

In De Hann and Sturm (1992) line of reasoning, an independent Central Bank (not subject to political influence) will have more predictable actions, promoting economic stability and, by that, promoting economic growth. This argument is supported by Alesina and Summers (1993), stating that independent Central Banks will not create business cycles with an electoral purpose, not serving Governments in pre-election manipulation policies. Alesina and Summers (1993) presented two additional arguments. The first one states that Central Bank independence can prevent unpropitious consequences in an economy through low inflation – distortions, rent-related activities, and high-risk premia would be avoided. The second one is about the fact that an independent Central Bank can be less worried about decreasing unemployment and interest rates in real terms and about raising the output of a country, not achieving significant economic growth, since inflation would be low.

In line with the models of Stockman (1981), De Gregorio (1993), and Jones and Manuelli (1993), De Gregorio (1996) argues that an inflation increase leads an investor to need a higher investment profitability and would make savings' real interest rate decrease – inflation works as a tax for investment, which harms economic growth. De Gregorio (1996) also presents different views concerning the Mundell-Tobin effect. The first one states that raising inflation will bring up the cost of holding money. By substituting money for capital, the real interest rate will decrease and capital accumulation will increase, leading the economy to grow. The second one is related to the Sidrauski (1967) extended model of an agent who gets utility from money: if there is inflation, the capital stock on the steady-state will go down, reversing the effect referred – both money and capital are complements.

Walsh (1994) argues that if a Central Banker is independent it will offset an excessive inflation bias that might occur. Considering that independence is equivalent to placing a higher weight on inflation stabilization, it is plausible that it does not give much weight to real business cycles and unemployment. Hence, Central Bank independence can harm the economy as a whole.

Considering the credibility associated with independence, Mendonça (2006) defends that a credible and independent Central Bank can affect other agents' expectations and decisions: if people believe that the economy is performing well, private planning capacity improving can lead to an increase on private activity level. However, if private agents do not believe on economic fundamentals, they might want to decrease their activity level since they create an investment risk aversion. The author also refers McDonough (1997), which defends that a higher level of independence of the

Central Bank, by limiting inflation expectations, promotes economic stability and by shifting resources from the non-productive sectors of the economy to the productive ones, investment and growth should also increase. Furthermore, Mendonça (2006) states that high inflation works as an erosion factor for income and savings, decreasing their value and promoting high nominal interest rates, which, in turn leads to a short-term risk capital inflow on the economy, with possible negative effects for it.

Ferguson (2006) points that it is reasonable for a Central Banker to promote stable and low inflation rates, reducing the possibility of the financial system having shocks, and increasing savings and investment returns predictability – this should enhance economic growth. The author adds that lower inflation can be a way to increase economic and political confidence, since high inflation is associated with institutional failure – higher confidence can have as an outcome a higher level of investment.

Obben (2006) also describes how Central Bank independence is related to economic growth. If inflation is high and if the monetary authority decides to decrease money supply to reduce it, the real interest rate will increase, the interest payment responsibility regarding Government debt will increase and, finally, investment will decrease. The exchange rate appreciates, decreasing a country's competitiveness. So, an independent Central Banker, characterised by inflation-averse preferences, might harm the international trade relations of a country and then also its economic growth.

Issing (2006), grounded on Alesina *et al.* (2001) and Issing (2002), agrees with this view, arguing that a relationship of dependence (policy cooperation) between the Central Bank and other policymakers, namely the fiscal authorities, is reflected by an *ex ante* policy coordination, which, in turn, can make the private agents and the financial markets consider the Central Bank as non-credible and communication problems can also arise, harming a country's stability as well as the economy.

### **2.2.2 Empirical Findings Regarding the Relationship between Central Bank Independence and Economic Growth**

In this sub-section we start by presenting empirical results connecting inflation to economic growth. A summary of the results is presented in Table 2 (a) below.

Fisher (1993) estimated a spline function through GLS of real GDP and capital stock growth rates on inflation considering a sample of 101 countries for the period 1960-1989. The GDP deflator was used when inflation, measured by the consumer price index growth rate, was not available. Results suggest inflation has a non-linear effect on real GDP growth and on capital accumulation, always with a negative sign, being stronger at low and moderate rates of inflation.

Cukierman *et al.* (1993) found, both with OLS and an IV estimation methods for a panel of 52 countries, a negative relationship between the transformed inflation and *per capita* economic growth. Debelle and Fisher (1994) used the same countries as Grilli *et al.* (1991) to plot the variability of inflation against the GDP growth variability, for the period 1960-1992, and the relationship found was positive. Barro (2013) analysed a sample of 78, 89, and 84 countries for the periods 1965-1975, 1975-1985, and 1985-1990, respectively. The consumer price index measured average inflation in most cases (when data was not available, the GDP deflator replaced it). Using high average inflation countries in the sample, results suggest that, either by IV estimations or OLS, the GDP growth rate has a negative relationship with inflation.

Khan and Hanif (2018) estimated a model using GMM for the relationship between inflation and real income growth measuring the first variable by the the growth rate of CPI and the dependent one by the GDP *per capita* growth rate. The authors considered 113 countries (among developed and developing), during the period 1981-2015, and conclude that only high inflation rates influence growth negatively. When dividing the sample into OECD and non-OECD countries, previous results are also verified. Furthermore, inflation is also (negatively) significant when accounting for growth on countries with a high Government stability.

Now, we present results for the relationship between Central Bank independence and economic growth, also presented in Table 2 (b) below.

De Haan and Sturm (1992) found a non-significant relationship between Central Bank independence – given either by the Grilli *et al.* (1991) index, the Alesina (1989) measure, or the Eijffinger and Schaling (1995) measure – and output (measured by the GNP growth rate). However, for 18 OECD countries, the final measure of independence of

Grilli *et al.* (1991) is the only one showing a negative relationship with output variability, measured by the standard deviation of GNP growth rate, during the period 1970-1978. Cukierman *et al.* (1993) found, for the period 1960-1989 through a pooled cross-section time series for 55 countries, that the turnover rate of Central Bank governor (a proxy for actual independence) has a negative relationship with the *per capita* economic growth rate. The same happens when using a simple cross-section analysis for 51 or 52 countries, a basic panel regression for 47 low developed countries subsample, and an IV estimation method (panel) for 52 countries. Regarding just 30 developing countries, either with or without three outliers, from 1970 to 1990 (although there were four countries for which data was available only for the eighties), turnover appears to have a negative relationship with private investment as a share of GDP. TOR does not show any significance in industrial countries and LCBI is not significant in the previous scenarios. Garriga (2016), using a fixed effects panel method, also regressed the GDP growth rate in terms of, among others, Central Bank independence (measured by the LCBI). The measure is just significant when dividing the entire sample into two different income subsamples, having a negative coefficient on high-income countries and a positive one for low and middle-income countries.

Eijffinger *et al.* (1996), with a panel data estimation technique (Hsiao, 1986), estimated monetary policy reaction functions, also considering the current account surplus and economic growth, with respect to an actual level of central bank independence measure, from 1977 (third quarter), to 1999 (fourth quarter), considering 10 developed countries. They conclude that the relationship between Central Bank independence with average output growth (and its variance) is not significant.

Eijffinger *et al.* (1998), when regressing – through an OLS estimation method for the period 1972-1992 (20 developed countries), and two subperiods 1972-1982 (11 EMS countries), and 1983-1992 (9 non EMS countries) – the average annual growth rate of GDP *per capita* on Grilli *et al.* (1991), on Alesina (1988, 1989), on Eijffinger and Schaling (1993, 1995) as well as on Cukierman (1992) independence indexes, the only significant relationship found was one using the first index during the second subperiod (with a positive sign). Concerning economic growth variability, given by the variance of the average annual growth rate of GDP *per capita*, none of the Central Bank independence variables show significance.

Akhand (1998) studied 56 countries during the period 1960-1989, with a regression of real GDP *per capita* annual growth rate on four measures of Central Bank independence – the LCBI and the TOR from Cukierman *et al.* (1992), and two measures of political and non-political turnover from Cukierman and Webb (1995) – applying to them the Levine-Renelt robustness test. The author concluded that none of the variables is robustly significant when accounting for growth.

In order to test whether or not Central Bank independence influences economic growth, Mendonça (2006) regressed, first, real investment on Cukierman *et al.* (1992) legal independence index, and second, average real GDP *per capita* on the same independence measure, considering the period 1972-1989 for 69 countries (including industrial and developing) and using an OLS estimation method. The author considers investment the channel through which Central Bank independence can affect economic growth, concluding that Central Bank independence does not have a significant impact on investment and growth.

Akinci *et al.* (2015) used an ARDL model to study the effect of contemporaneous Central Bank independence – constructed by the Heritage Foundation – on economic growth – measured by the percentage change of the expenditure-based real GDP –, considering European Union member countries from 1995 to 2011. The relationship found is positive between the two variables, considering both their short and long-term relationships.

Most of the research presented above suffers from two problems. The most critical problem is the omitted variables. The majority of previous research about Central Bank independence and economic growth did not consider variables that are traditional determinants of economic growth, such as investment, Government expenditure, debt, deficits/surpluses, human capital, rule-of-law, political regime, and terms of trade. Additionally, most works do not account for differences among subsamples, at the exception of developing and industrial countries, or the high-income and low-income subsamples. We contribute to the literature by considering differences between continents, income levels, countries with and without crisis, quantitative easing performing and non-performing countries, and also considering the level of monetary integration.

Table 2: Summary of the Empirical Findings Regarding the Relationship between Central Bank Independence and Economic Growth  
(a) Relationship between Inflation and Economic Growth

Authors	Periods	Countries	Econometric approach	Dependent variables	Independent variables	Type of Relationship Findings
Fisher (1993)	1960-1989	101 countries	GLS	Real GDP growth rate, capital stock growth rate	Consumer Price Index growth rate, GDP deflator (when CPI data was not available)	Inflation has a non-linear effect on real GDP growth and on capital accumulation, always with a negative sign, being stronger at low and moderate rates of inflation.
Cukierman <i>et al.</i> (1993)	1965-1989	52 countries	OLS and IV (panel)	GDP <i>per capita</i> growth rate	TIR	Negative.
Debelle and Fisher (1994)	1960-1992	18 OECD countries	Plot	GDP growth variability	Variability of inflation	Positive.
Barro (2013)	1965-1990	89 countries	OLS and IV	GDP growth rate	Average inflation or the GDP deflator	Negative when using high inflation countries in the sample.
Khan and Hanif (2018)	1981-2015	113 countries	GMM	GDP <i>per capita</i> growth rate	Consumer Price Index growth rate	High inflation rates influence negatively growth either when considering the whole sample as well as when dividing it in OECD and non-OECD countries. Countries with high Government stability show inflation also accounting negatively for growth.

(b) Relationship between Central Bank Independence and Economic Growth

Authors	Periods	Countries	Econometric approach	Dependent variables	Independent variables	Type of Relationship Findings
De Hann and Sturm (1992)	1961-1987	18 OECD countries	Method not referred	GNP growth rate and std. of GNP growth rate	GMT (1991) index, Alesina (1989) measure, and Eijffinger and Schaling (1995) measure	GMT (1991) is the only index showing a significant negative relationship in 18 countries during 1970-1978 using the standard deviation of GNP growth rate as the dependent variable.
Cukierman <i>et al.</i> (1993)	1960-1990	55 countries (including industrial and developing)	Pooled cross-section time-series, cross-section analysis, panel regression, IV (panel), one method not refereed	GDP <i>per capita</i> growth rate and private investment as a share of GDP	LCBI and TOR	During 1960-1969, using a pooled cross-section time-series estimation, TOR is the only one having a negative relationship with the GDP <i>per capita</i> growth rate, for 55, 52 and 51 countries. The same happens when using a simple cross-section analysis for 51 or 52 countries, a basic panel regression for 47 low developed countries subsample, and an IV estimation method (panel) for 52 countries. In the period 1970-1990, TOR is the only variable that has a significant negative impact on private investment as a share of GDP, for 30 or 27 developing countries. There is no significance for the industrial countries subsample.

Table 2 (cont.): Summary of the Empirical Findings Regarding the Relationship between Central Bank Independence and Economic Growth  
 (b) Relationship between Central Bank Independence and Economic Growth (cont.)

Authors	Periods	Countries	Econometric approach	Dependent variables	Independent variables	Type of Relationship Findings
Eijffinger <i>et al.</i> (1996)	1977-1999	10 developed countries	Panel data estimation technique from Hsiao (1986)	Current account surplus, average output growth, and their variances	Actual level of CBI	Unexistent.
Eijffinger <i>et al.</i> (1998)	1972-1992	20 developed countries	OLS	Average annual growth rate of GDP <i>per capita</i> and its variance	Grilli <i>et al.</i> (1991), Alesina (1988, 1989), Eijffinger and Schaling (1993, 1995) and Cukierman (1992) independence measures.	The only significant relationship found is between Grilli <i>et al.</i> (1991) index and GDP growth rate during 1983-1992, for 9 non EMS countries, with a positive sign.
Akhand (1998)	1960-1989	56 countries	Levine-Renelt robustness test	Real GDP <i>per capita</i> annual growth rate	LCBI, TOR, political and non-political turnover rates from Cukierman and Webb (1995)	Unexistent.
Mendonça (2006)	1972-1989	69 countries	OLS	Real investment, average real GDP <i>per capita</i>	LCBI	Unexistent.
Akinci <i>et al.</i> (2015)	1995-2011	European Union member countries	ARDL	Percentage change of the real expenditure based real GDP	Contemporaneous CBI measure from the Heritage Foundation	Positive relationships in the short and long terms.
Garriga (2016)	1970-2012	182 countries (high-income, middle-income, and low-income countries)	Fixed effects (panel)	GDP growth rate	LCBI	LCBI influences negatively the GDP growth rate in high-income countries and positively in middle and low-income countries.

### 3 Empirical Evidence

In this section we present some empirical evidence regarding the relationship between economic growth and two measures of Central Bank independence that we use in our work. We plot, below, real GDP growth rate (gY) and real GDP *per capita* (gYpc) against a legal index of Central Bank independence – LCBI –, and a measure of the actual independence of a Central Bank (given by an irregular turnover dummy of the Central Bank Governor or CEO) – Irreg\_TO. The value each variable takes corresponds to its average across countries *per year*. From Figure 1 to Figure 4, the pairwise correlation between the variables calculated considering all countries and all years is, respectively, -0.1133, -0.0689, -0.0248 and -0.0770. The negative correlation between the actual independence of a Central Bank and the two measures of economic growth was expected: if the irregular turnover is high, meaning CBI is low, economic growth should decrease. The negative correlation between the legal Central Bank independence index and the two measures of economic growth was not expected. Further analysis must be developed in order to understand their relationships.

Figure 1: Real GDP Growth Rate (gY) and Legal Central Bank Independence Index (LCBI)

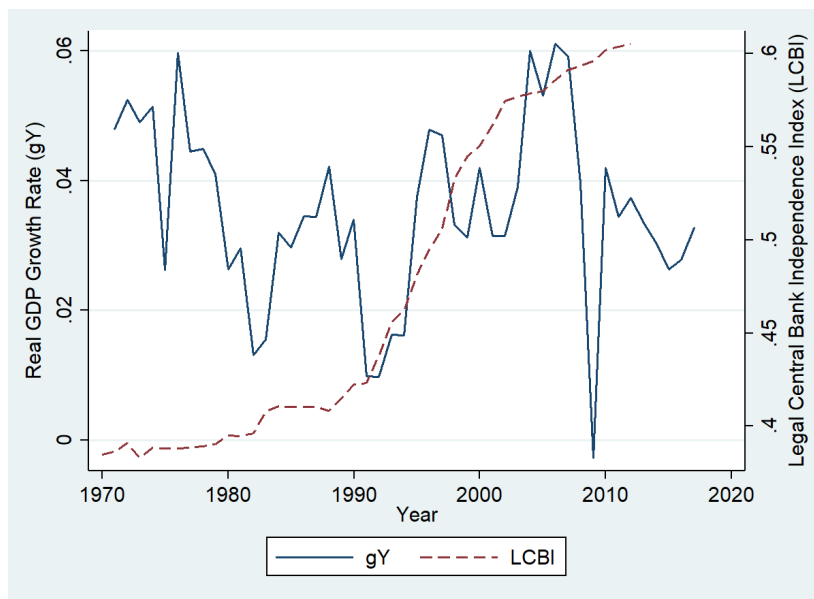


Figure 2: Real GDP Growth Rate (gY) and Irregular Turnover (Irreg\_TO)

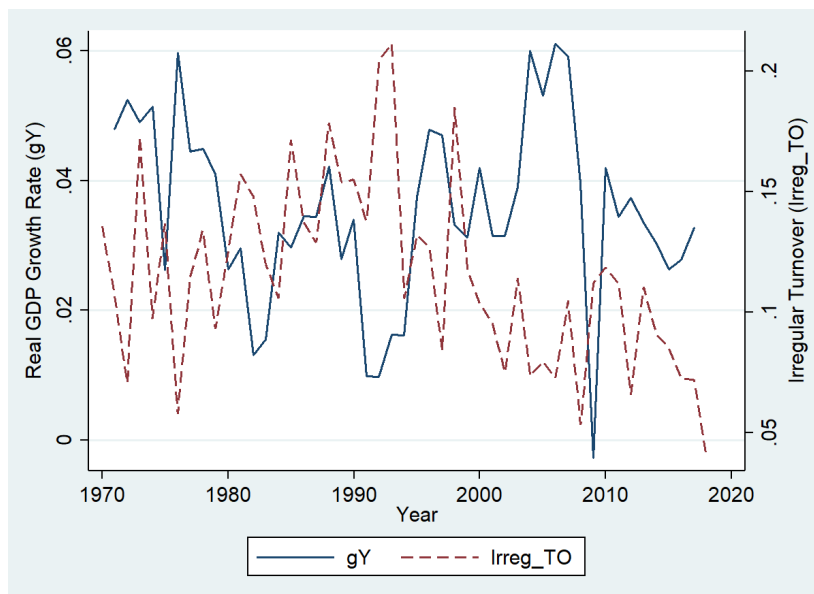


Figure 3: Real GDP *per capita* Growth Rate (gYpc) and Legal Central Bank Independence Index (LCBI)

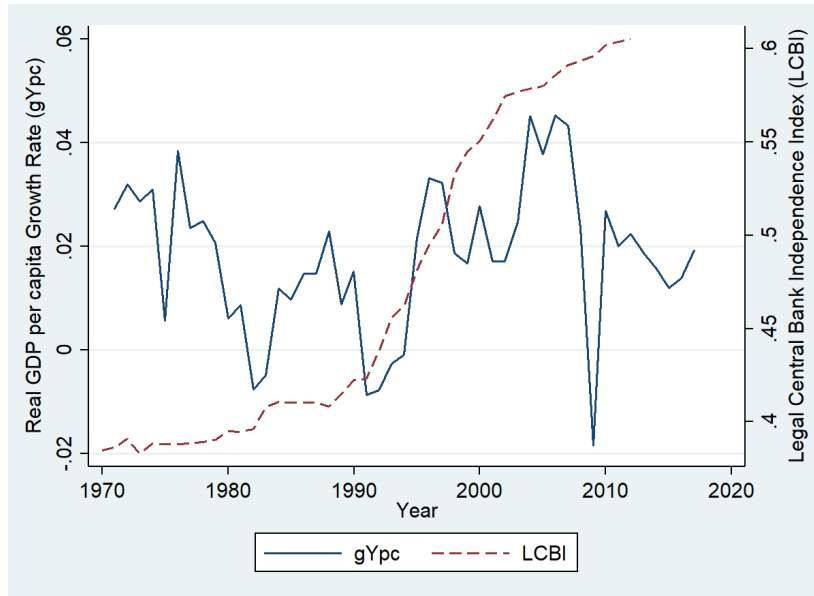
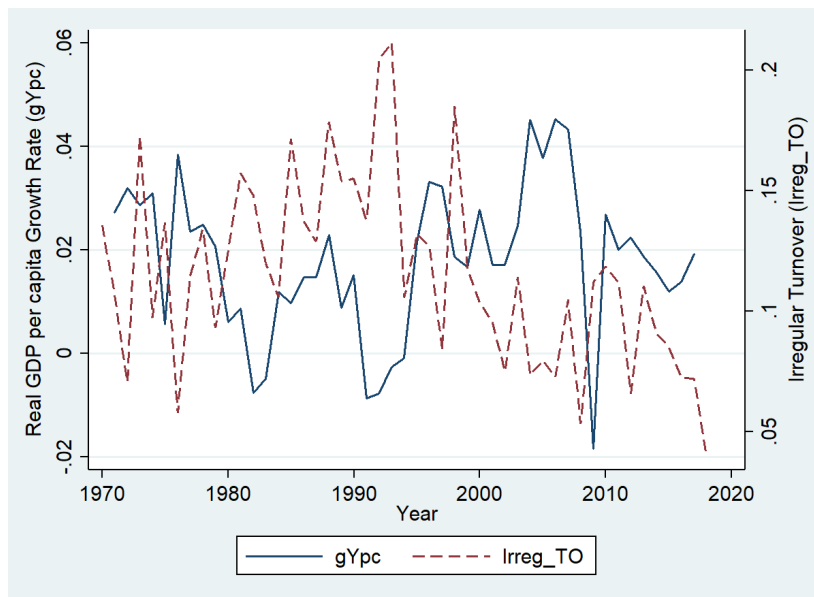


Figure 4: Real GDP *per capita* Growth Rate (gYpc) and Irregular Turnover (Irreg\_TO)



## 4 Empirical Methodology

In this section we describe the data and the econometric methods. The period of analysis ranges between 1970 and 2018 for 186 countries<sup>1</sup>. We do not have the same time-period for all the variables and for all countries: hence we have an unbalanced panel.

### 4.1 Data

In this sub-section we present the dependent and independent variables. In brackets, we also define the acronyms for each variable in our database.

<sup>1</sup>Please note that Hong Kong and Macao, although they are Chinese regions, they are treated as countries in our sample, as it happens in most of the databases we use.

### 4.1.1 Dependent Variables

The variable that we aim to explain is economic growth. We use two variables (interchangeably) to define the economic growth rate – the real GDP ( $\mathbf{Y}$ ) and the real GDP *per capita* ( $\mathbf{Ypc}$ ) growth rates. The time availability and countries for each dependent variables considered – as well as the variables used to calculate them – can be seen in Table A1 in the Appendix.

- **Real GDP Growth Rate ( $\mathbf{gY}$ )** – for the calculation of this variable we used real gross domestic product (GDP) at constant 2010 USD, using the official 2010 exchange rates applied to each country’s local currency. Data for real GDP is from the World Bank database, which is a compilation of the World Bank national accounts data and the Organization for Economic Cooperation and Development (OECD) National Accounts data. We compute the growth rate of real GDP, taking the first differences of  $\ln(\mathbf{Y})$ .
- **Real GDP *per capita* Growth Rate ( $\mathbf{gYpc}$ )** – we divide the real GDP by the population ( $\mathbf{Pop}$ ) to obtain real GDP *per capita*. Population data reflects midyear estimates and comprehends the *de facto* population of each country, including all the residents, despite their legal status or if they are citizens or not. Data was taken from the World Bank database<sup>2</sup>. We compute the growth rate of the Real GDP *per capita*, taking the first differences of  $\ln(\mathbf{Ypc})$ .

### 4.1.2 Independent Variables

The independent variables are divided in two groups: the Central Bank independence measures and economic growth determinants. The time availability for each country and for each variable considered can be seen on Tables A2 and A4 in the Appendix, respectively.

#### 4.1.2.1 Central Bank Independence Measures

- **Legal Central Bank Independence Index (LCBI)**

The legal Central Bank independence index (LCBI) reflects the legislation defining fiscal and monetary powers’ relationships. Cukierman *et al.* (1992) provided an index which, originally, contained 16 variables, posteriorly aggregated into 4 composite variables: Central Bank Chief Executive Officer (CEO), Policy Formulation, Objectives, and Limitations on Lending to Government. The index can lay between 0 (lowest independence possible) and 1 (highest independence possible). A more detailed description, as well as the weights applied on each parameter of the index can be consulted in Table 3 below. Garriga (2016) updated the data for the four aggregate variables, so we use the database constructed by this author. The interpretation for each one of the four components is as follows:

- **Central Bank Chief Executive Officer (CEO)** – the legal index of independence assumes that if the legal mandate’s duration of the CEO is longer and the country’s Government has low authority, in legal terms, to appoint and dismiss the CEO, the Central Bank is considered to have more independence.
- **Policy Formulation** – a Central Bank which has a high authority in policy formulation, maintaining it and resisting to possible pressures and conflicts created by Governments, is also considered an independent Central Bank.
- **Objectives** – if the statutory law of the Central Bank defines as its own goal price stability, a Central Bank will be more independent when compared to others that have another objective (besides the first one), even if the second goal does not offset the first. On the other hand, this last type of Central Bank will be more independent than one that includes a contradictory goal with the pursuit of price stability.
- **Limitations on Lending to the Government** – a Central Bank with a higher degree of limitations on lending to the public sector, namely limitations on lending concerning advances, securities, and maturities, is considered to be more independent.

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<sup>2</sup>The World Bank database is a compilation of the World Population Prospects (2017 Revision) from the United Nations Population Division, the Census reports and statistical publications from each country’s official statistical offices, the Demographic Statistics from the Eurostat, the Population and Vital Statistics Report (various years) from the United Nations Statistical Division, the International Database from the U.S.A. Census Bureau, and also the Statistics and Demography Programme from the Secretariat of the Pacific Community.



Table 3: **Index of Legal Central Bank Independence (LCBI)**

Variables	Weight
<b>1. Chief executive officer (CEO):</b>	0.20
a. Term of office	
b. Who appoints CEO?	
c. Dismissal	
d. May CEO hold other offices in Government?	
<b>2. Objectives</b>	0.15
<b>3. Policy formulation:</b>	0.15
a. Who formulates monetary policy?	
b. Who has final word in resolution of conflict?	
c. Role in the Government's budgetary process	
<b>4. Limitations on lending to the Government:</b>	0.50
a. Advances (limitation on nonsecuritized lending)	0.15
b. Securitized lending	0.10
c. Terms of lending (maturity, interest, amount)	0.10
d. Potential borrowers from the bank	0.05
e. Limits on Central Bank lending	0.025
f. Maturity of loans	0.025
g. Interest rates on loans	0.025
h. Central Bank prohibited from buying or selling Government securities in the primary market?	0.025

Adapted from: Cukierman *et al.* (1992)

#### • Turnover of the Central Bank Governor

Regarding this variable, we use the database constructed by De Haan and Sturm (2001), later on updated by De Haan *et al.* (2008, 2010):

- **Irregular Turnover (Irreg\_TO)** – dummy variable that is equal to 1 if at time  $t$  the turnover happens before the legally defined mandate, meaning that the Central Bank is not independent, and 0 otherwise.

Considering these two measures of independence (LCBI and Irreg\_TO), a summary of the descriptive statistics for each country is presented on Table A3 of the Appendix.

#### 4.1.2.2 Economic Growth determinants

We also detail the variables that we use as proxies for economic growth determinants. In order to understand which variables, besides the ones related with Central Bank independence, are the main determinants of economic growth, we recur to the economic growth literature, namely to the work of Lucas (1988), Rebelo (1991), Caballé and Santos (1993), Ball and Mankiw (1995), Barro (1998), and Reinhart and Rogoff (2010), and also to some arguments presented in the literature review section. The economic growth control determinants used are: the gross capital formation (% of GDP), the general Government final consumption expenditure (% of GDP), the debt-to-GDP ratio, the general Government lending/borrowing (% of GDP), the inflation rate, the life expectancy, the human capital index, the rule of law, the democracy index, and the net barter terms of trade index. Additionally, from the endogenous growth literature and the seminal work of Romer (1986), we will also use R&D Expenditures (% of GDP).

#### • Gross Capital Formation as a share of GDP or Saving Rate (I\_Y)

The gross capital formation considers the sum of the inventories' level net changes and the money, in an economy, spent on additions to fixed assets. The first one comprehends changes in the firms' goods stocks, in order to face unexpected needs concerning production, work-in-process, and sales. The second includes land improvements, purchases of plants, machines and equipment, and also the building of railways, roads, schools, hospitals, offices, private residences, and industrial and commercial structures. Furthermore, valuables acquisitions are also accountable for capital formation. Data was taken from the World Bank database, which compiled information from the World Bank national accounts database and the OECD National Accounts database. This variable is measured as a percentage of GDP. We expect a positive relationship of this variable with GDP since investment in physical capital increases output *per* effective labour unit.

- **General Government Final Consumption Expenditure as a share of GDP (G\_Y)**

General Government final consumption expenditure (in % of GDP) comprehends all the expenditures on goods and services (including compensation of employees), national defense, and security (excluding the military ones, which belong to Government's physical capital formation). Data was taken from the World Bank database which compiled information from the World Bank national accounts database and the OECD National Accounts database. We expect a negative relationship between economic growth and Government consumption as a share of GDP, since a higher allocation of resources to the Government takes away resources from the private sector (crowding-out effect).

- **Debt-to-GDP ratio (Debt\_Y)**

The debt-to-GDP ratio corresponds to the total gross Government debt of a country as a share of its GDP. The gross Government debt is calculated by summing, when applicable, currency and deposits, securities apart from shares, not considering financial derivatives, loans, insurance technical reserves, and other payable accounts. Information about this variable was taken from the International Monetary Fund (IMF). According to Reinhart and Rogoff (2010) the relationship between the debt-to-GDP ratio and economic growth is non-linear and it depends on the level of the public debt, being positive for low levels and negative for high levels of the debt-to-GDP ratio.

- **General Net Lending/Borrowing as a share of GDP (GovBal\_Y)**

The general Government net lending/borrowing as a share of GDP might also play an important role in determining economic growth. This variable will be equal to the difference between Government revenues and Government expenditures and net investment in non-financial assets. This variable was taken from the World Bank database, with information compiled from the Government Finance Statistics Yearbook and data files of the IMF. When positive it is defined as a surplus, when negative it is denominated as deficit. Ball and Mankiw (1995) argue that the initial effect of the deficit on the economy starts on national savings, which are reduced, although less than the amount of public savings reduction once private saving is increased. Furthermore, from the fundamental equation of macroeconomics, follows that a deficit also makes a country an importer of goods and services and an exporter of assets, in net terms. A decrease in national savings will make the supply of loans (from savers) to be lower for private agents, which will increase interest rates and reduce investment. The increase of interest rates will increase the attractiveness of a country's domestic assets, bringing a higher return, hence foreign investors want to acquire domestic currency, leading to a higher currency demand and a subsequent appreciation. Domestic goods, now more expensive relative to foreign goods, will make exports decrease and imports increase generating a deficit in the trade balance. Also according to the fundamental equation of macroeconomics, the country's output will be lower and economic growth will decrease. Considering the case of a surplus, the opposite process takes place and we expect its impact to be positive concerning economic growth.

- **Inflation (infl)**

The inflation rate is the growth rate of the consumer price index, in annual terms. This variable was taken from the World Bank database that uses the International Financial Statistics and data files of the IMF. In theory, there is the possibility for inflation to have either a positive or a negative effect on economic growth. Research also found that the relationship between growth and inflation can be non-linear. We can recall some arguments presented on the literature review. The relationship can be negative when inflation shows a lot of variability, promoting uncertainty in the economy and the need to higher risk premia in domestic and foreign markets. Furthermore, it might be negative also when inflation is high and leads to high real interest rates, making an investor requiring more investment profitability (it works as a tax on investment). Finally, the negative relationship might occur when inflation leads to distortions and rent-related activities, or even if it increases the probability of the financial system to suffer with shocks. The relationship should be positive if one considers that high inflation leads real interest rates to decrease promoting capital accumulation or that low inflation decreases a country's competitiveness concerning international trade. Although it appears to be possible to have one or the other type of relationships, we expected it to be negative in the linear term, as it is in most cases of empirical work already done on this subject.

- **Life Expectancy (LE) and Human Capital Index (HKI)**

Life expectancy considers the expected number of years a just born child might live if mortality patterns are considered to be the same during his or her life as in the moment of birth. This variable was also taken from the World Bank database<sup>3</sup>. A higher life expectancy is reflected on a higher accumulation of human capital, hence it should have a positive effect on economic growth (Lucas, 1988; Rebelo, 1991; Caballé and Santos, 1993).

The human capital index is calculated through the average years of schooling and returns to education. It was computed for a number of countries by Barro and Lee (2013) and for the remaining countries from the update made by Cohen and Leker (2014) of the work of Cohen and Soto (2007). This variable was compiled by Feenstra *et al.* (2015) at the Penn World Tables, version 9.1. Barro (1998) found that the initial level of human capital has an ambiguous relationship with economic growth since this variable in his work is composed of three different variables – the secondary and higher schooling average years of attainment for males with and over 25 years old; the interaction between the previous and the initial level of GDP; and life expectancy at birth – the expected relationship is positive with the first and third variables and negative for the second.

- **Rule of Law (RoL)**

The variable reflecting the rule of law captures the individuals' perception of the extent to which they accept rules (contracts' enforcement quality, property rights, police, courts, and the possibility of the existence of violence and crime), as well as the confidence they have on these rules. This variable is given by an aggregate indicator, characterised by a standard normal distribution, with values between approximately -2.5 and 2.5. The lower values mean that the country is characterized by having a weak governance and the higher values the opposite. This variable was taken from the World Governance Indicators and it was developed by Kaufmann *et al.* (2010), at the World Bank. In the work of Barro (1998), the relationship of the rule of law index with economic growth is positive, since trust in institutions and private property induces investment and hence economic growth.

- **Democracy Index (Polity2)**

We use the Polity2 index, from the Center for Systemic Peace and developed by Marshall *et al.* (2017), which consists in the subtraction of two other indexes and a subsequent standardization of the values of the index. The first index is a democracy component that ranges between 0 and 10 and considers three elements: the fact that citizens can express their preferences, concerning the leaders and the policies, through the existence of different institutions and procedures; the constraints institutions impose on the executive powers; the certainty individuals have to exercise their civil liberties, either regarding political participation as well as regarding the other aspects of their life. The second is an autocracy component, which uses a scale with eleven scores and focus on the characteristics related to an institutionalized autocracy present on each country considering the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and the constraints on the chief executive. The final democracy index that will be used ranges between -10 (strongly autocratic) and 10 (strongly democratic). The two scales for each of the two components of the final measure of democracy can be found on Tables A5 and A6, respectively. The role of democracy on economic growth is theoretically inconclusive. Barro (1998) states that a democracy usually expands political rights which, in turn, promote economic rights and, as a consequence, economies grow. A democratic system should also promote limited but balanced powers to institutions, avoiding situations that are more characteristic of autocracies where a dictator is free to use his power to make non-productive investments or steal a country's wealth. But he also refers that a democracy, characterized by a majority voting decision-based system, tends to transfer income from rich to poor, which can retard economic growth. Additionally, there can be autocracies that if the dictator is not involved in central planning, he/she might not have any motivation not to have economic freedom and, by doing so, it promotes economic growth. In Barro's work he found that the democracy index (measuring the right to have truthful participation in politics) has a positive effect on growth if included in the regression along with its square (which has a negative effect), defining an inverted U-shape, i.e., a non-linear relationship.

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<sup>3</sup>The World Bank compiled information from the World Population Prospects (2017 Revision), from the United Nations Population Division, the Census reports and statistical publications from each country's official statistical offices, the Demographic Statistics from the Eurostat, the Population and Vital Statistics Report (various years) from the United Nations Statistical Division, the International Database from the U.S.A. Census Bureau, and also the Statistics and Demography Programme from the Secretariat of the Pacific Community.

- **Terms of Trade (ToT)**

Net barter terms of trade index, or simply terms of trade index, corresponds to the ratio between the export unit value indexes and the import unit value indexes. The index is measured relative to the base year 2000. The data source for this variable is the United Nations Conference on Trade and Development (UNCTAD). Barro (1998) found that the GDP *per capita* growth rate was positively influenced by the terms of trade. For the author, changes in the terms of trade, such as changes in relative prices (domestic and foreign), can change real income and consumption domestically, but real GDP will only be affected when changes in terms of trade promote a change in employment and output, since Governments can promote opposite policies.

- **R&D Expenditures as a share of GDP (R&D\_Y)**

The gross domestic expenditures on research and development – basic research, applied research, and also experimental development – as a share of GDP, comprehends capital and current expenditures in R&D by private firms, Government, higher education and private non-profit institutions. This variable was taken from the World Bank database with information provided by the UNESCO Institute for Statistics. In endogenous growth models characterised by incorporating R&D in their frameworks (e.g., Romer, 1986), growth should be positively influenced by R&D, since there is the propensity to benefit from *ex post* monopoly powers that are more prone to do R&D activities and reap their benefits.

A summary of the descriptive statistics for the variables described in this sub-section is presented in Table 4.

Table 4: **Summary Statistics**

Variables	Obs	Max	Min	P50	Mean	Std.
<b>gY</b>	7277	.9161826	-1.022961	.0374096	.0351556	.0007134
<b>gYpc</b>	7274	.8775547	-1.049717	.0212417	.018153	.0007109
<b>LCBI</b>	5699	.979	.0166667	.4798333	.4925949	.2031899
<b>Irreg_TO</b>	7045	1	0	0	.1145493	.3184999
<b>I_Y (%)</b>	6643	89.38105	-5.739738	22.84672	23.62336	8.699925
<b>G_Y (%)</b>	6441	135.794	0	15.49766	16.09698	6.831711
<b>Debt_Y (%)</b>	6518	2092.92	0.003909	45.34868	58.38498	60.93135
<b>GovBal_Y (%)</b>	3523	129.1839	-203.7191	-1.910019	-1.723981	7.001916
<b>infl (%)</b>	6587	23773.13	-18.10863	5.804468	28.17117	371.7887
<b>LE</b>	8682	85.41707	18.907	68.41266	65.52495	10.56346
<b>HKI</b>	5891	3.734285	1.007409	2.085773	2.144798	.7151095
<b>RoL</b>	3439	2.100273	-2.606445	-.2158597	-.0566917	.9866262
<b>Polity2</b>	6779	10	-10	4	1.681664	7.271726
<b>ToT</b>	4866	721.0526	21.39672	100.9623	112.7545	39.16065
<b>R&amp;D_Y (%)</b>	1780	4.42859	.00544	.56417	.9234837	.9274415

## 4.2 Econometric Methodology

### 4.2.1 Stationarity

After defining the variables we use on this research, we check whether or not each one of them is stationary. The number of countries is 186 and periods is less than 50, which means that we rely on large N (cross-sections) for the asymptotics of the model's estimation and testing procedures. With this purpose, the Fisher-type test (Choi, 2001) will be performed for all the variables and to confirm the results obtained we also used the Im-Pesaran-Shin (2003) test for most of the variables (it did not work for some variables). These two methods are specific for unbalanced panel data, as it is our case. In the Fisher-type test we specify four lags, in order to remove the auto-regressive components of high order. It assumes a null hypothesis where all panels contain a unit root (and, therefore, are non-stationary), and an alternative that at least one of the panels is stationary. The Im-Pesaran-Shin (2003) test is similar to the previous one. We perform it by choosing at most four lags and minimizing either AIC, BIC or HIQC, separately, to pick the correct number of lags in the test regression. Our time period of analysis is considerably small when compared to the number of countries in the sample. Both tests are performed by mitigating the dependence concerning the cross-section component of our data. This procedure is suggested by Levin *et al.* (2002) and consists on

the subtraction of cross-sectional averages from the data. Also, for both tests they are initially performed considering the case where the test regression does not contain a linear time trend, which reflects the process through which it is generated. Only when the variables appear to be non-stationary, a time trend is included.

The conclusions are as follows. Almost all the variables are stationary according to the Fisher-type test. The exceptions are life expectancy, for which when applying its first differences (**vLE**), it becomes stationary and also the human capital index, which needs a second difference to be stationary. Research and development as a share of GDP is the only one inconclusive, since it does not have enough observations to perform the two stationarity tests for unbalanced panel data. At the final benchmark models none of these three variables were found to be statistically significant.

#### 4.2.2 Econometric Method

Economic growth typically depends on its past values (being persistent over time), so we use a linear dynamic panel data model in this research. These type of models include as explanatory variables, besides the usual covariates, the lag(s) of the dependent variable as well as panel-level effects (fixed or random) which cannot be observed. The estimation and inference method chosen for this work is the Arellano-Bover (1995)/Blundell-Bond (1998) approach, considering that it is designed for samples with a large number of countries and a small time period. The main method's assumptions are: no autocorrelation in the idiosyncratic errors and panel effects in level terms cannot be correlated with the first difference of the dependent variable first observation. Incorporating endogeneity in this IV/GMM approach, Stata, the software we use in this empirical econometric work, determines the number of instruments to use automatically<sup>4</sup>.

The Arellano-Bover (1995)/Blundell-Bond (1998) can be performed either using a one-step or a two-step GMM estimation approaches. The difference between both lays on the process of coefficients' identification, since the one-stage chooses all the coefficients simultaneously, while the two-stage does it sequentially. The two can also be performed with or without robust standard errors under heteroscedasticity.

Furthermore, two different post estimation tests are performed, either for the one-step or the two-step estimators. The first (`estat abond`, in Stata) tests if the idiosyncratic errors are serially correlated having as a null hypothesis the no auto-correlation condition. The second (`estat sargan`, in Stata) tests if the moment overidentifying restrictions are valid, being its null hypothesis the affirmative case. In the case of a no rejection of the null, the estimator in the model is consistent. In Stata, the first test can only be performed when the standard errors are robust and the second one in the opposite circumstances. The only situation where both can be applied to the same model regards the two-step estimation with standard errors that are not robust.

Our model has the following general form:

$$y_{i,t} = \beta_0 + \sum_{j=1}^J \alpha_j y_{i,t-j} + \sum_{k=1}^K \beta_k EGD_{k,i,t} + \beta_{K+1} CBIM_{i,t} + v_i + \epsilon_{i,t} \quad (1)$$

where  $y_{i,t}$  is the dependent variable (gY or gYpc, interchangeably); the  $\alpha$ 's are the coefficients associated to the dependent variable lags; the  $\beta$ 's are the model coefficients related either to economic growth determinants,  $EGD_{k,i,t}$ , as well as to the Central Bank independence measure,  $CBIM_{i,t}$  (LCBI or Irreg\_TO, interchangeably<sup>5</sup>); for cross sections  $i = 1, \dots, N$ ; for periods  $t = 1, \dots, T$ ; for the dependent variable lags  $j = 1, \dots, J$ ; for the economic growth determinants  $k = 1, \dots, K$ ; for the Central Bank independence measure  $K + 1$ ;  $v_i$  are the panel effects (that can have a correlation with the explanatory variables); and  $\epsilon_{i,t}$  are *iid* through the entire sample with a variance equal to  $\sigma_\epsilon^2$ .

Our general regressions' results for the entire sample are presented in Tables A7, A8, in the Appendix, without the regressors that were found to be not statistically significant. Afterwards, we chose the two-stage estimation with robust standard errors based on the size of our sample and on the following considerations: Hwang and Sun (2018) refer that the two-step model usually improves efficiency when compared to the one step estimator; furthermore, the

<sup>4</sup>For the differenced equation, it uses the dependent variable lags from the second lag on beyond when constructing the GMM-type instruments, and the first differences of the explanatory (exogenous) variables, when creating the standard instruments. Furthermore, for the level equation, it uses the first lag of the first difference of the dependent variable considering the GMM-type instruments, and the intercept regarding the standard instruments.

<sup>5</sup>LCBI and Irreg\_TO are used interchangeably in the regressions since they both measure independence but using different approaches, namely the legal framework and the actual perspective of independence.

authors argue that the two-stage estimator as well as the associated test statistic have a lower asymptotic variance, increasing their power. Considering the specification tests performed for both estimators, the regressions fail the tests in the one-step and passed them in the two-stage method. For the two-step approach, Arellano and Bond (1991) argue that the standard errors have a tendency to be downward biased and the estimation might be affected by this – the bias is corrected due to the work of Windmeijer (2005) through the use of robust standard errors.

## 5 Empirical Results

Table 5 presents the estimation results for the model chosen previously – the Arellano-Bover (1995)/Blundell-Bond (1998) two-stage estimation with the Windmeijer (2005) standard errors correction, either for gY as well as for gYpc, considering LCBI or Irreg\_TO for the CBI measure –, after removing the regressors that were found to be not statistically significant.

Table 5: Results for gY and gYpc – Entire Sample

Variables	gY		gYpc	
	1	2	3	4
L1	.1546358*** (.0493944)	.1367066*** (.0342855)	.1642238*** (.0369068)	.1705094*** (.0338943)
L2	-.1513305*** (.0400322)	-.1751747*** (.033372)	-.1616085*** (.0252035)	-.1681382*** (.0299705)
I_Y	.0021718* (.0011241)	.0022228*** (.0005636)	.0021377* (.0010984)	.0019537** (.0007909)
G_Y	-.0030899** (.0013612)	-.0032163*** (.000745)	-.0027154*** (.0010536)	-.0024873*** (.0009465)
GovBal_Y	.0026134*** (.0005269)	.0026187*** (.0005452)	.0026058*** (.000543)	.00254*** (.0006638)
infl	-.0000354** (.0000172)	-.0000292** (.0000136)	-.0000373** (.0000159)	-.0000351** (.0000157)
inflsq	1.43e-09** (6.87e-10)	1.20e-09** (5.62e-10)	1.49e-09** (6.57e-10)	1.39e-09** (6.48e-10)
LCBI	-.0225661 (.0229363)		-.013591 (.0167413)	
Irreg_TO		-.0067408* (.0035552)		-.0067053* (.0038599)
Intercept	.0491747 (.0480898)	.0406716** (.0205358)	.027472 (.0404509)	.0219256 (.0278001)
estat abond	0.2118	0.3308	0.2555	0.3231

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively; estat abond test has a null hypothesis where there is no auto-correlation.

According to the estat abond test, we do not reject the hypothesis of no autocorrelation of the error term. The results discussion is as follows, for each variable, *ceteris paribus*.

The growth rates of GDP and GDP *per capita* appear to be significantly influenced by their past values (L1 and L2), although these have opposite effects. A 1 percentage point (p.p.) higher economic growth rate in the period  $t - 1$  will lead the growth rate in  $t$  to increase, approximately, 0.13-0.17 p.p.

All the presented determinants of economic growth are significant in the four regressions and have the expected signs. I\_Y presents a positive impact in gY and gYpc, considering that an increase in physical capital promotes a country's productivity: our evidence shows that a 1 p.p. increase in I\_Y leads the economy to grow about 0.19-0.22 p.p. G\_Y shows a negative relationship with growth since, as referred, there might exist a crowding-out effect, according to which an increase in the general Government final consumption expenditure might lead to a reduction on the resources' allocation to the private sector: in our case, an increase in G\_Y by 1 percentage point makes GDP and GDP *per capita* growth rates decrease, approximately, 0.25-0.32 p.p. An increase in 1 p.p. in GovBal\_Y makes gY and gYpc increase, approximately, 0.25-0.26 p.p. Being this variable defined as Government revenues minus expenses,

the increase referred can occur if the first are raised or the second are decreased. Recalling some arguments previously presented, an increase in  $GovBal\_Y$  can be a reflection of a deficit reduction which might increase national savings, increasing either the supply of loans to private agents as well investment by a decrease in interest rates; this decrease on interest rates decreases a country's assets return – demand for domestic currency from foreign investors might diminish and a deficit in the trade balance is reduced. The same will happen if we verify a surplus increase. For inflation, its overall impact on growth is negative until its values are higher than, approximately, 12167-12626%<sup>6</sup>: only the Democratic Republic of Congo appears to show an inflation rate of approximately 23773% in 1994. The existence of few observations concerning inflation that surpass those values makes it impossible to infer that hyper-inflation promotes growth. The significance of the squared inflation term confirms only that this variable has a non-linear relationship with growth, defining a convex (U-shaped) function. The overall negative relationship confirmed some arguments previously presented, namely considering the facts that when inflation shows variability it will promote uncertainty, it can be considered a tax on investment, it can create distortions and rent-related activities and, finally, that it can even increase the probability of shocks in the financial system.

LCBI appears not to be statistically significant when accounting for economic growth. This means that, according to this index composition, a CEO with a longer mandate or a country where a Government has low authority to appoint or dismiss this CEO, and a Central Bank with high authority concerning policy formulation, which main objective is price stability with high limitations on lending to the Government, will not contribute positively (as it was expected) or negatively for a country's economic growth.  $Irreg\_TO$  is significant and has a negative effect on  $gY$  and  $gYpc$ , as expected. This implies that, when a Central Bank Governor or CEO initiates her or his mandate out of the legally defined period, this will harm economic growth when compared to the situation where turnover is regular or there is no turnover at all. In particular, it punishes growth in about 0.67 p.p. in the year it happens. An irregular turnover can occur when a country's Government decides so, reflecting a low independence degree: the new governor or CEO is better aligned with the wishes of a Government, and this convergence can produce benefits for both parts. Recalling some theoretical arguments presented in the Literature Review section and which relate directly Central Bank independence and economic growth, one of the benefits can be related to the electoral cycle: if a Government wants the monetary authority to take actions to create pre-electoral booms in the economy, earning more votes with that purpose, and afterwards create a recession, economic growth will suffer from this lack of independence. This manipulation of policies is accompanied by a lack of care for price stability, actions' predictability and credibility.

## 6 Robustness

As robustness exercises for our results, we divide our entire sample by continents ( $Cont$ ), income levels ( $Inc\_level$ ), banking, currency and sovereign debt crisis, quantitative easing (QE) performed and not-performed by countries, and also by the level of monetary integration ( $MU$ ), estimating new regressions to see how results differ from the benchmark ones. The availability of data for each country can be found on Table A9 in the Appendix.

### 6.1 Continents ( $Cont$ )

The continents division classifies a country by the continent of the world it belongs to: America, Africa, Asia, Europe, and Oceania. The process of matching each country to its continent was based on data from the Central Intelligence Agency (CIA). The results for Oceania are not presented bellow, due to the inability of the econometric software we use to perform the estimation, considering that the number of observations is not sufficient.

Table 6 and Table 7 present the results regarding the robustness exercise for the division in continents, either for  $gY$  as well as for  $gYpc$ , respectively.

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<sup>6</sup>These values are obtained by taking the derivative of each growth rate in order to inflation and making it equal to 0.

Table 6: Results for gY by Continent

Variables	Africa		America		Asia		Europe	
	1	2	3	4	5	6	7	8
<b>L1</b>	.0095517 (.2507359)	.0850031 (.2455064)	-.4284048 (.5731297)	-.4758914 (2.670828)	-.0001678 (.3092191)	-.0641439 (.2498036)	.1693876 (.183816)	.228672 (.2086692)
<b>L2</b>	-.1066609 (.1322001)	-.1166087 (.2158142)	-.5583689 (.5616708)	.0564103 (2.996207)	-.2195085* (.131511)	-.054482 (.154365)	-.2288252** (.1132716)	-.2223115* (.1335719)
<b>I_Y</b>	.0014115 (.005063)	.0017628 (.0032044)	.003296 (.0035475)	.0041937 (.0221388)	.002084 (.002665)	.0028307 (.0018655)	.0024613 (.0087685)	.0021252 (.0060891)
<b>G_Y</b>	-.001172 (.0032955)	-.0016833 (.0030374)	-.0042305 (.0078427)	-.0030572 (.005386)	-.0014375 (.0038597)	-.0009099 (.0027409)	-.0037895 (.0170419)	-.0037852 (.0085008)
<b>GovBal_Y</b>	.0008372 (.003379)	-.0003048 (.0018151)	.0023987 (.0026719)	.0032094 (.0077559)	.0020562 (.0021043)	.0018495 (.0016088)	.0017621 (.0031296)	.0018795 (.0024619)
<b>infl</b>	-.0001868 (.0001636)	-.0002358 (.0002219)	-.0000517 (.0001549)	-.0000772 (.0007414)	-.000521 (.0006681)	-.0002642 (.0010511)	-.0002668 (.0004387)	-.0001714 (.0007394)
<b>inflsq</b>	7.67e-09 (6.89e-09)	9.70e-09 (9.28e-09)	4.92e-09 (1.79e-08)	8.62e-09 (5.86e-08)	9.29e-07 (1.89e-06)	3.24e-07 (2.66e-06)	8.49e-08 (1.74e-07)	4.67e-08 (2.63e-07)
<b>LCBI</b>	.0480424 (.1149205)		-.0131648 (.1321426)		-.0105523 (.0802244)		-.0216392 (.0924311)	
<b>Irreg_TO</b>		-.0039548 (.0109174)		-.0007582 (.3118514)		-.016887 (.0121231)		.0013619 (.029914)
<b>Intercept</b>	.0111675 (.068565)	.0312322 (.0596824)	.0601001 (.0594359)	.0020882 (.5110877)	.0375087 (.0605067)	-.0016592 (.0323327)	.0609023 (.2326269)	.0526449 (.1699192)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

Table 7: Results for gYpc by Continent

Variables	Africa		America		Asia		Europe	
	9	10	11	12	13	14	15	16
<b>L1</b>	.0025055 (.1504603)	.0599675 (.2061593)	-.630732* (.3471828)	-.8385713 (3.13311)	.1632933 (.1318691)	-.0548153 (.2342973)	.1286641 (.2488657)	.1870947 (.2312774)
<b>L2</b>	-.0725168 (.474862)	-.0807938 (.1127039)	-.1373555 (.4638938)	.0493913 (.4227442)	-.1379136 (.1174403)	.0078693 (.1971864)	-.2303426* (.1182425)	-.2087269** (.0873532)
<b>I_Y</b>	.0009257 (.0041124)	.0012028 (.0036411)	.0047474*** (.001831)	.0049222* (.0028128)	.0008999 (.0029037)	.0013616 (.0008824)	.0025731 (.0051561)	.002307 (.0041659)
<b>G_Y</b>	-.0012665 (.0033552)	-.002028 (.0062308)	-.0022142 (.0026629)	-.0011122 (.0075656)	-.0016888 (.0027969)	-.0023853 (.0019431)	-.0040534 (.0065498)	-.0048558 (.0183313)
<b>GovBal_Y</b>	.0001561 (.0022798)	.000095 (.0019258)	.0028938 (.0020038)	.0033996 (.0046845)	.0027648 (.0018692)	.0020231 (.0016353)	.0013945 (.0034188)	.0014383 (.0035459)
<b>infl</b>	-.0001307 (.0001108)	-.0001497 (.0001524)	-.0000569 (.000055)	-.0000654 (.0000915)	-.0003747 (.0004328)	-.0001461 (.0007023)	-.000268 (.000364)	-.0001758 (.0008365)
<b>inflsq</b>	5.30e-09 (4.57e-09)	6.08e-09 (6.28e-09)	6.03e-09 (6.64e-09)	6.95e-09 (1.57e-08)	7.06e-07 (1.37e-06)	8.63e-08 (2.19e-06)	8.93e-08 (1.34e-07)	5.07e-08 (3.05e-07)
<b>LCBI</b>	.031712 (.0971912)		-.0061939 (.088318)		-.0185791 (.1110592)		-.0250472 (.0408228)	
<b>Irreg_TO</b>		-.0047212 (.0116199)		.0011916 (.1418227)		-.0157591 (.0136095)		.0015837 (.0178704)
<b>Intercept</b>	.0061713 (.0815076)	.0289925 (.0380582)	-.0331511 (.0626712)	-.051665 (.090105)	.0447738 (.0619154)	.0341503 (.0344215)	.0621574 (.2039938)	.0660287 (.3816599)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

The estimation output concerning the sample division in different continents shows that regressions are not that robust, since only few variables are significant, namely L1, L2, and I\_Y. The growth rate in period  $t - 1$  is only accountable for gYpc in America (regression 11): a 1 p.p. increase in L1 leads the dependent variable in  $t$  to decrease by around 0.63 p.p. Considering the other variables mentioned, L2 influences gY in Asia (regression 5) and Europe and gYpc in Europe. Investment as a share of GDP also promotes growth *per capita* in America: a 1 p.p. increase in I\_Y generates an increase in gYpc of, approximately, 0.47-0.49 p.p.



LCBI is part of the non-significant variables of the estimations (as it occurred before) and Irreg\_TO now loses its significance.

The conclusion generated by this scenario is the fact that different countries in the same or in different continents will not see their economic growth affected by their different irregular turnover paths (if they existed) just because of the world region they belong to.

## 6.2 Income Levels (Inc\_level)

For income levels division of the sample, we use the World Bank classification, which includes four different levels of income, based on the estimates of gross national income (GNI) *per capita* in \$US, considering the period 1987-2017: low-income, lower middle-income, upper middle-income, and high-income. We merged two of these groups – lower middle-income and upper middle-income – into a single one, the middle-income. This classification criteria changes through time (please see Table A10 in the Appendix) being calculated every year in July using the World Bank Atlas method. Table 8 and Table 9 present the results for this analysis, concerning gY and gYpc, respectively.

Table 8: Results for gY by Income Level

Variables	Low-Income		Middle-Income		High-Income	
	1	2	3	4	5	6
L1	.2010148 (.2805614)	0 (omitted)	.0631963 (.0823996)	.0720666 (.0517998)	.0815432 (.1095935)	.1093937 (.0842872)
L2	.0274018 (.0670089)	.0629682 (988366.6)	-.158694 (.0516978)	-.1649388*** (.0477479)	-.1751549*** (.0479814)	-.1638407** (.08313)
I_Y	.0008532 (.0009554)	.000902 (9201.305)	.0027208*** (.0008094)	.0022015*** (.0008377)	.0030596** (.0012102)	.0020609 (.0017641)
G_Y	-.0015103 (.0027712)	0 (omitted)	-.0023705 (.0020359)	-.0027337** (.0013852)	-.0034435* (.0019431)	-.0049411 (.0034672)
GovBal_Y	.0016462 (.0043216)	.0017073 (11508.09)	.0026627*** (.0007013)	.0029234*** (.0008444)	.0024251 (.0015084)	.0018043 (.0012336)
infl	-.0001573 (.0002816)	-.0002414 (377.8139)	-.0000804*** (.0000212)	-.0000761*** (.0000162)	.000752 (.0026999)	-.0001074 (.0035275)
inflsq	6.49e-09 (1.16e-08)	1.00e-08 (.0160462)	9.07e-09*** (2.28e-09)	8.47e-09*** (1.86e-09)	.0000167 (.0002153)	.0000363 (.0002805)
LCBI	-.0766158 (.1010576)		.0079384 (.0259138)		-.02078 (.0137907)	
Irreg_TO		-.0770416 (415804.8)		-.0091492** (.0046033)		.0132183 (.0083791)
Intercept	.0879755 (.066289)	0 (omitted)	.0133344 (.0416975)	.038664 (.0356893)	.0326841 (.0500966)	.0735473 (.0803706)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

Table 9: Results for gYpc by Income Level

Variables	Low-Income		Middle-Income		High-Income	
	7	8	9	10	11	12
<b>L1</b>	.1368245 (.3224609)	.079076 (.2896047)	.0752143 (.0829219)	.11218** (.0548142)	.129646 (.1010882)	.139806*** (.0503476)
<b>L2</b>	-.0112124 (.1157227)	-.1621405 (.1341873)	-.167844*** (.0469908)	-.159083*** (.0479029)	-.2274231*** (.0626709)	-.2180533*** (.058906)
<b>I_Y</b>	.001115 (.0015585)	.0020795*** (.0004397)	.0025891*** (.0008145)	.0020146*** (.0006346)	.0017661* (.0010312)	.0011333 (.001283)
<b>G_Y</b>	-.0008974 (.0030132)	.00284 (.0033126)	-.0020883 (.0018595)	-.002018 (.0013308)	-.0059247** (.002702)	-.0066526* (.0035485)
<b>GovBal_Y</b>	.0013421 (.0042043)	.001319 (.0019082)	.0024427*** (.0008185)	.0028505*** (.0009987)	.0010907 (.0006723)	.0007113 (.0006696)
<b>infl</b>	-.0001507 (.0001358)	-.0001305*** (.0000321)	-.0000877*** (.000027)	-.0000819*** (.0000201)	.0013552 (.0022055)	.0003664 (.002887)
<b>inflsq</b>	6.19e-09 (5.61e-09)	5.33e-09*** (1.27e-09)	9.92e-09*** (3.14e-09)	9.15e-09*** (2.34e-09)	-.00018 (.0001772)	-.0001475 (.0002104)
<b>LCBI</b>	-.0896721 (.2139249)		.0213365 (.0208108)		-.0204109 (.0186592)	
<b>Irreg_TO</b>		-.0039131 (.0047621)		-.0094429* (.004927)		.0097672 (.0102247)
<b>Intercept</b>	.0678274 (.105294)	-.0414858 (.0294579)	-.0066423 (.0331996)	.0193642 (.0242641)	-.0986799* (.0547292)	.1157329 (.0827458)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

Growth on period  $t - 1$  is only significant for gYpc in middle-income countries (regression 10) and for high-income countries (regression 12): when it increases 1 p.p. it leads current growth to increase by, approximately, 0.11-0.14 p.p. L2 accounts for current growth in the middle-income sample partition (regressions 4, 9, and 10), and also considering high-income countries.

In this robustness exercise, all the economic growth determinants are significant although this does not happen for all the subsample estimations. I\_Y is significant for gY and gYpc in middle-income countries and in high-income countries (regressions 5 and 11), and also accounts for gYpc when considering the low-income ones (regression 8): an increase in 1 p.p. on the investment to GDP ratio will make growth increase by about 0.17-0.31 p.p. G\_Y influences gY and gYpc in high-income countries (regressions 5, 11, and 12) and is also accountable for gY in middle-income countries (regression 4): if we increase 1 p.p. the Government expenditure as a share of GDP, growth will suffer a decrease of about 0.27-0.67 p.p. GovBal\_Y is only accountable for growth in the middle-income countries: for this subgroup, an increase in Government balances of 1 p.p. promotes gY and gYpc in, approximately, 0.24-0.29 p.p. As for the benchmark model, inflation's overall impact on growth is negative until its values are higher than, approximately, 4432-12242%, considering low-income countries and gYpc (regression 8) and also middle-income countries: again the Democratic Republic of Congo appears to show an inflation rate of approximately 23773% in 1994, but Peru and Ukraine also present inflation rates of, respectively and approximately, 7482% in 1990 and 4735% in 1993. It is not possible to state that hyperinflation rates promote growth, but only that inflation continues to define U-shaped (non-linear) function.

Robustness results by income level confirms that LCBI is never significant in all the regressions, contrarily to what occurred in Garriga (2016) where this measure of independence had a negative coefficient on high-income countries and a positive one for low and middle-income ones. Irreg\_TO appears to influence negatively growth for middle-income countries, being this penalized by, approximately, 0.9-1.0 p.p.

The middle-income countries subsample regressions are the ones closer to the results for the entire sample. This can occur since most countries in our sample are defined as middle-income ones during more than half of the period we consider and for which income data is available. Furthermore, all the variables which are significant show the expected sign which is in accordance to the results for the entire sample.

### 6.3 Crisis

As referred before, we also perform a crisis robustness analysis. With this purpose, we used a dataset by Laeven and Valencia (2008, 2013), updated by the authors in 2018, which contains information on crises around the world, for the period 1970-2017. We divide the sample in two: countries which had at least one crisis for all  $t$  and countries which didn't had any. For this second subsample, the number of observations is not sufficient to estimate the regressions and, therefore, there is no output to present. It is also important to highlight that we do not consider when a crisis occurred in a specific country, just if it occurred. Results for this robustness analysis is in Table 10 for gY and gYpc.

Table 10: Results for gY and gYpc – Crisis (Banking, Currency, and Sovereign Debt)

Variables	gY		gYpc	
	1	2	5	6
L1	.1434212*** (.0405097)	.1372798*** (.0388376)	.1525529*** (.0345922)	.1547286*** (.037944)
L2	-.1638716*** (.0345569)	-.1851869*** (.023334)	-.1691078*** (.0295186)	-.1861838*** (.0201037)
I_Y	.0024702*** (.0008929)	.0024179*** (.0006053)	.002375* (.00122)	.0022558*** (.0007673)
G_Y	-.0026664** (.0011683)	-.0029715*** (.0007851)	-.0023465 (.0015222)	-.0024379*** (.0008483)
GovBal_Y	.0028747*** (.0008188)	.0029455*** (.0006647)	.0028907*** (.0007207)	.0030258*** (.0004886)
infl	-.0000401** (.0000195)	-.0000312* (.0000169)	-.0000375** (.0000174)	-.000031** (.0000136)
inflsq	1.60e-09** (7.83e-10)	1.25e-09** (6.31e-10)	1.48e-09** (7.38e-10)	1.21e-09** (5.57e-10)
LCBI	-.0246928 (.0234638)		-.0151165 (.0194118)	
Irreg_TO		-.0076558*** (.0031813)		-.0069848** (.003123)
Intercept	.038573 (.0359776)	.0326787* (.0182183)	.0185712 (.0501221)	.0166046 (.0259767)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

Considering L1, a 1 p.p. increase in this variable, promotes economic growth in 0.14-0.15 p.p. L2 continues also to be accountable for growth.

With the exception of G\_Y, all the economic growth determinants show significance in this subsample in the four regressions and have the expected effect on gY and gYpc. If I\_Y is increased by 1 p.p. growth will also increase by, approximately, 0.23-0.25 p.p. Considering G\_Y which doesn't show significance in regression 3, an increase in G\_Y by 1 percentage point decreases GDP and GDP *per capita* growth by around 0.24-0.30 p.p. In our estimation, an increase in 1 p.p. in GovBal\_Y makes gY and gYpc increase by, approximately, 0.29-0.30 p.p. Again, inflation's overall impact on growth is negative until its values are higher than, approximately, 12480-12810%, being the Democratic Republic of Congo the only country with an inflation rate of, approximately, 23773% in 1994. Considering this analysis, one can also conclude that inflation continues to be a non-linear (convex) function but it not possible to state that hyperinflation leads to higher economic growth rates.

LCBI is not statistically significant when accounting for economic growth. Irreg\_TO is always significant and has a negative effect on gY and gYpc. When an irregular turnover occurs it pushes growth down by around 0.7 p.p.

The reason behind these results can also be the fact that only few countries (9 out of 158) did not have any type of crisis, considering the countries and the time period for which data is available. It is, therefore, expected that in this robustness exercise, results would be in accordance with the entire sample ones.

## 6.4 Quantitative Easing (QE)

We also divided our entire sample in countries which performed quantitative easing measures and countries which never used it as a way to conduct monetary policy. We do not account here for the time periods when the countries started using it, but only if they had used it anytime during the whole sample. This is also to prevent a small number of observations since QE is a recent phenomenon (as explained before, our method can't estimate models in this case). The QE countries are: all the countries in the Eurozone, Japan, Switzerland, Sweden, United Kingdom, and United States of America. Table 11 presents the results regarding this robustness exercise, for gY as well as for gYpc, respectively.

Table 11: Results for gY and gYpc – Quantitative Easing performing and non-performing countries

Variables	gY				gYpc			
	Performing		Non-performing		Performing		Non-performing	
	1	2	3	4	5	6	7	8
L1	-.0625171 (.1326174)	-.0173121 (.1623773)	.1668274*** (.049153)	.1443814* (.0755942)	-.0386596 (.153767)	.0253442 (.139087)	.1874793*** (.0456671)	.1691501*** (.0554679)
L2	-.5588658** (.2787892)	-.530576** (.2585068)	-.1173028*** (.0400663)	-.1475909*** (.0519918)	-.2864421*** (.084746)	-.5093893* (.2677113)	-.115099*** (.0317433)	-.1407835*** (.0424328)
I_Y	.0043823*** (.0013939)	.0042948*** (.0013028)	.0016063** (.0007906)	.0018832*** (.0007451)	.0039157 (.0024265)	.0039124** (.0019236)	.0014326*** (.0006201)	.0014038** (.000579)
G_Y	-.0078381 (.006214)	-.0054552 (.0054038)	-.0022453 (.0018059)	-.0023217*** (.0007913)	-.0069206 (.0078403)	-.0050475 (.0071802)	-.0023418*** (.0014127)	-.0018987** (.0009443)
GovBal_Y	.0017001* (.0008883)	.0021394** (.0010843)	.0025056*** (.0008233)	.0024759*** (.0005554)	.0016256 (.002047)	.0019086 (.0017895)	.0024861** (.0007595)	.0023871*** (.0004128)
infl	-.0017666 (.0024976)	-.0010318 (.0032849)	-.0000335** (.0000163)	-.0000268 (.0000168)	-.0005012 (.004408)	-.0010361 (.003521)	-.0000327*** (.0000182)	-.0000305* (.000017)
inflsq	-4.68e-06 (.0001391)	-.000056 (.0001736)	1.37e-09** (6.81e-10)	1.12e-09 (7.04e-10)	-.0001214 (.0001948)	-.0000544 (.000167)	1.30e-09*** (7.82e-10)	1.20e-09* (6.75e-10)
LCBI	-.0297153 (.0198483)		-.0059524 (.043285)		-.0292146 (.0355481)		.0036579 (.0358143)	
Irreg_TO		.0036303 (.0060838)		-.0120811*** (.0042484)		.0043222 (.008843)		-.0113108*** (.0037675)
Intercept	.1161918 (.1559835)	.0527299 (.1083967)	.0380485 (.0451584)	.0332172* (.0181917)	.091115 (.2145921)	.045078 (.1487396)	.0246772 (.0277272)	.0227773 (.0194127)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

Considering the country's division mentioned before, growth on period  $t - 1$  only influences current growth in non QE performing countries: an increase in 1 p.p. for L1 will promote an increase by, approximately, 0.14-0.19 p.p. for growth in  $t$ . L2 influences current growth in the two subgroups created.

Furthermore, there is at least one case where each economic growth determinant is significant, with the required and expected sign. I\_Y is not statistically significant for gYpc only in QE performing countries, considering regression 5: an increase in 1 p.p. on the investment as a share of GDP makes growth increase by, approximately, 0.14-0.44 p.p. G\_Y is also related with growth only in the non QE performing countries (regressions 4, 7, and 8): if we increase this variable in 1 p.p., gY and gYpc will decrease, approximately, 0.18-0.23 p.p. GovBal\_Y is not significant when only considering gYpc and QE performing countries: an increase in Government balances of 1 p.p. will lead to an increase in gY and gYpc of, approximately, 0.17-0.25 p.p. Inflation's overall impact on growth is, as in the benchmark model, negative until its values are higher than, approximately, 12226-12708%, considering only the non-performing subgroup (regressions 3, 7, and 8). The only country with inflation higher than the previous ones continues to be the Democratic Republic of Congo, in 1994, being this rate approximately 23773%. It continues not to be possible to conclude that hyperinflation promotes growth, but it is clear that inflation continues to define a convex (U-shaped) function.

LCBI is again never significant in all the regressions. Furthermore, Irreg\_TO appears to be accountable for growth just when considering the non QE performing countries, in a negative way of, approximately, 1.1-1.2 p.p.

Again, as in the previous two robustness analysis, the number of countries which never performed quantitative easing comprehends the largest part of our entire sample. Therefore, this exercise results were expected to be in accordance with the original ones, as they are.

## 6.5 Level of Monetary Integration (MU)

We also consider the level of monetary integration of each country, to perform a final robustness exercise. In this analysis we will use Garriga's (2016) dummy concerning monetary unions: it is equal to 1 if a country belongs to a monetary union and equal to 0 otherwise – the first type of countries are designated as insiders, and outsiders in the opposite scenario. This author's classification is based on a minimalist approach, considering the fact that belonging to a monetary union is equivalent to having, at least, a fixed exchange rate. Table 12 shows the output for the division referred, considering both dependent variables.

Table 12: Results for gY and gYpc – Monetary Unions and Non Monetary Unions

Variables	gY				gYpc			
	Insiders		Outsiders		Insiders		Outsiders	
	1	2	3	4	5	6	7	8
L1	-.1120792 (.2088202)	-.1822791 (.2288904)	.1364188*** (.0415091)	.1298956*** (.0322221)	-.0366721 (.2469253)	.0443628 (.1833239)	.1685502*** (.0276323)	.150798*** (.0304424)
L2	-.1976439 (.1250284)	-.3270756** (.1376324)	-.1609946*** (.0222104)	-.1715646*** (.028725)	-.2240404** (.1092551)	-.3067968*** (.1152365)	-.1589842*** (.0258141)	-.1837583*** (.0241711)
I_Y	.003412 (.0033818)	.0053087 (.0032372)	.0022079*** (.0005739)	.0021145** (.0009677)	.0029207 (.0054984)	.0044731 (.0030414)	.0018243*** (.0005648)	.0019299** (.0007904)
G_Y	-.0106736*** (.0040147)	-.0086026** (.0041334)	-.0028276*** (.000934)	-.0032876*** (.0007688)	-.0093399 (.0057105)	-.0055912*** (.0019965)	-.0025692*** (.0010004)	-.0026489** (.0011324)
GovBal_Y	.0019245 (.0019878)	.0018949 (.0054267)	.0024956*** (.0008494)	.002422*** (.0005911)	.0015634 (.0029947)	.0012251 (.0024432)	.0025231** (.001016)	.0024906*** (.0005978)
infl	-.0002751*** (.0000836)	-.0003223*** (.0001151)	-.0000803*** (.0000205)	-.0000687*** (.0000263)	-.0002525*** (.0000458)	-.0002803** (.0001197)	-.0000914*** (.0000224)	-.000076*** (.0000138)
inflsq	1.13e-08*** (3.50e-09)	1.32e-08*** (4.81e-09)	9.61e-09*** (2.89e-09)	7.75e-09** (3.61e-09)	1.04e-08*** (1.96e-09)	1.15e-08** (4.99e-09)	1.11e-08*** (3.19e-09)	8.74e-09*** (1.66e-09)
LCBI	.193807* (.1161163)		-.0142537 (.029177)		.2423076** (.1062191)		-.0004305 (.0256049)	
Irreg_TO		.0093858 (.0170288)		-.0083247*** (.0032128)		.0139931 (.0248432)		-.0091651*** (.0028655)
Intercept	.000055 (.0822453)	.0777287 (.0629091)	.0412333* (.0219631)	.0457196 (.0289904)	-.0739265 (.105365)	.0198573 (.0787297)	.0274711 (.0245317)	.027782 (.033062)

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively.

Growth on period  $t - 1$  is only significant for countries which do not belong to a monetary union: if it increases 1 p.p. it makes current growth increase for, approximately 0.14-0.17 p.p. L2 accounts for current growth, except when considering regression 1.

Regarding economic growth determinants, I\_Y is significant for gY and gYpc only in countries which do not belong to a monetary union: an increase in 1 p.p. on this variable will make growth increase by about 0.18-0.22 p.p. G\_Y influences growth, except for regression 5: if we increase the Government expenditure to GDP ratio in 1 p.p., growth will decrease by around 0.26-1.07 p.p. GovBal\_Y is also only accountable for growth considering outsiders: for this subgroup, when this variable increases by 1 p.p. it will promote growth in, approximately, 0.25 p.p. Inflation's overall relationship with growth is negative until its values are higher than, approximately, 4117-12208%, for all the regressions performed. Bolivia appears to have an inflation rate of 11750% in 1985, Peru had an inflation rate of about 7482% in 1990, the Democratic Republic of Congo attains an inflation rate of, approximately, 4129% in 1992 and 23773% 1994, Ukraine also shows an inflation rate of around 4735% in 1993, and Angola shows an inflation rate of, approximately, 4145% in 1996. Still, hyperinflation does not promote growth, but inflation continues to define a convex function.

This is the first regression in this research in which LCBI is statistically significant and has the expected sign, promoting economic growth, although only considering insiders. On the other hand, Irreg\_TO appears to influence growth negatively (almost 1 p.p.) only when considering countries which are not part of a monetary union. In monetary union countries, an increase in 0.01 (one percentage point of index) for LCBI will make gY and gYpc increase by, approximately, 0.0019-0.0024. Considering these two values, for growth to increase 1 p.p., LCBI has to increase, approximately and respectively, 0.053 and 0.042 point of index. This might occur since a country which is considered to be part of a monetary union (with fixed exchange rates or, in the limit, with a single currency) is subject to a high level of regulatory, supervision, and legal enforcement (direct or indirect) procedures, not having as much freedom as it would if it did not belong to a monetary union. When a country starts being part of a monetary union,

at least one of the components of LCBI in Table 3 is reinforced in a positive perspective and the arguments presented in the literature review section about LCBI impact on economic growth should be considered. In fact, LCBI appears to be much higher on average (approximately 0.71) in the insiders subsample than on the outsiders partition (around 0.45). Irreg\_TO, by the same line of reasoning, should be higher in countries which are not in a monetary union having individually, at least, more freedom than if they were. Indeed, the irregular turnover is, on average, higher in countries that do not belong to monetary unions (approximately 0.13) when compared to the opposite situation (around 0.11). The arguments previously discussed on this research, either in the literature review section as well as in the benchmark results, can be also applied to this scenario.

## 7 Conclusion

The work so far developed on the relationship between Central Bank independence and economic growth appears to suffer from an omitted variables problem, which can bias the conclusions taken by some authors. This work wants to investigate how the independence of a country's Central Bank can influence its economic growth, by controlling for other variables which are, theoretically and empirically, considered as determinants of economic performance, such as the gross capital formation (% of GDP), the general Government final consumption expenditure (% of GDP), the debt-to-GDP ratio, the general Government lending/borrowing (% of GDP), the inflation rate, the life expectancy, the human capital index, the rule-of-law, the democracy index, the net barter terms of trade index, and the research and development expenditures (% GDP). With this purpose, we analyse a total of 186 countries for a 49-year period (1970-2018). In order to measure Central Bank independence, we use a legal index of Central Bank independence, and another measure of *de facto* independence, corresponding this last to an irregular turnover dummy of the Governor or CEO. We also use as measures of economic growth, the growth rates of real GDP and real GDP *per capita*. We found that only the second measure of independence can harm growth, by 0.67 p.p.

Secondly, in order to see how robust our estimations are, we divided the sample according to the continent of the world countries belong to. We found no evidence that Central Bank independence could foster or decrease economic growth, depending on the continent a country is inserted in. Furthermore, another data split was made regarding different income levels: low, middle, and high-income. Results for middle-income countries are the more robust when compared to the other two partitions, confirming the results for the entire sample. We also consider the analysis for countries which had experienced at least one type of crisis – banking, currency, or sovereign debt –, independently of when they occurred and conclude that the original results are maintained. Two more robustness analysis were performed. One was considering countries which had undertaken or perform quantitative easing as an unconventional monetary policy measure. Only countries which did not applied quantitative easing appear to be harmed by the irregular turnover dummy. Finally, in the last robustness exercise, we divide the sample into countries which are part of a monetary union (the criteria is based on a minimalist perspective) and countries which are not. This was the first and only case where the legal index of independence shows significance, promoting the economic growth rate of countries under a monetary union (its impact is, approximately, 0.0019-0.0024, when independence increases one percentage point of index), and the actual measure of independence continues to negatively determine growth only in countries outside monetary unions.

On the relationship between Central Bank independence and economic growth, further research might develop a new single measure of independence, combining either the legal framework Central Banks are subject to as well as the actual level of independence. This would capture independence as a whole.

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## 9 Appendix

Table A1: Data availability by country – Dependent and Dependent Related Variables

Countries	Pop	Y	Ypc	gY	gYpc
Afghanistan	1970-2017	2002-2017	2002-2017	2003-2017	2003-2017
Albania	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Algeria	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Angola	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Antigua and Barbuda	1970-2017	1977-2017	1977-2017	1978-2017	1978-2017
Argentina	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Armenia	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Aruba	1970-2017	1986-2017	1986-2017	1987-2017	1987-2017
Australia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Austria	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Azerbaijan	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Bahamas, The	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Bahrain	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Bangladesh	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Barbados	1970-2017	1974-2017	1974-2017	1975-2017	1975-2017
Belarus	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Belgium	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Belize	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Benin	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Bermuda	1970-2017	1970-2013	1970-2013	1971-2013	1971-2013
Bhutan	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Bolivia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Bosnia and Herzegovina	1970-2017	1994-2017	1994-2017	1995-2017	1995-2017
Botswana	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Brazil	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Brunei Darussalam	1970-2017	1974-2017	1974-2017	1975-2017	1975-2017
Bulgaria	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Burkina Faso	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Burundi	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Cambodia	1970-2017	1993-2017	1993-2017	1994-2017	1994-2017
Cameroon	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Canada	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Cape Verde	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Chad	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Chile	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
China	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Colombia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Comoros	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Congo, Dem. Rep.	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Costa Rica	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Cote d'Ivoire	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Croatia	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017
Cuba	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Cyprus	1970-2017	1975-2017	1975-2017	1976-2017	1976-2017
Czech Republic	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Denmark	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Djibouti	1970-2017	2010	2010	N/A	N/A
Dominica	1970-2017	1977-2017	1977-2017	1978-2017	1978-2017
Dominican Republic	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Ecuador	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Egypt, Arab Rep.	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
El Salvador	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Equatorial Guinea	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Estonia	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017

Table A1 (cont.): Data availability by country – Dependent and Dependent Related Variables

Countries	Pop	Y	Ypc	gY	gYpc
Eswatini	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Ethiopia	1970-2017	1981-2017	1981-2017	1982-2017	1982-2017
Fiji	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Finland	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
France	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
French Polynesia	1970-2017	N/A	N/A	N/A	N/A
Gabon	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Gambia, The	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Georgia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Germany	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Ghana	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Greece	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Grenada	1970-2017	1977-2017	1977-2017	1978-2017	1978-2017
Guatemala	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Guinea	1970-2017	1986-2017	1986-2017	1987-2017	1987-2017
Guinea-Bissau	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Guyana	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Haiti	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Honduras	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Hong Kong, China	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Hungary	1970-2017	1991-2017	1991-2017	1992-2017	1992-2017
Iceland	1970-2017	1996-2017	1996-2017	1997-2017	1997-2017
India	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Indonesia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Iran, Islamic Rep.	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Iraq	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Ireland	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Israel	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Italy	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Jamaica	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Japan	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Jordan	1970-2017	1975-2017	1975-2017	1976-2017	1976-2017
Kazakhstan	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Kenya	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Kiribati	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Korea, Rep.	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Kuwait	1970-1991, 1995-2017	1992-2017	1995-2017	1996-2017	1996-2017
Kyrgyz Republic	1970-2017	1986-2017	1986-2017	1987-2017	1987-2017
Lao PDR	1970-2017	1984-2017	1984-2017	1985-2017	1985-2017
Latvia	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017
Lebanon	1970-2017	1988-2017	1988-2017	1989-2017	1989-2017
Lesotho	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Liberia	1970-2017	2000-2017	2000-2017	2001-2017	2001-2017
Libya	1970-2017	1999-2017	1999-2017	2000-2017	2000-2017
Lithuania	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017
Luxembourg	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Macao, China	1970-2017	1982-2017	1982-2017	1983-2017	1983-2017
Macedonia, FYR	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Madagascar	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Malawi	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Malaysia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Maldives	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017
Mali	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Malta	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Mauritania	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Mauritius	1970-2017	1976-2017	1976-2017	1977-2017	1977-2017
Mexico	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Moldova	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017

Table A1 (cont.): Data availability by country – Dependent and Dependent Related Variables

Countries	Pop	Y	Ypc	gY	gYpc
Mongolia	1970-2017	1981-2017	1981-2017	1982-2017	1982-2017
Montenegro	1970-2017	1997-2017	1997-2017	1998-2017	1998-2017
Morocco	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Mozambique	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Myanmar	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Namibia	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Nepal	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Netherlands	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Netherlands Antilles	N/A	N/A	N/A	N/A	N/A
New Zealand	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Nicaragua	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Niger	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Nigeria	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Norway	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Oman	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Pakistan	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Panama	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Papua New Guinea	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Paraguay	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Peru	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Philippines	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Poland	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Portugal	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Qatar	1970-2017	2000-2017	2000-2017	2001-2017	2001-2017
Romania	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Russian Federation	1970-2017	1989-2017	1989-2017	1990-2017	1990-2017
Rwanda	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Samoa	1970-2017	1982-2017	1982-2017	1983-2017	1983-2017
San Marino	1970-2017	1997-2017	1997-2017	1998-2017	1998-2017
Sao Tome and Principe	1970-2017	2001-2017	2001-2017	2002-2017	2002-2017
Saudi Arabia	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Senegal	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Serbia	1990-2017	1995-2017	1995-2017	1996-2017	1996-2017
Seychelles	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Sierra Leone	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Singapore	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Slovak Republic	1970-2017	1992-2017	1992-2017	1993-2017	1993-2017
Slovenia	1970-2017	1995-2017	1995-2017	1996-2017	1996-2017
Solomon Islands	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
Somalia	1970-2017	N/A	N/A	N/A	N/A
South Africa	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Spain	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Sri Lanka	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
St. Kitts and Nevis	1970-2017	1977-2017	1977-2017	1978-2017	1978-2017
St. Lucia	1970-2017	1977-2017	1977-2017	1978-2017	1978-2017
St. Vincent and the Grenadines	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Sudan	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Suriname	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Sweden	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Switzerland	1970-2017	1980-2017	1980-2017	1981-2017	1981-2017
Syrian Arab Republic	1970-2017	N/A	N/A	N/A	N/A
Tajikistan	1970-2017	1985-2017	1985-2017	1986-2017	1986-2017
Tanzania	1970-2017	1988-2017	1988-2017	1989-2017	1989-2017
Thailand	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Timor-Leste	1970-2017	2000-2017	2000-2017	2001-2017	2001-2017
Togo	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
Tonga	1970-2017	1981-2017	1981-2017	1982-2017	1982-2017
Trinidad and Tobago	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017

Table A1 (cont.): Data availability by country – Dependent and Dependent Related Variables

<b>Countries</b>	<b>Pop</b>	<b>Y</b>	<b>Ypc</b>	<b>gY</b>	<b>gYpc</b>
<b>Tunisia</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
<b>Turkey</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
<b>Turkmenistan</b>	1970-2017	1987-2017	1987-2017	1988-2017	1988-2017
<b>Uganda</b>	1970-2017	1982-2017	1982-2017	1983-2017	1983-2017
<b>Ukraine</b>	1970-2017	1987-2017	1987-2017	1988-2017	1988-2017
<b>United Arab Emirates</b>	1970-2017	1975-2017	1975-2017	1976-2017	1976-2017
<b>United Kingdom</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
<b>United States</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
<b>Uruguay</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
<b>Uzbekistan</b>	1970-2017	1987-2017	1987-2017	1988-2017	1988-2017
<b>Vanuatu</b>	1970-2017	1979-2017	1979-2017	1980-2017	1980-2017
<b>Venezuela, RB</b>	1970-2017	1970-2014	1970-2014	1971-2014	1971-2014
<b>Vietnam</b>	1970-2017	1984-2017	1984-2017	1985-2017	1985-2017
<b>Yemen, Rep.</b>	1970-2017	1990-2017	1990-2017	1991-2017	1991-2017
<b>Zambia</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017
<b>Zimbabwe</b>	1970-2017	1970-2017	1970-2017	1971-2017	1971-2017

Table A2: Data availability by country – Central Bank Independence Measures

Countries	LCBI	Irreg_TO
Afghanistan	2003-2012	2003-2018
Albania	1991-2012	1970-2018
Algeria	2003-2012	1976-2018
Angola	N/A	2010-2018
Antigua and Barbuda	1983-2012	N/A
Argentina	1970-2012	1970-2018
Armenia	1993-2012	1994-2018
Aruba	N/A	1970-1985, 1987-2018
Australia	1970-2012	1970-2018
Austria	1970-2012	1970-2018
Azerbaijan	1992-2012	N/A
Bahamas, The	1973-2012	1970-2018
Bahrain	2006-2012	1970-2018
Bangladesh	1972-2012	1970-2018
Barbados	1972-2012	1970-2018
Belarus	1990-2012	1992-1995, 1997-2018
Belgium	1970-2012	1970-1998, 2011-2018
Belize	1982-2012	1970, 1982, 1984-1985, 1987-1991, 1993-2018
Benin	1970-2012	N/A
Bermuda	N/A	1970-2018
Bhutan	1982-2012	1970-2018
Bolivia	1970-2012	1970-2018
Bosnia and Herzegovina	1997-2012	1970-2018
Botswana	1975-2012	1970-2018
Brazil	1970-2012	1970-1973, 1975-1978, 1980-2002, 2004-2010, 2012-2015, 2017-2018
Brunei Darussalam	N/A	1970-2018
Bulgaria	1991-2012	1970-2018
Burkina Faso	1970-2012	N/A
Burundi	1993-2012	1970-1976, 1978, 1980-2018
Cambodia	1996-2012	N/A
Cameroon	1972-2012	N/A
Canada	1970-2012	1970-2018
Cape Verde	2002-2012	1970-1982, 1984-1990, 1992-1998, 2005-2018
Chad	1972-2012	1972-2009
Chile	1970-2012	1970-2018
China	1970-2012	1970-2018
Colombia	1970-2012	1970-2018
Comoros	1979-2012	N/A
Congo, Dem. Rep.	1972-2012	1972-2018
Costa Rica	1970-2012	1970-2018
Cote d'Ivoire	1970-2012	N/A
Croatia	1992-2012	1970-2018
Cuba	1997-2012	1970-2018
Cyprus	2002-2012	1970-2018
Czech Republic	1992-2012	1970-2018
Denmark	1970-2012	1970-2018
Djibouti	2000-2012	1975-2018
Dominica	1983-2012	N/A
Dominican Republic	1990-2012	1970-2018
Ecuador	1992-2012	1973-2004, 2006-2007, 2009, 2012-2018
Egypt, Arab Rep.	1970-2012	1970-2018
El Salvador	1991-2012	1970-2018
Equatorial Guinea	1972-2012	1972-1984
Estonia	1993-2012	1971-2018
Eswatini	N/A	1970-2017

Table A2 (cont.): Data availability by country – Central Bank Independence Measures

Countries	LCBI	Irreg_TO
Ethiopia	1993-2012	1970-2018
Fiji	1973-2012	1974-2018
Finland	1970-2012	1970-1981, 1983-2018
France	1970-2012	1970-2018
French Polynesia	N/A	1970-1985, 1988-2018
Gabon	1972-2012	1972-2009
Gambia, The	2005-2012	1972-2018
Georgia	1995-2012	1977-2018
Germany	1970-2012	1970-2018
Ghana	1970-2012	1970-2018
Greece	1970-2012	1970-2018
Grenada	1983-2012	N/A
Guatemala	1970-2012	1970-2018
Guinea	1994-2012	1977-1978, 1980, 1982-1983, 1986-1995, 1997-2003, 2005-2018
Guinea-Bissau	1997-2012	2009-2018
Guyana	1995-2012	1970-2018
Haiti	1979-2012	1974-2018
Honduras	1970-2012	1975-2018
Hong Kong, China	N/A	1970-1992, 1994-2008, 2010-2018
Hungary	1970-2012	1970-2018
Iceland	1970-2012	1970-2018
India	1970-2012	1970-2018
Indonesia	1970-2012	1973-2018
Iran, Islamic Rep.	1970-2012	1970-2018
Iraq	2004-2012	2003-2018
Ireland	1970-2012	1970-2018
Israel	1970-2012	1970-2018
Italy	1970-2012	1970-2018
Jamaica	1977-2012	1970-2018
Japan	1970-2012	1970-2018
Jordan	1971-2012	1970-2018
Kazakhstan	1993-2012	1970-2018
Kenya	1970-2012	1970-2018
Kiribati	N/A	1970-2018
Korea, Rep.	1970-2012	1971-2018
Kuwait	1977-2012	1970-2018
Kyrgyz Republic	1993-2012	2007-2018
Lao PDR	1995-2012	1970-2018
Latvia	1992-2012	1970-1989, 1991-2018
Lebanon	1970-2012	1970-2018
Lesotho	2000-2012	1970-1981, 1983-1984, 1986-1987, 1989-1997, 1999-2018
Liberia	1999-2012	N/A
Libya	1993-2012	1970-1986, 1988-2018
Lithuania	1992-2012	1970-2018
Luxembourg	1970-2012	1970-2018
Macao, China	N/A	1980-2018
Macedonia, FYR	1994-2012	1998-2018
Madagascar	1994-2012	1974-1992, 1994-1995, 1997-2018
Malawi	1989-2012	1970-2018
Malaysia	1970-2012	1970-2018
Maldives	1981-2012	1970-2018
Mali	1984-2012	N/A
Malta	1970-2012	1970-2018
Mauritania	1970-2012	N/A
Mauritius	2004-2012	1972-2018
Mexico	1970-2012	1970-2018

Table A2 (cont.): Data availability by country – Central Bank Independence Measures

Countries	LCBI	Irreg_TO
Moldova	1992-2012	N/A
Mongolia	1991-2012	1970-1974, 1976-1990, 1992-2018
Montenegro	2000-2012	2001-2018
Morocco	1970-2012	1970-2018
Mozambique	1992-2012	1970-2018
Myanmar	1990-2012	1970-2018
Namibia	1997-2012	1970-1989, 1991-1993, 1995-1996, 1998-2018
Nepal	1970-2012	1970-2018
Netherlands	1970-2012	1970-2018
Netherlands Antilles	N/A	1970-2018
New Zealand	1970-2012	1970-2018
Nicaragua	1970-2012	1979-2018
Niger	1970-2012	N/A
Nigeria	1970-2012	1970-2018
Norway	1970-2012	1970-2018
Oman	1974-2012	1970-1973, 1975-1990, 1992-2018
Pakistan	1970-2012	1970-2018
Panama	1970-2012	1971-1986, 1989-2018
Papua New Guinea	2000-2012	1974-1992, 1995-1997, 2000-2008, 2010-2018
Paraguay	1970-2012	1970-2018
Peru	1970-2012	1970-2018
Philippines	1970-2012	1971-1980, 1982-2018
Poland	1970-2012	1970-2018
Portugal	1970-2012	1970-2018
Qatar	1973-2012	1973, 1975, 1990-2018
Romania	1970-2012	1970-2018
Russian Federation	1991-2012	1970-2014
Rwanda	1997-2012	1970, 1972-1984, 1986-1990, 1992-1993, 1995, 1997-2001, 2003-2018
Samoa	1984-2012	1970-2018
San Marino	1988-2012	N/A
Sao Tome and Principe	1992-2012	1993-2018
Saudi Arabia	1970-2012	1970-2018
Senegal	1970-2012	N/A
Serbia	2006-2012	1970-1971, 1973-1976, 1978-1980, 1982-1985, 1987-1991, 1995-1996, 1998-1999, 2001-2002, 2004-2018
Seychelles	1983-2012	1970-1990, 1992-1994, 1996-2000, 2002-2007, 2009-2011, 2013-2018
Sierra Leone	2000-2012	N/A
Singapore	1970-2012	1972-2018
Slovak Republic	1992-2012	1970-2018
Slovenia	1991-2012	1970-2018
Solomon Islands	1982-2012	1970-2018
Somalia	1970-2012	N/A
South Africa	1970-2012	1970-2018
Spain	1970-2012	1970-2018
Sri Lanka	1970-2012	1970-2018
St. Kitts and Nevis	1983-2012	N/A
St. Lucia	1983-2012	N/A
St. Vincent and the Grenadines	1983-2012	N/A
Sudan	1970-2012	1970-2018
Suriname	1970-2012	1970-2018
Sweden	1970-2012	1970-2018
Switzerland	1970-2012	1970-2018
Syrian Arab Republic	2002-2012	1970-2018
Tajikistan	1991-2012	N/A
Tanzania	1970-2012	1970-2018



Table A2 (cont.): Data availability by country – Central Bank Independence Measures

Countries	LCBI	Irreg_TO
Thailand	1970-2012	1970-2018
Timor-Leste	2001-2012	N/A
Togo	1970-2012	N/A
Tonga	1988-2012	N/A
Trinidad and Tobago	1970-2012	1970-2018
Tunisia	1970-2012	1975-2018
Turkey	1970-2012	1970-2018
Turkmenistan	1991-2012	N/A
Uganda	1970-2012	1970-2018
Ukraine	1991-2012	2001-2018
United Arab Emirates	1980-2012	N/A
United Kingdom	1970-2012	1970-2018
United States	1970-2012	1970-2018
Uruguay	1970-2012	1970-2018
Uzbekistan	1991-2012	N/A
Vanuatu	1980-2012	1970-2018
Venezuela, RB	1970-2012	1970-2018
Vietnam	1997-2012	1970-2018
Yemen, Rep.	2000-2012	1998-2018
Zambia	1970-2012	1971, 1973-1975, 1977-1980, 1982-1983, 1985, 1987, 1989-1990, 1993-1994, 1996-2018
Zimbabwe	1970-2012	1970-1993, 2003-2018

Table A3: Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
Afghanistan	LCBI	10	.6620625	.6620625	.6620625	.6620625	0
	Irreg_TO	16	1	0	0	.25	.4472136
Albania	LCBI	22	.7105	.4955139	.7105	.6518674	.0979998
	Irreg_TO	49	1	0	0	.122449	.3312007
Algeria	LCBI	10	.4525	.3625	.3625	.3895	.0434741
	Irreg_TO	43	1	0	0	.1627907	.3735437
Angola	LCBI	0	.	.	.	.	.
	Irreg_TO	9	1	0	0	.3333333	.5
Antigua and Barbuda	LCBI	30	.642375	.642375	.642375	.642375	0
	Irreg_TO	0	.	.	.	.	.
Argentina	LCBI	43	.8025526	.400125	.480375	.5986995	.1954632
	Irreg_TO	49	1	0	0	.4081633	.496587
Armenia	LCBI	20	.8465	.3025	.8465	.7649	.1992931
	Irreg_TO	25	1	0	0	.12	.3316625
Aruba	LCBI	0	.	.	.	.	.
	Irreg_TO	48	1	0	0	.125	.3342187
Australia	LCBI	43	.3471645	.2511154	.3471645	.313659	.046319
	Irreg_TO	49	1	0	0	.0204082	.1428571
Austria	LCBI	43	.8565	.61375	.61375	.7001919	.1160335
	Irreg_TO	49	1	0	0	.1020408	.3058389
Azerbaijan	LCBI	21	.5715	.2180147	.2524342	.3826206	.1680844
	Irreg_TO	0	.	.	.	.	.
Bahamas, The	LCBI	40	.41125	.40375	.41125	.4088125	.0035576
	Irreg_TO	49	1	0	0	.0612245	.2422261
Bahrain	LCBI	7	.51475	.51475	.51475	.51475	0
	Irreg_TO	49	1	0	0	.1020408	.3058389
Bangladesh	LCBI	41	.327625	.327625	.327625	.327625	0
	Irreg_TO	49	1	0	0	.122449	.3312007
Barbados	LCBI	41	.4133355	.3859803	.3859803	.3959883	.0133399
	Irreg_TO	49	1	0	0	.0612245	.2422261
Belarus	LCBI	23	.7486705	.3729408	.727875	.5762682	.1824622
	Irreg_TO	26	1	0	0	.1153846	.3258126
Belgium	LCBI	43	.8565	.141579	.1565789	.4437007	.3276489
	Irreg_TO	37	1	0	0	.027027	.164399
Belize	LCBI	31	.593	.508	.508	.5162258	.0255457
	Irreg_TO	46	1	0	0	.0434783	.2061846
Benin	LCBI	43	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Bermuda	LCBI	0	.	.	.	.	.
	Irreg_TO	49	1	0	0	.1428571	.3535534
Bhutan	LCBI	31	.542625	.3388947	.3388947	.3586106	.0612285
	Irreg_TO	49	1	0	0	.0612245	.2422261
Bolivia	LCBI	43	.7970263	.302375	.302375	.5094383	.2469145
	Irreg_TO	49	1	0	0	.4081633	.496587
Bosnia and Herzegovina	LCBI	16	.979	.979	.979	.979	0
	Irreg_TO	49	1	0	0	.0204082	.1428571
Botswana	LCBI	38	.515875	.32725	.32725	.4116349	.0950475
	Irreg_TO	49	1	0	0	.0816327	.2766417
Brazil	LCBI	43	.2548816	.1496184	.2548816	.2108179	.0525441
	Irreg_TO	44	1	0	0	.2954545	.4615215
Brunei Darussalam	LCBI	0	.	.	.	.	.
	Irreg_TO	49	0	0	0	0	0
Bulgaria	LCBI	22	.8565	.50175	.8565	.75975	.1617101
	Irreg_TO	49	1	0	0	.0408163	.1999149
Burkina Faso	LCBI	43	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Burundi	LCBI	20	.53175	.53175	.53175	.53175	0
	Irreg_TO	47	1	0	0	.0851064	.2820567

Table A3 (cont.): Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
Cambodia	LCBI	17	.63725	.63725	.63725	.63725	0
	Irreg_TO	0	.	.	.	.	.
Cameroon	LCBI	41	.50145	.50145	.50145	.50145	0
	Irreg_TO	0	.	.	.	.	.
Canada	LCBI	43	.472375	.450625	.450625	.4566948	.0098712
	Irreg_TO	49	1	0	0	.0408163	.1999149
Cape Verde	LCBI	11	.518	.518	.518	.518	0
	Irreg_TO	41	1	0	0	.0243902	.1561738
Chad	LCBI	41	.50145	.50145	.50145	.50145	0
	Irreg_TO	38	1	0	0	.1052632	.3110117
Chile	LCBI	43	.819	.2572303	.819	.6394653	.2135153
	Irreg_TO	49	1	0	0	.2857143	.4564355
China	LCBI	43	.6021426	.2061765	.2061765	.3715078	.1971522
	Irreg_TO	49	1	0	0	.1632653	.3734378
Colombia	LCBI	43	.69325	.26725	.26725	.4752965	.2154625
	Irreg_TO	49	1	0	0	.0612245	.2422261
Comoros	LCBI	34	.6612708	.526625	.526625	.5464259	.0484039
	Irreg_TO	0	.	.	.	.	.
Congo, Dem. Rep.	LCBI	41	.50145	.50145	.50145	.50145	0
	Irreg_TO	47	1	0	0	.1702128	.3798826
Costa Rica	LCBI	43	.73425	.474	.474	.5829419	.1299087
	Irreg_TO	49	1	0	0	.2653061	.4460713
Cote d'Ivoire	LCBI	43	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Croatia	LCBI	21	.894	.4423333	.819	.6825714	.2151055
	Irreg_TO	49	1	0	0	.0612245	.2422261
Cuba	LCBI	16	.2251864	.2251864	.2251864	.2251864	0
	Irreg_TO	49	1	0	0	.0408163	.1999149
Cyprus	LCBI	11	.5751754	.5751754	.5751754	.5751754	0
	Irreg_TO	49	1	0	0	.0408163	.1999149
Czech Republic	LCBI	21	.8315	.6937222	.8315	.7658915	.07051
	Irreg_TO	49	1	0	0	.122449	.3312007
Denmark	LCBI	43	.5025526	.5025526	.5025526	.5025526	0
	Irreg_TO	49	0	0	0	0	0
Djibouti	LCBI	13	.6984205	.6260455	.6984205	.6705839	.0366485
	Irreg_TO	44	1	0	0	.0909091	.2908034
Dominica	LCBI	30	.642375	.642375	.642375	.642375	0
	Irreg_TO	0	.	.	.	.	.
Dominican Republic	LCBI	23	.64825	.625	.625	.6361196	.011875
	Irreg_TO	49	1	0	0	.2653061	.4460713
Ecuador	LCBI	21	.8815	.4709375	.8815	.783747	.1791842
	Irreg_TO	42	1	0	0	.4761905	.5054867
Egypt, Arab Rep.	LCBI	43	.517375	.4875	.492625	.4944302	.0086727
	Irreg_TO	49	1	0	0	.1632653	.3734378
El Salvador	LCBI	22	.7575625	.3410625	.7575625	.5871761	.2095979
	Irreg_TO	49	1	0	0	.244898	.434483
Equatorial Guine	LCBI	41	.50145	.50145	.50145	.50145	0
	Irreg_TO	13	1	0	0	.1538462	.3755338
Estonia	LCBI	20	.8660455	.844	.8612727	.8587727	.0086841
	Irreg_TO	48	1	0	0	.1041667	.3087093
Eswatini	LCBI	0	.	.	.	.	.
	Irreg_TO	48	1	0	0	.0833333	.2793102
Ethiopia	LCBI	20	.42875	.3995	.42875	.4272875	.0065405
	Irreg_TO	49	1	0	0	.1428571	.3535534
Fiji	LCBI	40	.405875	.405875	.405875	.405875	0
	Irreg_TO	45	1	0	0	.1555556	.3665289
Finland	LCBI	43	.8565	.2728431	.2728431	.4764444	.2814643
	Irreg_TO	48	1	0	0	.0833333	.2793102

Table A3 (cont.): Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
France	LCBI	43	.8565	.2567917	.357375	.5427432	.2971017
	Irreg_TO	49	1	0	0	.0408163	.1999149
French Polynesia	LCBI	0	.	.	.	.	.
	Irreg_TO	47	0	0	0	0	0
Gabon	LCBI	41	.50145	.50145	.50145	.50145	0
	Irreg_TO	38	1	0	0	.1052632	.3110117
Gambia, The	LCBI	8	.5493947	.5493947	.5493947	.5493947	0
	Irreg_TO	47	1	0	0	.1276596	.3373181
Georgia	LCBI	18	.7985455	.735	.735	.7491212	.0271843
	Irreg_TO	42	1	0	0	.0952381	.2971018
Germany	LCBI	43	.8565	.694875	.694875	.7512558	.0779425
	Irreg_TO	49	1	0	0	.122449	.3312007
Ghana	LCBI	43	.5606667	.305625	.305625	.3708682	.1125962
	Irreg_TO	49	1	0	0	.122449	.3312007
Greece	LCBI	43	.8565	.512375	.555125	.6457849	.1408441
	Irreg_TO	49	1	0	0	.1428571	.3535534
Grenada	LCBI	30	.642375	.642375	.642375	.642375	0
	Irreg_TO	0	.	.	.	.	.
Guatemala	LCBI	43	.7825	.6835	.6835	.7088256	.0437067
	Irreg_TO	49	1	0	0	.244898	.434483
Guinea	LCBI	19	.8665	.3899375	.3899375	.4902665	.1996101
	Irreg_TO	36	1	0	0	.0833333	.280306
Guinea-Bissau	LCBI	16	.8015	.8015	.8015	.8015	0
	Irreg_TO	10	1	0	0	.1	.3162278
Guyana	LCBI	18	.7362121	.52875	.6382917	.6526749	.0726818
	Irreg_TO	49	1	0	0	.1020408	.3058389
Haiti	LCBI	34	.3755	.3755	.3755	.3755	0
	Irreg_TO	45	1	0	0	.3111111	.4681794
Honduras	LCBI	43	.671	.364125	.364125	.4854477	.1518147
	Irreg_TO	44	1	0	0	.1363636	.3471418
Hong Kong, China	LCBI	0	.	.	.	.	.
	Irreg_TO	47	0	0	0	0	0
Hungary	LCBI	43	.844	.243125	.625375	.4997064	.2656034
	Irreg_TO	49	1	0	0	.1020408	.3058389
Iceland	LCBI	43	.827625	.3440066	.3440066	.4789699	.2194903
	Irreg_TO	49	1	0	0	.0816327	.2766417
India	LCBI	43	.295	.295	.295	.295	0
	Irreg_TO	49	1	0	0	.1020408	.3058389
Indonesia	LCBI	43	.904	.268375	.268375	.4644136	.2833584
	Irreg_TO	46	1	0	0	.1956522	.4010855
Iran, Islamic Rep.	LCBI	43	.4362719	.0166667	.4362719	.4167554	.0894106
	Irreg_TO	49	1	0	0	.2244898	.4215698
Iraq	LCBI	9	.3515	.3515	.3515	.3515	0
	Irreg_TO	16	1	0	0	.125	.341565
Ireland	LCBI	43	.8565	.3634737	.3634737	.5354596	.2377584
	Irreg_TO	49	1	0	0	.0816327	.2766417
Israel	LCBI	43	.67025	.389625	.463375	.4521744	.0696948
	Irreg_TO	49	1	0	0	.1020408	.3058389
Italy	LCBI	43	.8565	.2496111	.2496111	.5160323	.2919423
	Irreg_TO	49	1	0	0	.0816327	.2766417
Jamaica	LCBI	36	.3830139	.3830139	.3830139	.3830139	0
	Irreg_TO	49	1	0	0	.1836735	.3912304
Japan	LCBI	43	.4360368	.1753015	.1753015	.2723193	.1275213
	Irreg_TO	49	1	0	0	.0204082	.1428571
Jordan	LCBI	42	.482625	.482625	.482625	.482625	5.62e-17
	Irreg_TO	49	1	0	0	.122449	.3312007
Kazakhstan	LCBI	20	.5698529	.3112303	.4703607	.4643969	.109571
	Irreg_TO	49	1	0	0	.2040816	.4072055

Table A3 (cont.): Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
Kenya	LCBI	43	.537375	.4365	.4365	.4750901	.0486228
	Irreg_TO	49	1	0	0	.0816327	.2766417
Kiribati	LCBI	0	.	.	.	.	.
	Irreg_TO	49	0	0	0	0	0
Korea, Rep.	LCBI	43	.4105724	.2901974	.2923026	.3372218	.0575267
	Irreg_TO	48	1	0	0	.1666667	.3766218
Kuwait	LCBI	36	.410375	.410375	.410375	.410375	0
	Irreg_TO	49	1	0	0	.0408163	.1999149
Kyrgyz Republic	LCBI	20	.5735694	.5160695	.5735694	.5620694	.0235975
	Irreg_TO	12	1	0	0	.25	.452267
Lao PDR	LCBI	18	.241125	.241125	.241125	.241125	0
	Irreg_TO	49	1	0	0	.2653061	.4460713
Latvia	LCBI	21	.8865	.4798333	.8865	.6928492	.2081183
	Irreg_TO	48	1	0	0	.0416667	.2019409
Lebanon	LCBI	43	.4	.4	.4	.4	5.62e-17
	Irreg_TO	49	1	0	0	.0612245	.2422261
Lesotho	LCBI	13	.681	.681	.681	.681	1.16e-16
	Irreg_TO	45	1	0	0	.0666667	.2522625
Liberia	LCBI	14	.533125	.533125	.533125	.533125	0
	Irreg_TO	0	.	.	.	.	.
Libya	LCBI	20	.3225	.255	.315	.291	.0335057
	Irreg_TO	48	1	0	0	.1041667	.3087093
Lithuania	LCBI	21	.844	.202375	.844	.6032679	.2862759
	Irreg_TO	49	1	0	0	.0816327	.2766417
Luxembourg	LCBI	43	.8565	.3265132	.3265132	.5113923	.2555824
	Irreg_TO	49	1	0	0	.0204082	.1428571
Macao, China	LCBI	0	.	.	.	.	.
	Irreg_TO	39	1	0	0	.1538462	.3655178
Macedonia, FYR	LCBI	19	.8715	.4135	.6788684	.6482424	.2163327
	Irreg_TO	21	0	0	0	0	0
Madagascar	LCBI	19	.7301842	.7301842	.7301842	.7301842	0
	Irreg_TO	43	1	0	0	.1162791	.324353
Malawi	LCBI	24	.393	.393	.393	.393	0
	Irreg_TO	49	1	0	0	.1632653	.3734378
Malaysia	LCBI	43	.5765	.34425	.34425	.4108983	.0808958
	Irreg_TO	49	1	0	0	.1020408	.3058389
Maldives	LCBI	32	.4281579	.4156579	.4156579	.4180016	.004957
	Irreg_TO	49	1	0	0	.122449	.3312007
Mali	LCBI	29	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Malta	LCBI	43	.8565	.4235	.4395	.4983992	.1461386
	Irreg_TO	49	1	0	0	.1632653	.3734378
Mauritania	LCBI	43	.8015	.393375	.393375	.4557035	.1277881
	Irreg_TO	0	.	.	.	.	.
Mauritius	LCBI	9	.5109167	.5109167	.5109167	.5109167	0
	Irreg_TO	47	1	0	0	.1489362	.3598746
Mexico	LCBI	43	.63825	.3403706	.392875	.4886874	.1423266
	Irreg_TO	49	1	0	0	.0408163	.1999149
Moldova	LCBI	21	.6942632	.38075	.6942632	.6494756	.112416
	Irreg_TO	0	.	.	.	.	.
Mongolia	LCBI	22	.55525	.40575	.55525	.5212727	.0641253
	Irreg_TO	47	1	0	0	.1276596	.3373181
Montenegro	LCBI	13	.819	.7385455	.7385455	.7571119	.0352816
	Irreg_TO	18	1	0	0	.1666667	.3834825
Morocco	LCBI	43	.651875	.1439167	.1439167	.2266076	.1897446
	Irreg_TO	49	1	0	0	.0612245	.2422261
Mozambique	LCBI	21	.20875	.20875	.20875	.20875	0
	Irreg_TO	49	0	0	0	0	0

Table A3 (cont.): Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
Myanmar	LCBI	23	.50775	.50775	.50775	.50775	0
	Irreg_TO	49	1	0	0	.0408163	.1999149
Namibia	LCBI	16	.424	.424	.424	.424	0
	Irreg_TO	46	1	0	0	.0434783	.2061846
Nepal	LCBI	43	.64425	.179079	.179079	.2980762	.2053644
	Irreg_TO	49	1	0	0	.1020408	.3058389
Netherlands	LCBI	43	.8565	.418875	.418875	.5715349	.2110415
	Irreg_TO	49	1	0	0	.0408163	.1999149
Netherlands Antilles	LCBI	0	.	.	.	.	.
	Irreg_TO	49	1	0	0	.122449	.3312007
New Zealand	LCBI	43	.777275	.2422895	.348625	.3116081	.0899283
	Irreg_TO	49	1	0	0	.0816327	.2766417
Nicaragua	LCBI	43	.72175	.454	.454	.5785465	.1293373
	Irreg_TO	40	1	0	0	.175	.3848076
Niger	LCBI	43	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Nigeria	LCBI	43	.62625	.363625	.368125	.4366366	.1009241
	Irreg_TO	49	1	0	0	.0816327	.2766417
Norway	LCBI	43	.452625	.1379539	.1797895	.2283938	.1270422
	Irreg_TO	49	1	0	0	.1020408	.3058389
Oman	LCBI	39	.497	.497	.497	.497	0
	Irreg_TO	47	1	0	0	.0425532	.2040297
Pakistan	LCBI	43	.3396579	.2234737	.2321579	.2725526	.0534041
	Irreg_TO	49	1	0	0	.1836735	.3912304
Panama	LCBI	43	.234989	.2176206	.2176206	.2196402	.0056335
	Irreg_TO	46	0	0	0	0	0
Papua New Guinea	LCBI	13	.58375	.58375	.58375	.58375	0
	Irreg_TO	40	0	0	0	0	0
Paraguay	LCBI	43	.617125	.37525	.37525	.4765	.1207364
	Irreg_TO	49	1	0	0	.1836735	.3912304
Peru	LCBI	43	.79775	.431625	.431625	.6104302	.1851789
	Irreg_TO	49	1	0	0	.2244898	.4215698
Philippines	LCBI	43	.634	.417125	.418875	.5180785	.1093773
	Irreg_TO	47	1	0	0	.0425532	.2040297
Poland	LCBI	43	.87525	.1039408	.461625	.4588753	.3493838
	Irreg_TO	49	1	0	0	.1836735	.3912304
Portugal	LCBI	43	.8565	.290375	.589	.5637093	.2421603
	Irreg_TO	49	1	0	0	.122449	.3312007
Qatar	LCBI	40	.586125	.2003224	.2493289	.2996921	.1406776
	Irreg_TO	31	1	0	0	.0967742	.3005372
Romania	LCBI	43	.8462222	.2296053	.295375	.4484622	.2618058
	Irreg_TO	49	1	0	0	.1020408	.3058389
Russian Federation	LCBI	22	.6999276	.385875	.5957763	.576549	.1315396
	Irreg_TO	45	1	0	0	.1111111	.3178209
Rwanda	LCBI	16	.7625	.66625	.7625	.7264062	.048125
	Irreg_TO	43	1	0	0	.0465116	.2130826
Samoa	LCBI	29	.331125	.331125	.331125	.331125	5.65e-17
	Irreg_TO	49	1	0	0	.0408163	.1999149
San Marino	LCBI	25	.1854125	.1437458	.1437458	.1570792	.0198373
	Irreg_TO	0	.	.	.	.	.
São Tome and Principe	LCBI	21	.482	.482	.482	.482	0
	Irreg_TO	26	1	0	0	.1923077	.4019185
Saudi Arabia	LCBI	43	.5522083	.5522083	.5522083	.5522083	0
	Irreg_TO	49	1	0	0	.0816327	.2766417
Senegal	LCBI	43	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Serbia	LCBI	7	.8110455	.676	.676	.7338766	.0721848
	Irreg_TO	39	1	0	0	.0769231	.2699528

Table A3 (cont.): Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
Seychelles	LCBI	30	.6785	.224	.224	.3203292	.1558576
	Irreg_TO	44	0	0	0	0	0
Sierra Leone	LCBI	13	.72475	.69775	.69775	.7019038	.0101394
	Irreg_TO	0	.	.	.	.	.
Singapore	LCBI	43	.5115	.1216316	.1216316	.2278936	.15797
	Irreg_TO	47	1	0	0	.0638298	.2470922
Slovak Republic	LCBI	21	.8565	.479	.522	.5652381	.1460806
	Irreg_TO	49	1	0	0	.0204082	.1428571
Slovenia	LCBI	22	.8565	.5858333	.7211667	.7211667	.1385181
	Irreg_TO	49	1	0	0	.0204082	.1428571
Solomon Islands	LCBI	31	.74475	.480625	.480625	.4891452	.0474383
	Irreg_TO	49	1	0	0	.0204082	.1428571
Somalia	LCBI	43	.409125	.409125	.409125	.409125	5.62e-17
	Irreg_TO	0	.	.	.	.	.
South Africa	LCBI	43	.3651539	.2186842	.275	.2879647	.0535493
	Irreg_TO	49	1	0	0	.0408163	.1999149
Spain	LCBI	43	.8565	.097125	.310375	.5005174	.3253859
	Irreg_TO	49	1	0	0	.0816327	.2766417
Sri Lanka	LCBI	43	.642	.4295	.6055	.5866047	.0574262
	Irreg_TO	49	1	0	0	.1632653	.3734378
St. Kitts	LCBI	30	.642375	.642375	.642375	.642375	0
	Irreg_TO	0	.	.	.	.	.
St. Lucia	LCBI	30	.642375	.642375	.642375	.642375	0
	Irreg_TO	0	.	.	.	.	.
St. Vincent	LCBI	30	.642375	.642375	.642375	.642375	0
	Irreg_TO	0	.	.	.	.	.
Sudan	LCBI	43	.3147917	.272625	.3147917	.3040048	.0186158
	Irreg_TO	49	1	0	0	.1836735	.3912304
Suriname	LCBI	43	.513875	.417125	.417125	.4491948	.0390163
	Irreg_TO	49	1	0	0	.122449	.3312007
Sweden	LCBI	43	.2945	.2945	.2945	.2945	0
	Irreg_TO	49	1	0	0	.0816327	.2766417
Switzerland	LCBI	43	.7670263	.505079	.5571842	.5962907	.0971371
	Irreg_TO	49	1	0	0	.1428571	.3535534
Syrian Arab Rep.	LCBI	11	.3714583	.3714583	.3714583	.3714583	5.82e-17
	Irreg_TO	49	1	0	0	.1428571	.3535534
Tajikistan	LCBI	22	.6649167	.2958706	.6649167	.5810426	.1582957
	Irreg_TO	0	.	.	.	.	.
Tanzania	LCBI	43	.58725	.439375	.439375	.4873023	.0597511
	Irreg_TO	49	1	0	0	.0612245	.2422261
Thailand	LCBI	43	.3815	.1345	.1345	.1632209	.0801152
	Irreg_TO	49	1	0	0	.1836735	.3912304
Timor-Leste	LCBI	12	.7765	.2833654	.2833654	.3655545	.1919524
	Irreg_TO	0	.	.	.	.	.
Togo	LCBI	43	.8015	.8015	.8015	.8015	0
	Irreg_TO	0	.	.	.	.	.
Tonga	LCBI	25	.3330385	.1880385	.1880385	.2208385	.0598623
	Irreg_TO	0	.	.	.	.	.
Trinidad and Tobago	LCBI	43	.443875	.431375	.431375	.4366076	.0062396
	Irreg_TO	49	1	0	0	.0612245	.2422261
Tunisia	LCBI	43	.621625	.314625	.442125	.4179738	.1083505
	Irreg_TO	44	1	0	0	.2045455	.4080325
Turkey	LCBI	43	.899	.455375	.492875	.5989448	.1892181
	Irreg_TO	49	1	0	0	.1020408	.3058389
Turkmenistan	LCBI	22	.4822917	.2066571	.4822917	.433964	.1050186
	Irreg_TO	0	.	.	.	.	.
Uganda	LCBI	43	.541875	.3425	.3425	.4331977	.0984995
	Irreg_TO	49	1	0	0	.0816327	.2766417

Table A3 (cont.): Summary Statistics by country – LCBI and Irreg\_TO

Country	Variable	Obs	Max	Min	P50	Mean	Std.
Ukraine	LCBI	22	.89925	.1998654	.85375	.6221783	.3271065
	Irreg_TO	18	1	0	0	.2777778	.4608886
United Arab Emirates	LCBI	33	.5155	.5155	.5155	.5155	0
	Irreg_TO	0	.	.	.	.	.
United Kingdom	LCBI	43	.7011705	.26525	.26525	.425106	.2074616
	Irreg_TO	49	1	0	0	.0204082	.1428571
United States	LCBI	43	.4803947	.4803947	.4803947	.4803947	0
	Irreg_TO	49	1	0	0	.0612245	.2422261
Uruguay	LCBI	43	.71175	.18175	.18175	.3597668	.2138894
	Irreg_TO	49	1	0	0	.3265306	.4738035
Uzbekistan	LCBI	22	.5721579	.388125	.5721579	.5386974	.0726509
	Irreg_TO	0	.	.	.	.	.
Vanuatu	LCBI	33	.532875	.472875	.532875	.5136326	.0279542
	Irreg_TO	49	1	0	0	.1020408	.3058389
Venezuela, RB	LCBI	43	.7870455	.2107017	.427125	.5544125	.1889804
	Irreg_TO	49	1	0	0	.2857143	.4564355
Vietnam	LCBI	16	.1492171	.1492171	.1492171	.1492171	0
	Irreg_TO	49	1	0	0	.2040816	.4072055
Yemen, Rep.	LCBI	13	.5205	.5205	.5205	.5205	0
	Irreg_TO	21	1	0	0	.1428571	.3585686
Zambia	LCBI	43	.494	.325625	.39825	.4175262	.0686429
	Irreg_TO	39	1	0	0	.0769231	.2699528
Zimbabwe	LCBI	43	.463875	.20125	.20125	.2887907	.1232122
	Irreg_TO	40	1	0	0	.125	.3349321



Table A4: Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>Afghanistan</b>	1970-1978, 2002-2017	2002-2017	2002-2015	2006-2017	2005-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-1978, 1989-2000, 2014-2017	2000-2017	N/A
<b>Albania</b>	1980-2017	1980-2017	1994-2015	1995-1998, 2002-2004, 2011-2017	1992-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2007-2008
<b>Algeria</b>	1970-2017	1970-2017	1970-2015	1994-2011	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2001-2005, 2017
<b>Angola</b>	1985-1990, 2000-2017	2001-2017	1995-2015	1999-2017	1991-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1975-2017	1985-2017	N/A
<b>Antigua and Barbuda</b>	N/A	N/A	1998-2015	2000-2014	1999-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
<b>Argentina</b>	1970-2017	1970-1979, 1987-2017	1970-1988, 1990-2015	1990-2004, 2014-2017	N/A	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2016
<b>Armenia</b>	1990-2017	1990-2017	1993-2015	2004-2017	1994-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1997-2017
<b>Aruba</b>	1995-2017	1995-2017	N/A	N/A	1985-2017	1970-2017	N/A	2005-2018	N/A	2000-2017	N/A
<b>Australia</b>	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010-2011, 2013, 2015
<b>Austria</b>	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Azerbaijan</b>	1990-2017	1990-2017	1993-2015	1994-1999, 2008-2017	1992-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-2017
<b>Bahamas, The</b>	1977-1987, 1989-2016	1977-1987, 1989-2017	1970-1988, 1991-2015	1973-1986, 1988-1989, 1991-2017	1970-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
<b>Bahrain</b>	1980-2016	1980-2017	1974-1989, 1991-2015	1990-2011, 2013	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1971-2017	2000-2017	2014
<b>Bangladesh</b>	1970-2017	1970, 1973-2017	1974-2015	2001-2016	1987-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1972-2017	1980-2017	N/A
<b>Barbados</b>	1975-2017	1975-2017	1970-1973, 1977-2015	2003-2015	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
<b>Belarus</b>	1990-2017	1990-2017	1994, 1996-2015	1992-2017	1993-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-2017
<b>Belgium</b>	1970-2017	1970-2017	1970-1979, 1982-1988, 1990-2015	1995-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>Belize</b>	1980-2017	1980-2017	1976-2015	1990-2017	N/A	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
<b>Benin</b>	1970-2017	1970-2017	1970-2006, 2008-2015	2001-2013	1993-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
<b>Bermuda</b>	2009-2013	2009-2013	N/A	N/A	N/A	1970, 1980, 1991, 2000-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	1997-2015
<b>Bhutan</b>	1980-2017	1980-2017	1982-1986, 1988-1992, 1994-2015	N/A	1981-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	N/A
<b>Bolivia</b>	1970-2017	1970-2017	1970-2015	1986-2007	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2002, 2009
<b>Bosnia and Herzegovina</b>	1995-2017	2002-2017	1998-2015	2005-2017	2006-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1992-1994	2000-2017	2003-2009, 2012-2017
<b>Botswana</b>	1970-2017	1970-2017	1972-2015	1990-1996, 2006-2017	1975-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2005, 2012-2013
<b>Brazil</b>	1970-2017	1970-2017	1978-2015	1980-1982, 1984-1986, 1989-1994, 1997-2017	1981-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2000-2016
<b>Brunei Darussalam</b>	1989-2017	1974-1983, 1989-2017	2001-2015	N/A	1981-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	2002-2004
<b>Bulgaria</b>	1980-2017	1980-2017	1992-1999, 2001-2015	1990-1994, 2005-2016	1986-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Burkina Faso</b>	1970-2017	1970-2017	1976-2015	2002-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-1997, 2001-2005, 2007-2009, 2014
<b>Burundi</b>	1970-2016	1970-2016	1970-2015	1991-1999, 2010-2013	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007-2011
<b>Cambodia</b>	1970, 1993-2017	1970, 1993-2017	1996-2015	2002-2017	1995-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-1978, 1988-2017	2000-2017	2002, 2015
<b>Cameroon</b>	1970-2017	1970-2017	1970-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
<b>Canada</b>	1970-2017	1970-2017	1970-2015	1990-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2017
<b>Cape Verde</b>	2007-2017	N/A	1981-2005, 2007-2015	2005-2009	1984-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1975-2017	1980-2017	2011
<b>Chad</b>	1970-1978, 1982-2017	1970-1978, 1982-2017	1970-2015	N/A	1984-2015	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2016

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
Chile	1970-2017	1970-2017	1970-1998, 2000-2015	1972-2017	1971-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007-2016
China	1970-2017	1970-2017	1984-2015	2013-2016	1987-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2016
Colombia	1970-2017	1970-2017	1972-1995, 1997-2015	1998-2000, 2003, 2008-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-1997, 2000-2017
Comoros	1980-2017	1980-2017	1982-2015	N/A	2001-2013	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1975-2017	1980-2017	N/A
Congo, Dem. Rep.	1991, 1994-2017	1994-2017	1970-2015	1990-2010	1970-2016	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2004-2009
Costa Rica	1970-2017	1970-2017	1970-2015	1973-2014	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2000, 2003-2004, 2006-2016
Cote d'Ivoire	1970-2017	1970-2017	1979-2015	2003-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
Croatia	1995-2017	1995-2017	1994-2015	1995-2017	1986-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1999-2016
Cuba	1970-2017	1970-2017	N/A	N/A	N/A	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
Cyprus	1975-2017	1975-2017	1970-2015	1975-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1998-2016
Czech Republic	1990-2017	1990-2017	1993-2015	1993-2017	1992-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1993-2017	2000-2017	1996-2016
Denmark	1970-2017	1970-2017	1970-1996, 1998-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-1999, 2001-2016
Djibouti	2013-2017	2013-2017	1993-2015	N/A	1980-1987, 2001-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1977-2017	2000-2017	N/A
Dominica	N/A	N/A	1975-2015	2000-2014	1970-1978, 1981-2017	1982, 1987, 1992, 1997, 2002	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
Dominican Republic	1970-2017	1970-2017	1970-2015	1972-1976, 1978-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
Ecuador	1970-2017	1970-2017	1971-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-1998, 2001-2003, 2006-2014
Egypt, Arab Rep.	1970-2017	1970-2017	1970-2001, 2003-2015	1975-1979, 1981-1997, 2002-2015	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1998-2000, 2004-2016
El Salvador	1970-2017	1970-2017	1972-2015	1998-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1998, 2007-2016

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>Equatorial Guinea</b>	2005-2017	2005-2017	1980-2015	2006-2015, 2017	1986-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	1985-2017	N/A
<b>Estonia</b>	1995-2017	1995-2017	1995-2015	1995-2017	1993-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1998-2016
<b>Eswatini</b>	1970-2017	1970-2017	N/A	1999-2012	1970-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	1980-2017	2015
<b>Ethiopia</b>	1981-2017	2011-2017	1970-2015	1990-1999, 2001-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1981-2017	2005, 2007, 2010, 2013
<b>Fiji</b>	1970-2008, 2011-2016	1970-2008, 2011-2016	1970-2015	1990-1996, 2005-2006, 2010-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-1988, 2000-2017	N/A
<b>Finland</b>	1970-2017	1970-2017	1970-1978, 1981-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>France</b>	1970-2017	1970-2017	1970-1977, 1980-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>French Polynesia</b>	N/A	1991-2000	N/A	N/A	N/A	1970-2017	N/A	N/A	N/A	2000-2017	N/A
<b>Gabon</b>	1970-2017	1970-2017	1970-2015	N/A	1970-2016	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007-2009
<b>Gambia, The</b>	1970-2012	1977-2012	1973-2015	1990	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2008-2009, 2011
<b>Georgia</b>	1980-2017	1980-2017	1995-2015	1997-2017	1995-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-2005, 2013-2016
<b>Germany</b>	1970-2017	1970-2017	1970-1975, 1977-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1990-2017	2000-2017	1996-2016
<b>Ghana</b>	1970-1975, 1983-2017	1970-2017	1970-1989, 1991-2015	2010	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007, 2010
<b>Greece</b>	1970-2017	1970-2017	1970-1975, 1979-2015	1972-1990, 1995-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1997, 1999, 2001, 2003-2016
<b>Grenada</b>	N/A	N/A	1970-2015	1999-2014	1977-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
<b>Guatemala</b>	1970-2017	1970-2017	1970-1998, 2000-2015	1990-2016	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2005-2015
<b>Guinea</b>	1986-2017	1986-2017	1990-2015	N/A	2005-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	1986-2017	N/A
<b>Guinea-Bissau</b>	1970-2017	1970-2017	1986-2015	N/A	1988-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1974-2017	1980-2017	N/A
<b>Guyana</b>	1970-2017	1970-2017	1970-2015	N/A	1995-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	N/A

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>Haiti</b>	1988-2017	1988-1990	1970-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
<b>Honduras</b>	1970-2017	1970-1977, 2000-2017	1970-2015	1972-1976, 2003-2015	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2000-2004, 2015
<b>Hong Kong, China</b>	1970-2017	N/A	2001-2015	N/A	1982-2017	1970-2017	1970-2014	N/A	N/A	1980-2017	1998-2017
<b>Hungary</b>	1991-2017	1991-2017	1982-1992, 1995-2015	1991-2017	1973-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Iceland</b>	1970-2017	1970-2017	1972-1979, 2001-2015	1972-2017	1977-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	1997-2003, 2005-2009, 2011, 2013-2016
<b>India</b>	1970-2017	1970-2017	1970-1982, 1985-2015	1974	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2011, 2015
<b>Indonesia</b>	1970-2017	1970-2017	1976-2015	1972-1998, 2002-2004, 2008-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1981-2017	2000-2001, 2009, 2013
<b>Iran, Islamic Rep.</b>	1970-2017	1970-2017	1970-1977, 1980-2015	1972-2009	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2001-2006, 2008-2010, 2012-2013
<b>Iraq</b>	2000-2017	1970-2017	2004-2015	2014-2016	1970-1978, 1991-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2002, 2010-2017	2000-2017	2007-2011, 2014-2017
<b>Ireland</b>	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Israel</b>	1970-2016	1970-2017	1972-1980, 1983-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Italy</b>	1970-2017	1970-2017	1970-2015	1973-1980, 1986-1989, 1995-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Jamaica</b>	1970-2017	1970-1991, 1993-2017	1970-1994, 1996-2015	1988-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2001-2002
<b>Japan</b>	1970-2016	1970-2017	1970-2015	1972-1990, 1994-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Jordan</b>	1976-2017	1976-2017	1970-1981, 1990-2015	2008-2012	1970-1985, 1987-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2002, 2008, 2016
<b>Kazakhstan</b>	1992-2017	1992-2017	1993-2015	1997-2004, 2010-2017	1994-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1997-2016
<b>Kenya</b>	1970-2017	1970-2017	1970-1976, 1979-2015	2014-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007, 2010
<b>Kiribati</b>	1972-1992	N/A	1988-2015	2011-2017	2007-2015	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>Korea, Rep.</b>	1970-2017	1970-2017	1971-2015	1972-2017	1970-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	1980-2017	1996-2016
<b>Kuwait</b>	1970-2017	1970-2017	1971-1989, 1991-2015	1972-1974, 1977-1986, 1990-1998, 2001-2004, 2008-2015	1973-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-1989, 1991-2017	2000-2017	1997-2017
<b>Kyrgyz Republic</b>	1987-2017	1987-2017	1995-2015	2014-2017	1996-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1997-2017
<b>Lao PDR</b>	1984-1988, 2000-2017	1984-1988, 2000-2017	1989-2015	2008-2017	1989-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2002
<b>Latvia</b>	1995-2017	1995-2017	1994-2015	1995-2017	1992-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-2016
<b>Lebanon</b>	1990-2017	1989-2017	1970-1973, 1976-1987, 1990-2015	1998-2017	2009-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-1988, 2005-2017	2000-2017	N/A
<b>Lesotho</b>	1970-1981, 2007-2016	1970-1981, 2007-2016	1973-1990, 1992-2015	1987-1989, 1991-2017	1974-1996, 2000-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2002-2015
<b>Liberia</b>	2000-2017	2000-2017	1973-1990, 1977-1983, 2000-2006, 2008-2015	N/A	2002-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-1987, 2000-2017	N/A
<b>Libya</b>	1990-2008	1990-2008	1973-2015	N/A	1970-2013	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	1982-1985, 2000-2017	N/A
<b>Lithuania</b>	1995-2017	1995-2017	1994-2015	1995-2017	1993-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-2016
<b>Luxembourg</b>	1970-2017	1970-2017	1974-1989, 1991-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2000, 2003-2016
<b>Macao, China</b>	1982-2017	N/A	N/A	N/A	1989-2017	1970-2017	1970-2014	N/A	N/A	2000-2017	2001-2017
<b>Macedonia, FYR</b>	1990-2017	N/A	1995-1998, 2000-2015	2005-2017	1994-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1997-2017
<b>Madagascar</b>	1970-2017	1970-2017	1971-1972, 1974-1989, 1991-2015	2000-2002	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1997-2011, 2014, 2016-2017
<b>Malawi</b>	1970-2017	1970-2017	1970-2001, 2003-2015	2009-2017	1981-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
Malaysia	1970-2017	1970-2017	1970-1989, 1991-2015	1996-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996, 1998, 2000, 2002, 2004, 2006, 2008-2012, 2014-2015
Maldives	N/A	N/A	1978-2015	1990-2011	2001-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
Mali	1970-1979, 1985-2017	1970-2017	1970-2015	2000-2017	1989-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007, 2010, 2015, 2017
Malta	1970-2017	1970-2017	1970-1978, 1980-2015	1972-1978, 1980-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	2002-2016
Mauritania	1970-2017	1970-2017	1977-2015	N/A	1986-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
Mauritius	1976-2017	1976-2017	1970-1999, 2001-2015	1976-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1997-2005, -2012
Mexico	1970-2017	1970-2017	1970-1980, 1982-2015	1972-2000, 2008-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2016
Moldova	1995-2017	1995-2016	1995-2015	1997-2001, 2003-2017	1992-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-1997, 2003-2017
Mongolia	1981-2017	1981-2017	1992-2007	1992-2003, 2006-2016	1993-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1997-2017
Montenegro	2000-2017	2000-2017	2002-2015	N/A	2006-2017	1970-2017	N/A	1999, 2001, 2003-2018	2006-2017	N/A	2003-2007, 2011, 2013-2015
Morocco	1970-2017	1970-2017	1970-2015	1972-1995, 1997-1999, 2002-2011	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1998, 2001-2003, 2006, 2010
Mozambique	1980-2017	1980-2017	1999-2015	2010-2012, 2016-2017	N/A	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1975-2017	1980-2017	2002, 2006, 2008, 2010, 2015
Myanmar	2008-2016	2010-2016	1970-1980, 1989-1994, 1998-2015	2003-2005, 2012-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1981-2017	1997-2002
Namibia	1980-2017	1980-2017	1993-2015	1991-1992, 1999-2017	2003-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1990-2017	1980-2017	2010, 2014
Nepal	1970-2017	1975-2017	1970-2015	2010-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2008-2010
Netherlands	1970-2017	1970-2017	1970-2015	1973-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
Netherlands Antilles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2005-2014	N/A	N/A	N/A

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>New Zealand</b>	1970-2016	1970-2017	1970-2015	1972-1988, 2002-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015
<b>Nicaragua</b>	1970-2017	1970-2017	1970-2015	1990-2017	2000-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1997, 2002, 2011-2015
<b>Niger</b>	1970-2017	1970-2017	1970-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A
<b>Nigeria</b>	1981-2017	1981-2017	1970-2015	2003-2013	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2007
<b>Norway</b>	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1997, 1999, 2001-2016
<b>Oman</b>	1970-2017	1970-2017	1973-2015	1990-2013	2001-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2011-2017
<b>Pakistan</b>	1970-2017	1970-2017	1970-1990, 1994-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1997-2002, 2005, 2007, 2009, 2011, 2013, 2015
<b>Panama</b>	1970-2017	1970-2017	1970-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1981-2017	1996-2013
<b>Papua New Guinea</b>	1970-2004	1970-2004	1973-2015	1990-2002, 2014-2017	1972-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1975-2017	2000-2017	2016
<b>Paraguay</b>	1970-2017	1970-2017	1970-2015	2005-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2001-2005, 2008, 2011-2012, 2014-2016
<b>Peru</b>	1970-2017	1970-2017	1970-2004, 2006-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1997-2004, 2011-2017
<b>Philippines</b>	1970-2017	1970-2017	1970-1989, 1993-2015	1990-1993, 2000-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2002-2003, 2005, 2007, 2009, 2011, 2013
<b>Poland</b>	1995-2017	1995-2017	1986-2015	1994-2017	1971-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Portugal</b>	1970-2017	1970-2017	1970-2015	1975-1976, 1978-1990, 1995-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Qatar</b>	1994-2017	1994-2017	1990-2015	2004-2010	1980-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1971-2017	2000-2017	2012, 2015
<b>Romania</b>	1981-1982, 1990-2017	1981-1982, 1990-2017	1990-2015	1981-2017	1991-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>Russian Federation</b>	1989-2017	1988-2017	1992-2015	1994-1995, 1998-2017	1993-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1992-2017	2000-2017	1996-2016
<b>Rwanda</b>	1970-2017	1970-2017	1970-2015	1990-1992, 2014-2017	1970-1993, 1996-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A



Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
Samoa	N/A	N/A	1970-1996, 1998-2015	2010-2017	1970-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
San Marino	N/A	N/A	2004-2015	2002-2007	2004-2017	2012	N/A	1997, 1999, 2001, 2003-2014	N/A	N/A	N/A
Sao Tome and Principe	N/A	N/A	1995-2015	2002-2012	1997-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	1986-2017	N/A
Saudi Arabia	1970-2017	1970-2017	1991-2015	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2003-2013
Senegal	1970-2017	1970-2017	1970-1999, 2001-2015	1999-2001, 2009-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2008, 2010, 2015
Serbia	1995-2017	N/A	2000-2015	2007-2012	1995-2017	1991, 1997, 2000-2017	1990-2014	N/A	2006-2017	2008-2017	1997-2017
Seychelles	1976-2003, 2006-2017	1976-2017	1973-1977, 1980-2015	1985-1989, 1993-2016	1971-2017	1980-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	1985-2017	2001-2005, 2016
Sierra Leone	1980-2017	1970-2017	1970-2015	2010-2014	2007-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	N/A
Singapore	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2014
Slovak Republic	1990-2017	1990-2017	1992-2015	1995-2017	1992-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1993-2017	2000-2017	1996-2016
Slovenia	1995-2017	1995-2017	1993-2015	2002-2017	1981-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1996-2016
Solomon Islands	1980-1990, 1997-2006	1997-2006	1980-2015	2011-2017	1972-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1978-2002, 2004-2017	1980-1988, 2000-2017	N/A
Somalia	1970-1990	1970-1984, 2013-2017	N/A	N/A	N/A	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	N/A
South Africa	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1997, 2001, 2003-2015
Spain	1970-2017	1970-2017	1970-2015	1995-2016	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
Sri Lanka	1970-2017	1970-2017	1970-2015	1990-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996, 2000, 2004, 2006, 2008, 2010, 2013-2015
St. Kitts and Nevis	N/A	N/A	1984-2015	1990-1994, 2000-2017	N/A	1982, 1987, 1992, 1997, 2002	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
St. Lucia	1977-2016	1977-2016	1981-2015	2000-2017	N/A	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	1998-1999

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
St. Vincent and the Grenadines	2013-2017	2013-2017	1975-2015	2000-2017	1975-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	2001-2002
Sudan	1976-2017	1970-2017	1992-2015	N/A	1970-2015	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2011	1980-2017	1999-2005
Suriname	2006-2010	2006-2010	1971-1977, 1984-1986, 1990-2015	2001-2012	1970-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1975-2017	2000-2017	N/A
Sweden	1970-2017	1970-2017	1970-2002, 2004-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1997, 1999, 2001, 2003-2016
Switzerland	1980-2017	1980-2017	1970-2015	1980-1984, 1990-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2016	1996, 2000, 2004, 2008, 2012, 2015
Syrian Arab Republic	1970-2007	1970-2007	1970-2010	N/A	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	2015
Tajikistan	1993-2016	1993-2017	1998-2015	1998-2001, 2003-2004	2001-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	2001-2017
Tanzania	1990-2017	1990-2017	1970-2002, 2004-2015	2014	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1987-2017	2007, 2010, 2013
Thailand	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-1997, 1999-2009, 2011, 2013-2016
Timor-Leste	2000-2017	2000-2016	N/A	2010-2017	2003-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	2002-2017	N/A	N/A
Togo	1970-2017	1970-2007, 2009-2017	1975-2015	2004-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2010, 2012, 2014
Tonga	1975-2012	1975-2012	1985-1992	N/A	1976-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
Trinidad and Tobago	N/A	N/A	1970-1976, 1978-1979, 1981-1997, 1999-2015	2001-2015	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-1990, 2000-2017	1980-1990, 2000-2017	1996-2016
Tunisia	1970-2017	1970-2017	1970-1976, 1978-2015	1972-2012	1984-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2002-2016
Turkey	1970-2017	1970-2017	1970-2015	1972-1981, 1983-1998, 2008-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2015
Turkmenistan	1987-1991, 1993, 1996-2012	1987-1991, 1993-2017	1997-2015	N/A	N/A	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	N/A

Table A4 (cont.): Data availability by country – Economic Growth Determinants

Countries	I_Y	G_Y	Debt_Y	GovBal_Y	infl	LE	HKI	RoL	Polity2	ToT	R&D_Y
<b>Uganda</b>	1970-2017	1982-2017	1970-1986, 1992-2015	2015-2017	1994-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-1978, 1980-2017	1982-2017	2002-2010, 2014
<b>Ukraine</b>	1991-2017	1989-2017	1992-2015	1999-2017	1993-2017	1970-2017	1990-2014	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	1997-2017
<b>United Arab Emirates</b>	2001-2017	2001-2017	1973-2015	1997-1999, 2011-2017	2008-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	N/A	2000-2017	2011, 2014-2016
<b>United Kingdom</b>	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	2000-2017	1996-2016
<b>United States</b>	1970-2016	1970-2017	1970-1978, 1980-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2016
<b>Uruguay</b>	1970-2017	1970-2017	1970-2015	1972-2017	1970-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-2000, 2002, 2006-2016
<b>Uzbekistan</b>	1992-2017	1992-2017	1998-2015	2011-2017	N/A	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1991-2017	2000-2017	2000-2017
<b>Vanuatu</b>	1983-2014	1980-2014	1981-2015	1990, 1995-1999, 2009-2017	1977-2016	1970-2017	N/A	1997, 1999, 2001, 2003-2018	N/A	2000-2017	N/A
<b>Venezuela, RB</b>	1970-2014	1970-2014	1972-1991, 1998-2015	N/A	2009-2016	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	2005-2016
<b>Vietnam</b>	1986-2017	1989-2017	1992-1993, 1995-2015	2003-2013	1996-2017	1970-2017	N/A	1997, 1999, 2001, 2003-2018	1976-2017	2000-2017	2002, 2011, 2013, 2015
<b>Yemen, Rep.</b>	N/A	N/A	1992-2015	N/A	1991-2014	1970-2017	1989-2014	1997, 1999, 2001, 2003-2018	1990-2017	2000-2017	N/A
<b>Zambia</b>	2010-2016	2010-2016	1970-2015	1998-1999, 2001-2017	1986-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	1996-1997, 2002-2005, 2008
<b>Zimbabwe</b>	1970-2017	1970-2017	1970-1977, 1979-2003, 2005-2015	2009-2012, 2015-2017	2010-2017	1970-2017	1970-2014	1997, 1999, 2001, 2003-2018	1970-2017	1980-2017	N/A

Table A5: Democracy measure – Democracy component

Authority Coding	Scale Weight
<b>1. Competitiveness of Executive Recruitment:</b>	
a. Election	+ 2
b. Transitional	+ 1
<b>2. Openness of Executive Recruitment:</b>	
a. Dual/election	+ 1
b. Election	+ 1
<b>3. Constraint on Chief Executive:</b>	
a. Executive parity or subordination	+ 4
b. Intermediate category	+ 3
c. Substantial limitations	+ 2
d. Intermediate category	+ 1
<b>4. Competitiveness of Political Participation:</b>	
a. Competitive	+ 3
b. Transitional	+ 2
c. Factional	+ 1

Adapted from: Marshall *et al.* (2017)

Table A6: Democracy measure – Autocracy component

Authority Coding	Scale Weight
<b>1. Competitiveness of Executive Recruitment:</b>	
a. Selection	+ 2
<b>2. Openness of Executive Recruitment:</b>	
a. Closed	+ 1
b. Dual/designation	+ 1
<b>3. Constraint on Chief Executive:</b>	
a. Unlimited authority	+ 3
b. Intermediate category	+ 2
c. Slight to moderate limitations	+ 1
<b>4. Regulation of Participation:</b>	
a. Restricted	+ 2
b. Sectarian	+ 1
<b>5. Competitiveness of Political Participation:</b>	
a. Repressed	+ 2
b. Suppressed	+ 1

Adapted from: Marshall *et al.* (2017)

Table A7: Results for gY with LCBI and Irreg\_TO – Entire Sample

Variables	One-step estimator				Two-step estimator			
	Without vce(robust)		With vce(robust)		Without vce(robust)		With vce(robust)	
	1	2	3	4	5	6	7	8
L1	.1539827*** (.0181222)	.1489737*** (.0164644)	.1539827*** (.0410446)	.1485692*** (.0359683)	.1080877*** (.0090805)	.1238831*** (.0082192)	.1546358*** (.0493944)	.1367066*** (.0342855)
L2	-.1516458*** (.0148743)	-.166705*** (.0138195)	-.1516458*** (.0340556)	-.1673477*** (.0281329)	-.1362888*** (.0037001)	-.1780449*** (.006753)	-.1513305*** (.0400322)	-.1751747*** (.033372)
I_Y	.002219*** (.0002224)	.0021611*** (.0001914)	.002219*** (.0005686)	.0021839*** (.0005048)	.0026931*** (.0000808)	.0026198*** (.0000731)	.0021718* (.0011241)	.0022228*** (.0005636)
G_Y	-.0030663*** (.0004497)	-.0031847*** (.0003879)	-.0030663*** (.000911)	-.0031531*** (.0007166)	-.0031296*** (.0002071)	-.0030198*** (.0001357)	-.0030899** (.0013612)	-.0032163*** (.000745)
GovBal_Y	.0026586*** (.0002779)	.0025955*** (.0002433)	.0026586*** (.0006687)	.0026077*** (.0005835)	.0027748*** (.0000826)	.0026778*** (.0000932)	.0026134*** (.0005269)	.0026187*** (.0005452)
infl	-.0000347*** (5.04e-06)	-.0000296*** (4.89e-06)	-.0000347*** (.0000114)	-.0000297*** (8.06e-06)	-.000033*** (3.30e-06)	-.0000307*** (1.94e-06)	-.0000354** (.0000172)	-.0000292** (.0000136)
inflsq	1.41e-09*** (2.24e-10)	1.22e-09*** (2.17e-10)	1.41e-09*** (4.70e-10)	1.22e-09*** (3.24e-10)	1.32e-09*** (1.35e-10)	1.24e-09*** (7.85e-11)	1.43e-09** (6.87e-10)	1.20e-09** (5.62e-10)
Debt_Y					.0000363* (.0000216)			
Polity2					-.0002253* (.0001206)	-.0004608*** (.0000786)		
vLE		-.004111* (.0024828)			-.0029574*** (.0007653)	-.0052889*** (.0004948)		
ToT						-.0001941*** (.0000329)		
RoL						-.0037507*** (.0009357)		
LCBI	-.0215869*** (.0078706)		-.0215869** (.0108534)		-.0095921*** (.0031275)		-.0225661 (.0229363)	
Irreg_TO		-.0069897*** (.0020343)		-.00697*** (.0024773)		-.0059358*** (.0005058)		-.0067408* (.0035552)
Intercept	.0474398*** (.0096527)	.0421321*** (.0080617)	.0474398** (.0215605)	.039962** (.0185824)	.0321648*** (.0036679)	.0317531*** (.003228)	.0491747 (.0480898)	.0406716** (.0205358)
estat abond	X	X	0.0473	0.0985	0.0994	0.2044	0.2118	0.3308
estat sargan	0.0000	0.0000	X	X	1.0000	1.0000	X	X

Note: "L1" and "L2" are the first and second lagged periods, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively; estat abond test has a null hypothesis where there is no auto-correlation; estat sargan test considers in its null hypothesis over-identifying restrictions are valid; p-values are presented for estat abond and estat sargan. "X" means the test can not be performed in the model, i.e., depends on the features considered.

Table A8: Results for gYpc with LCBI and Irreg\_TO – Entire Sample

Variables	One-step estimator				Two-step estimator			
	Without vce(robust)		With vce(robust)		Without vce(robust)		With vce(robust)	
	1	2	3	4	5	6	7	8
L1	.150083*** (.0182582)	.1137856*** (.0186097)	.1682825*** (.0403977)	.1703415*** (.0348013)	.1514591*** (.0057728)	.0875492*** (.0108585)	.1642238*** (.0369068)	.1705094*** (.0338943)
L2	-.1627602*** (.0155644)	-.1732249*** (.0160841)	-.1607408*** (.0317303)	-.169268*** (.0260888)	-.1620816*** (.0055013)	-.1950796*** (.0069996)	-.1616085*** (.0252035)	-.1681382*** (.0299705)
I_Y	.0022247*** (.0002226)	.0024209*** (.0002054)	.0020488*** (.0005621)	.0019276*** (.0005014)	.0022819*** (.0000875)	.002764*** (.0000839)	.0021377* (.0010984)	.0019537** (.0007909)
G_Y	-.0030247*** (.0004742)	-.0023806*** (.0003952)	-.0028073*** (.000939)	-.0024761*** (.000757)	-.003027*** (.0001695)	-.0024463*** (.0002293)	-.0027154*** (.0010536)	-.0024873*** (.0009465)
GovBal_Y	.0029169*** (.0002847)	.0025572*** (.0002616)	.0026444*** (.0007532)	.0026204*** (.0006841)	.0027359*** (.0001078)	.0026941*** (.0001084)	.0026058*** (.000543)	.00254*** (.0006638)
infl	-.0000365*** (4.93e-06)	-.00003*** (4.48e-06)	-.0000366*** (.0000126)	-.0000314*** (9.63e-06)	-.0000367*** (2.12e-06)	-.0000306*** (2.24e-06)	-.0000373** (.0000159)	-.0000351** (.0000157)
inflsq	1.45e-09*** (2.18e-10)	1.17e-09*** (1.96e-10)	1.46e-09*** (5.21e-10)	1.24e-09*** (3.99e-10)	1.46e-09*** (8.58e-11)	1.19e-09*** (9.33e-11)	1.49e-09** (6.57e-10)	1.39e-09** (6.48e-10)
Polity2	.0006971* (.000381)				.000706*** (.000146)	.001237*** (.0001583)		
vLE		-.0112189*** (.0028079)			-.0028179*** (.0008373)	-.0156433*** (.0009569)		
ToT		-.0000881** (.0000383)				-.0000274** (.0000119)		
RoL						-.0089169*** (.0023012)		
LCBI	-.0149103* (.007775)		-.0152721 (.011341)		-.0164627*** (.0028996)		-.013591 (.0167413)	
Irreg_TO		-.006154*** (.002231)		-.0067854*** (.0025038)		-.0050311*** (.0004933)		-.0067053* (.0038599)
Intercept	.0271682*** (.0097491)	.0214758** (.0091041)	.0320837 (.023248)	.0229234 (.0196278)	.0270168*** (.0045404)	.0021304 (.0044606)	.027472 (.0404509)	.0219256 (.0278001)
estat abond	X	X	0.1047	0.1197	0.2296	0.3172	0.2555	0.3231
estat sargan	0.0000	0.0000	X	X	1.0000	1.0000	X	X

Note: "L1" and "L2" are the first and second lags of the dependent variable, respectively; regressors' coefficients are presented with the standard errors between brackets; \*, \*\*, \*\*\* stand for statistically significant at 10%, 5%, and 1% levels, respectively; estat abond test has a null hypothesis where there is no auto-correlation; estat sargan test considers in its null hypothesis over-identifying restrictions are valid; p-values are presented for estat abond and estat sargan. "X" means the test can not be performed in the model, i.e., depends on the features considered.

Table A9: Data availability by country – Robustness

Countries	Cont	Inc_level	Crisis	QE	MU
Afghanistan	1970-2018	1987-2017	N/A	1970-2018	1970-2012
Albania	1970-2018	1990-2017	1970-2017	1970-2018	1991-2012
Algeria	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Angola	1970-2018	1988-2017	1970-2017	1970-2018	1976-2012
Antigua and Barbuda	1970-2018	1987-2017	N/A	1970-2018	1983-2012
Argentina	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Armenia	1970-2018	1991-2017	1970-2017	1970-2018	1993-2012
Aruba	1970-2018	1987-2017	N/A	1970-2018	N/A
Australia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Austria	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Azerbaijan	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
Bahamas, The	1970-2018	1987-2017	N/A	1970-2018	1973-2012
Bahrain	1970-2018	1987-2017	N/A	1970-2018	2006-2012
Bangladesh	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Barbados	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Belarus	1970-2018	1991-2017	1970-2017	1970-2018	1990-2012
Belgium	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Belize	1970-2018	1987-2017	1970-2017	1970-2018	1982-2012
Benin	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Bermuda	1970-2018	1987-2017	N/A	1970-2018	N/A
Bhutan	1970-2018	1987-2017	1970-2017	1970-2018	1982-2012
Bolivia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Bosnia and Herzegovina	1970-2018	1992-2017	1970-2017	1970-2018	1997-2012
Botswana	1970-2018	1987-2017	1970-2017	1970-2018	1975-2012
Brazil	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Brunei Darussalam	1970-2018	1987, 1990-2017	1970-2017	1970-2018	N/A
Bulgaria	1970-2018	1989-2017	1970-2017	1970-2018	1991-2012
Burkina Faso	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Burundi	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Cambodia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Cameroon	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Canada	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Cape Verde	1970-2018	N/A	1970-2017	1970-2018	1975-2012
Chad	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Chile	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
China	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Colombia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Comoros	1970-2018	1987-2017	1970-2017	1970-2018	1979-2012
Congo, Dem. Rep.	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Costa Rica	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Cote d'Ivoire	1970-2018	N/A	1970-2017	1970-2018	1970-2012
Croatia	1970-2018	1992-2017	1970-2017	1970-2018	1990-2012
Cuba	1970-2018	1990-2017	N/A	1970-2018	1970-2012
Cyprus	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Czech Republic	1970-2018	1992-2017	1970-2017	1970-2018	1992-2012
Denmark	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Djibouti	1970-2018	1990-2017	1970-2017	1970-2018	1977-2012
Dominica	1970-2018	1987-2017	1970-2017	1970-2018	1983-2012
Dominican Republic	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Ecuador	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Egypt, Arab Rep.	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
El Salvador	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Equatorial Guinea	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Estonia	1970-2018	1991-2017	1970-2017	1970-2018	1993-2012
Eswatini	1970-2018	N/A	N/A	1970-2018	1974-2012

Table A9 (cont.): Data availability by country – Robustness

Countries	Cont	Inc_level	Crisis	QE	MU
Ethiopia	1970-2018	1987-2017	1970-2017	1970-2018	1993-2012
Fiji	1970-2018	1987-2017	1970-2017	1970-2018	1973-2012
Finland	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
France	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
French Polynesia	1970-2018	1990-2017	N/A	1970-2018	N/A
Gabon	1970-2018	1987-2017	1970-2017	1970-2018	1972-2012
Gambia, The	1970-2018	1987-2017	1970-2017	1970-2018	1971-2012
Georgia	1970-2018	1991-2017	1970-2017	1970-2018	1992-2012
Germany	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Ghana	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Greece	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Grenada	1970-2018	1987-2017	1970-2017	1970-2018	1983-2012
Guatemala	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Guinea	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Guinea-Bissau	1970-2018	1987-2017	1970-2017	1970-2018	1975-2012
Guyana	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Haiti	1970-2018	1987-2017	1970-2017	1970-2018	1979-2012
Honduras	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Hong Kong, China	1970-2018	N/A	1970-2017	1970-2018	N/A
Hungary	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Iceland	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
India	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Indonesia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Iran, Islamic Rep.	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Iraq	1970-2018	1987-2017	N/A	1970-2018	1970-2012
Ireland	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Israel	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Italy	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Jamaica	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Japan	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Jordan	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Kazakhstan	1970-2018	1991-2017	1970-2017	1970-2018	1993-2012
Kenya	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Kiribati	1970-2018	1987-2017	N/A	1970-2018	N/A
Korea, Rep.	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Kuwait	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Kyrgyz Republic	1970-2018	1991-2017	1970-2017	1970-2018	1993-2012
Lao PDR	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Latvia	1970-2018	1991-2017	1970-2017	1970-2018	1992-2012
Lebanon	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Lesotho	1970-2018	1987-2017	1970-2017	1970-2018	1978-2012
Liberia	1970-2018	1987-2017	1970-2017	1970-2018	1999-2012
Libya	1970-2018	1987-2017	1970-2017	1970-2018	1993-2012
Lithuania	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
Luxembourg	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Macao, China	1970-2018	N/A	N/A	1970-2018	N/A
Macedonia, FYR	1970-2018	1992-2017	1970-2017	1970-2018	1992-2012
Madagascar	1970-2018	1987-2017	1970-2017	1970-2018	1974-2012
Malawi	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Malaysia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Maldives	1970-2018	1987-2017	1970-2017	1970-2018	1981-2012
Mali	1970-2018	1987-2017	1970-2017	1970-2018	1984-2012
Malta	1970-2018	1987-2017	N/A	1970-2018	1970-2012
Mauritania	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Mauritius	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Mexico	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012



Table A9 (cont.): Data availability by country – Robustness

Countries	Cont	Inc_level	Crisis	QE	MU
Moldova	1970-2018	1991-2017	1970-2017	1970-2018	1992-2012
Mongolia	1970-2018	1989-2017	1970-2017	1970-2018	1991-2012
Montenegro	1970-2018	2006-2017	N/A	1970-2018	2000-2012
Morocco	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Mozambique	1970-2018	1987-2017	1970-2017	1970-2018	1975-2012
Myanmar	1970-2018	1987-2017	1970-2017	1970-2018	1990-2012
Namibia	1970-2018	1989-2017	1970-2017	1970-2018	1990-2012
Nepal	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Netherlands	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Netherlands Antilles	1970-2018	N/A	N/A	1970-2018	N/A
New Zealand	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Nicaragua	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Niger	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Nigeria	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Norway	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Oman	1970-2018	1987-2017	N/A	1970-2018	1974-2012
Pakistan	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Panama	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Papua New Guinea	1970-2018	1987-2017	1970-2017	1970-2018	1973-2012
Paraguay	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Peru	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Philippines	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Poland	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Portugal	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Qatar	1970-2018	1987-2017	N/A	1970-2018	1973-2012
Romania	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Russian Federation	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
Rwanda	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Samoa	1970-2018	1987-2017	N/A	1970-2018	1974-2012
San Marino	1970-2018	1991-1993, 2000-2017	N/A	1970-2018	1988-2012
Sao Tome and Principe	1970-2018	N/A	1970-2017	1970-2018	1992-2012
Saudi Arabia	1970-2018	1987-2017	N/A	1970-2018	1970-2012
Senegal	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Serbia	1970-2018	N/A	1970-2017	1970-2018	2006-2012
Seychelles	1970-2018	1987-2017	1970-2017	1970-2018	1983-2012
Sierra Leone	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Singapore	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Slovak Republic	1970-2018	1992-2017	1970-2017	1970-2018	1992-2012
Slovenia	1970-2018	1992-2017	1970-2017	1970-2018	1991-2012
Solomon Islands	1970-2018	1987-2017	N/A	1970-2018	1976-2012
Somalia	1970-2018	1987-2017	N/A	1970-2018	1970-2012
South Africa	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Spain	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Sri Lanka	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
St. Kitts and Nevis	1970-2018	1987-2017	1970-2017	1970-2018	1983-2012
St. Lucia	1970-2018	1987-2017	N/A	1970-2018	1983-2012
St. Vincent and the Grenadines	1970-2018	1987-2017	N/A	1970-2018	1983-2012
Sudan	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Suriname	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Sweden	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Switzerland	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Syrian Arab Republic	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Tajikistan	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
Tanzania	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Thailand	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012

Table A9 (cont.): Data availability by country – Robustness

Countries	Cont	Inc_level	Crisis	QE	MU
Timor-Leste	1970-2018	2001-2017	N/A	1970-2018	2001-2012
Togo	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Tonga	1970-2018	1987-2017	N/A	1970-2018	1988-2012
Trinidad and Tobago	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Tunisia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Turkey	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Turkmenistan	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
Uganda	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Ukraine	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
United Arab Emirates	1970-2018	1987-2017	N/A	1970-2018	1973-2012
United Kingdom	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
United States	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Uruguay	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Uzbekistan	1970-2018	1991-2017	1970-2017	1970-2018	1991-2012
Vanuatu	1970-2018	1987-2017	N/A	1970-2018	1980-2012
Venezuela, RB	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Vietnam	1970-2018	1987-2017	1970-2017	1970-2018	1975-2012
Yemen, Rep.	1970-2018	1989-2017	1970-2017	1970-2018	1971-2012
Zambia	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012
Zimbabwe	1970-2018	1987-2017	1970-2017	1970-2018	1970-2012

Table A10: Income classification criteria

Year	Low-Income (\$US)	Lower middle-income (\$US)	Upper middle-income (\$US)	high-income (\$US)
1987	≤ 480	481-1,940	1,941-6,000	> 6,000
1988	≤ 545	546-2,200	2,201-6,000	> 6,000
1989	≤ 580	581-2,335	2,336-6,000	> 6,000
1990	≤ 610	611-2,465	2,466-7,620	> 7,620
1991	≤ 635	636-2,555	2,556-7,910	> 7,910
1992	≤ 675	676-2,695	2,696-8,355	> 8,355
1993	≤ 695	696-2,785	2,786-8,625	> 8,625
1994	≤ 725	726-2,895	2,896-8,955	> 8,955
1995	≤ 765	766-3,035	3,036-9,385	> 9,385
1996	≤ 785	786-3,115	3,116-9,645	> 9,645
1997	≤ 785	786-3,125	3,126-9,655	> 9,655
1998	≤ 760	761-3,030	3,031-9,360	> 9,360
1999	≤ 755	756-2,995	2,996-9,265	> 9,265
2000	≤ 755	756-2,995	2,996-9,265	> 9,265
2001	≤ 745	746-2,975	2,976-9,205	> 9,205
2002	≤ 735	736-2,935	2,936-9,075	> 9,075
2003	≤ 765	766-3,035	3,036-9,385	> 9,385
2004	≤ 825	826-3,255	3,256-10,065	> 10,065
2005	≤ 875	876-3,465	3,466-10,725	> 10,725
2006	≤ 905	906-3,595	3,596-11,115	> 11,115
2007	≤ 935	936-3,705	3,706-11,455	> 11,455
2008	≤ 975	976-3,855	3,856-11,905	> 11,905
2009	≤ 995	996-3,945	3,946-12,195	> 12,195
2010	≤ 1,005	1,006-3,975	3,976-12,275	> 12,275
2011	≤ 1,025	1,026-4,035	4,036-12,475	> 12,475
2012	≤ 1,035	1,036-4,085	4,086-12,615	> 12,615
2013	≤ 1,045	1,046-4,125	4,126-12,745	> 12,745
2014	≤ 1,045	1,046-4,125	4,126-12,735	> 12,735
2015	≤ 1,025	1,026-4,035	4,036-12,475	> 12,475
2016	≤ 1,005	1,006-3,955	3,956-12,235	> 12,235
2017	≤ 995	996-3,895	3,896-12,055	> 12,055

Adapted from: GNI *per capita* in USD, World Development Indicators, World Bank (2018).