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Unemployment and Growth

Does Okun's Law Apply to Trinidad and Tobago?

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Abstract[1]

Are output changes and the unemployment rate related in Trinidad and Tobago? According to the economic theory known as Okun's Law, the two variables should be negatively correlated, and for the United States this relation holds quite well. We test this hypothesis for the economy of Trinidad and Tobago using annual data between 1980 and 2012 and also look at more recent quarterly data, accounting for the fact that the energy sector is a large contributor to the country's GDP. We find that the relation between unemployment and real growth is negative but weaker in Trinidad and Tobago, compared with the United States, but seems to be clearly affected by underestimation of the unemployment rate in recent years. This exercise also reinforces the importance of improving labor and GDP statistics in the country.

JEL codes: E24, O40
Keywords: unemployment, labor force, economic growth, labor productivity

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1. Introduction

Since the 2010 peak, the unemployment rate in the United States has been declining from around 10 percent to 6.3 percent in April 2014, its lowest level since 2008. However, the slow improvement in employment has not been accompanied by encouraging real growth figures. This information is watched closely by monetary policymakers in the United States and has inspired some of the recent decisions by the Federal Reserve Board to perform a gradual tapering of monetary easing. Is the relation between GDP growth and unemployment in Trinidad and Tobago equally relevant and useful for policymakers?

The relation between unemployment and growth has been a central issue for economists and policymakers over the past 50 years. On the basis of empirical evidence that suggests a long-run relation between these two economic variables, in the early 1960s the economist Arthur Okun developed a theory later known as Okun's law. This theory predicts that the two variables are negatively correlated. Moreover, according to estimates, a 1 percentage point fall in real growth is associated with a 0.3 percentage point increase in the unemployment rate in the United States, abstracting from other aspects such as possible changes in labor force participation, the number of hours worked per employee, and changes in productivity per employee. Okun's Law can thus be a useful rule of thumb to make inferences in the short term while taking account of where one is relative to the long-term trend. Since then, different versions of Okun's law, which take into account several features of the business cycles, have been developed for the United States. However, this relation has been analyzed much less for the case of developing countries. A few studies that have looked at this relationship for the Caribbean have found structural factors to be important (see Downes (1998), Ouyang(2012) and Craigwell and Maurin (2002)). Two recent studies have estimated this relationship for the Caribbean.[2]

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[2] Schmid and Nugent (2014) considered Okun's Law in Jamaica and found that a 1 percentage point growth in GDP results in a 0.3 percent reduction in unemployment. An International Monetary Fund study (Kandil et.al., 2014) found that a range of unemployment-output elasticities for Caribbean countries. They obtain the lowest estimate for Trinidad and Tobago, 0.08 compared to our 0.11 although their time period is shorter than ours. Moreover, the study also notes that the trend reduction in unemployment does not appear to coincide with the growth cycle in Trinidad

In this Policy Brief, we discuss the long-run relation between growth and unemployment in Trinidad and Tobago and estimate the key parameters of Okun's law. We find that the relation is indeed negative but not as robust as the result in the United States. Part of the weak result may be related to lack of extensive data: national accounts are available only on an annual basis since 1980. Part of the result may be due to the presence of a large capital-intensive oil and gas-producing sector amid generous unemployment benefits, which weakens the link. This means that the mechanisms and policies that determine the unemployment rate are not necessarily strongly tied to economic activity, so monetary policymakers in Trinidad and Tobago may need to apply more caution when making growth-related inferences that are based on the reported unemployment rate[3].

## 2. Trends in Real Growth and Unemployment in Trinidad and Tobago

Between 1980 and 2012, the country's population grew by 22 percent, distributed mostly equally between men and women. Moreover, during that period, the labor force participation rate grew from 55 percent to 62 percent, which is solely explained by an increase in the labor force participation rate of women: This ratio rose dramatically from 32 percent to 52 percent (see Figure 1). The labor force participation rate of men actually fell slightly during that period, from 75 percent to 72 percent.[4] This is an important change in the labor supply, which likely impacted labor productivity in some sectors and could have an effect on the growth–unemployment relation (although there is not enough sector-level data to measure the impact). As is typical in many countries, the unemployment rate of women is larger: 6.2 percent compared with 4.1 percent in 2012 in Trinidad and Tobago. In what follows, we abstract from this change in the labor force composition and focus on total employment.

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and Tobago. Similar to this Brief, the study notes that the deliberate government strategy to lower unemployment via social programs, regardless of the growth cycle, has coincided with the recent downward trend in productivity growth.

[3] Sometimes this information is considered as an alternative indicator of economic activity because quarterly GDP is not available in Trinidad and Tobago, annual data is available with a considerable lag, and there are few quarterly economic activity indicators available outside of the energy sector.

[4] The labor force participation rate is defined as the proportion of the population 15 years of age and older that is economically active: All people who supply labor for the production of goods and services during a specified period.

Figure 1. Labor Force Participation Rate in Trinidad and Tobago, by Gender (%)
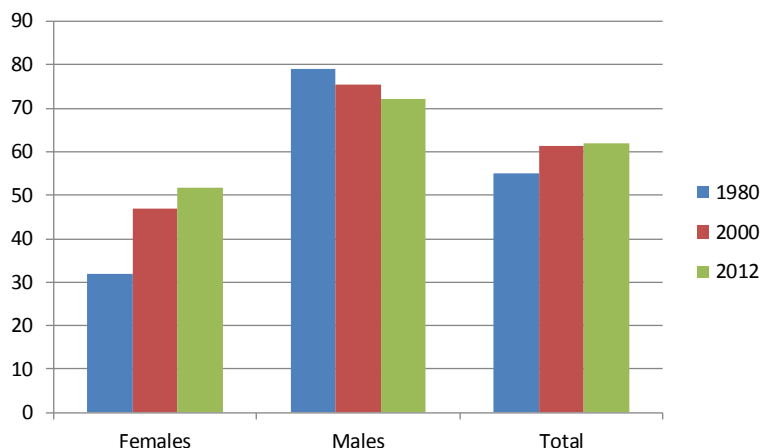

Source: Central Statistical Office.

As an energy net exporter, Trinidad and Tobago's growth performance has been strongly correlated with crude oil prices and growth has depended on the country's energy output. Figure 2 shows the annual real GDP growth for the past 30 years. During the 1980s, the economy shrank along with oil prices but began to recover in 1990 mainly as a result of a hike in oil prices associated with the Persian Gulf War. From 1994 to 2006, Trinidad and Tobago's real GDP followed a positive trend with real growth rates that reached 14.4 percent. However, the slump in international prices in 2009 and the constrained energy output (associated with maintenance operations in the country's oil fields) have reduced the past 5-year growth average to –0.6 percent. The energy sector accounts for 43 percent of Trinidad and Tobago's GDP.

Unemployment indicators show less volatility than the real GDP (Figure 2). The negative correlation with real growth is quiet clear: Unemployment increased until 1987, during a period of negative growth and started decreasing around 1989, along with the positive growth. During the past 5 years, the unemployment rate has been historically low, averaging 5.3 percent.

## Figure 2. Real GDP Growth and Unemployment Rate (%)
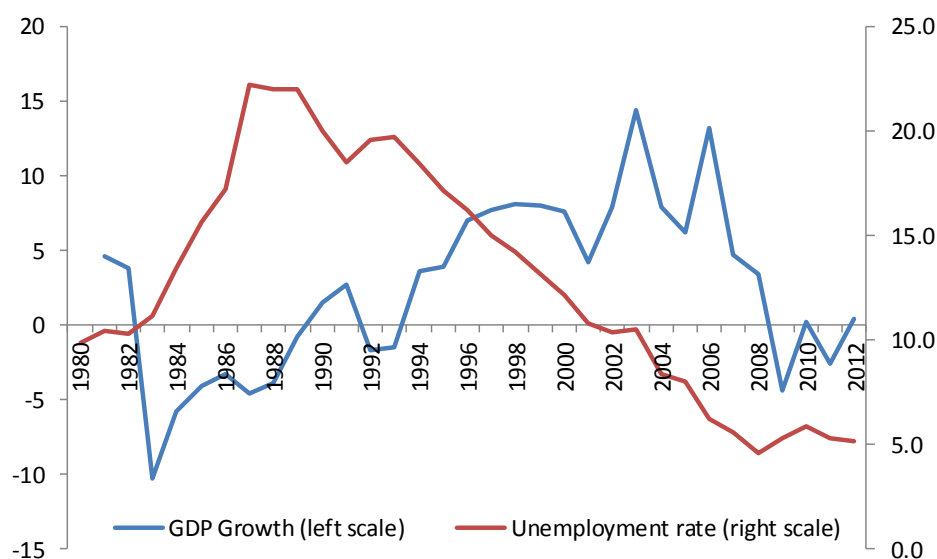
Source: International Monetary Fund and Central Bank of Trinidad and Tobago.

The continuous fall in the unemployment rate has caught the attention of regional policymakers, given that the downward trend was not affected during the last few years of slow and negative growth. A possible explanation could be that the overall figure does not capture some possible underemployment (in terms of hours worked), especially in the nonenergy sector. Part of this underestimation is explained by temporary government employment programs. Participants in these programs are classified as employed under International Labour Organization standards and are counted as part of the community, social, and personal service sector employment group. The two largest programs introduced by the government under the Social Sector Investment Programs are the Unemployment Relief Program created in 1992 and the Community Environment Protection and Enhance Program created in 2002.[5] The latest social sector review showed that expenditures on these two programs increased 14 percent and 7 percent in the 2012/13 fiscal year with respect to the previous year. However, since their

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[5] The program had almost 19,000 beneficiaries in 2013, which is about 3 percent of the labor force.

creation, the government has neither monitored nor evaluated the programs, so it is not clear how well-targeted or successful they are. The administrators of the programs have also noted some overlaps in eligibility, so it is possible to work in one of these programs and receive other benefits or hold a part-time employment. Moreover, these programs could also be affecting labor productivity, which has been declining since the third quarter of 2011 (Figure 3).

Figure 3. Productivity Index (All Industries)
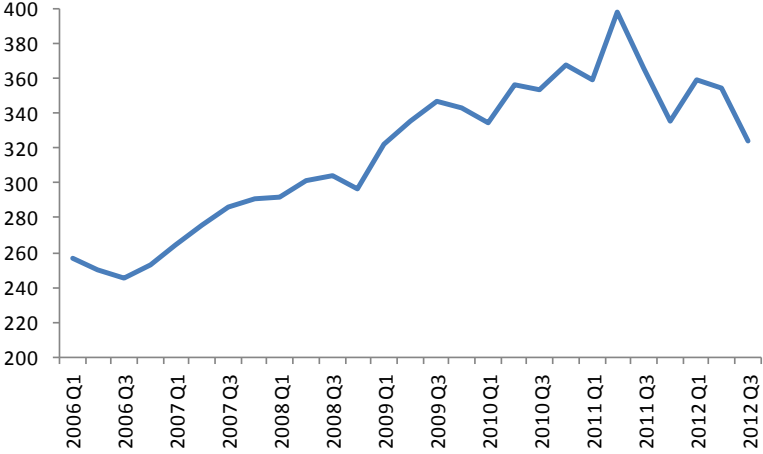
Source: Central Statistical Office of Trinidad and Tobago.

Temporary resource problems of the Central Statistical Office have substantially impacted the production of labor and employment data. The latest indicator available for the unemployment rate is March 2013, a lag of 15 months (in the past, the lag has been about 6 months). Insufficient updated data can hamper the ability to make policy decisions in this area.

More recent information is consistent with the hypothesis that the unemployment series is skewed in part due to the increasing number of people in the social programs (Table 1). First, according to the labor survey of the first quarter of 2013, 27 percent of the labor force is employed in the government or state-owned enterprises, reinforcing the importance of the public sector in total employment. According to the classification by industrial sectors, almost 33 percent of the labor force was employed in the community, social, and personal services sector, which would include workers from the Community Environment Protection and Enhance Program and the Unemployment Relief Program. This would suggest that the relation

between unemployment and GDP growth may be dampened by public-sector or make-work programs that do not respond to the business cycle.

Another factor to consider is that only 3.4 percent of the labor force was employed in the energy sector (defined as the petroleum and gas production, refining, and service contractors sector[6]), even though it contributed to about 43 percent of GDP during that time period. The sector is thus highly capital-intensive and has typically shown a low unemployment rate relative to other sectors. Because the share of the labor force is so low in this sector, this fact is likely to affect the unemployment-output relation that we measure subsequently. For example, if overall GDP declines because of a sharp fall in energy GDP as a result of maintenance-related shutdowns—which is what happened in 2011, 2012, and part of 2013—the overall unemployment rate may not change as much had the output decline originated from the nonenergy private sector.

Another type of under-employment may relate to an over-educated workforce. The generous Government Assistance in Tertiary Education (GATE) universal subsidy for universities has led to a number of university graduates unable to find work commensurate with their skills, according to anecdotal evidence. If true, this creates sub-employment which can also weaken the unemployment-labor relationship[7].

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[6] Unemployment was slightly higher during that period as a result of large maintenance shutdowns in the sector.
[7] See IDB Caribbean Region Quarterly Bulletin (July 2014) for a discussion of Labor and Social Policies in Trinidad and Tobago and other Caribbean countries.

**Table 1. Trinidad and Tobago: Share of Labor Force and Unemployment, by Sector, First Quarter 2013**

	Labor force (share of total, percent)	Unemployed as a percentage of labour force
Total all industries	**100.0**	**3.7**
Other agriculture, forestry and fishing	3.3	0.9
Petroleum and gas, including production, refining and service contractors	3.4	5.6
Other mining and quarrying	0.2	-
Other manufacturing (excluding sugar and oil)	7.9	3.0
Electricity and water	1.2	1.3
Construction	17.1	7.2
Wholesale and retail trade, restaurants and hotels	17.9	3.8
Transport, storage and communication	6.4	1.0
Financing, insurance, real estate and business service	8.9	2.5
Community, social and personal service	32.9	3.1
Not stated	0.6	10.5

Source: Central Statistica Office, T&T

3. Okun's Law: The Case of Trinidad and Tobago

To study the long-run relation between economic growth and unemployment in Trinidad and Tobago, we estimated the coefficient that result from Okun's Law using an annual sample from 1980 to 2012. A detailed technical explanation of the estimation and results appears in Appendix A. The results show that a 1 percent decrease in real GDP is associated with 0.16 percentage point increase in the unemployment rate, using annual data (a relation of 6 to 1). Figure 4 shows a scatter plot of the results. This is lower than Okun's results for the United States where the absolute value was closer to 0.3, meaning that unemployment in Trinidad and Tobago is half as responsive to increases in output compared to the United States.

Figure 4. Real Growth Versus Change in Unemployment (Annual Data, 1981–2012)
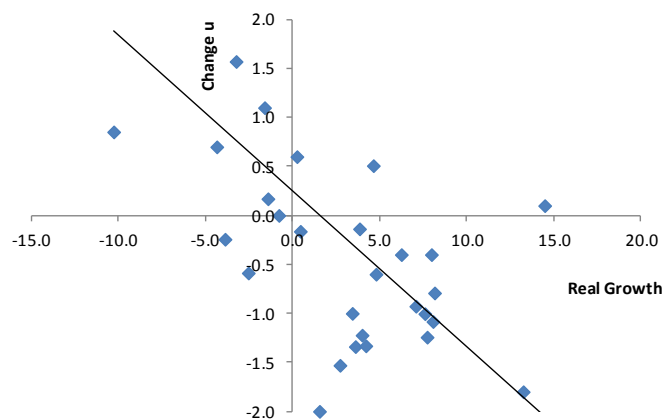
Source: Authors'calculation based on CSO data

We also test Okun's law relating unemployment to the output gap, controlling for output in the energy sector. The outliers marked in green in Figure 5 represent the values for 2011 and 2012, which could be associated with an underestimation of the unemployment rate (as a result of unemployment programs) or the reduction in output in energy as a result of substantial maintenance-related shutdowns in those years (the nonenergy GDP was recovering at the time). To measure this last hypothesis, we also regress the unemployment level against the output gap in the nonenergy sector. The output gap is defined as the cyclical component—that is, the difference between actual output and the output that would be obtained under full capacity utilization (see the Appendix for the technical definition). The regression result shows that a 1 percent increase in the output gap implies a –0.15 percentage point change in the unemployment rate (See Appendix, Table 2), but if we remove the 2011 and 2012 values from the sample, the output gap coefficient becomes significant and has a value of –0.11. When we consider the output gap using only GDP of the nonenergy sector from 1996 to 2012, we find a negative albeit not statistically significant relation. This could be the result of a shorter sample.

Figure 5. Output Gap Versus Unemployment Level (Annual Data, 1980–2012)
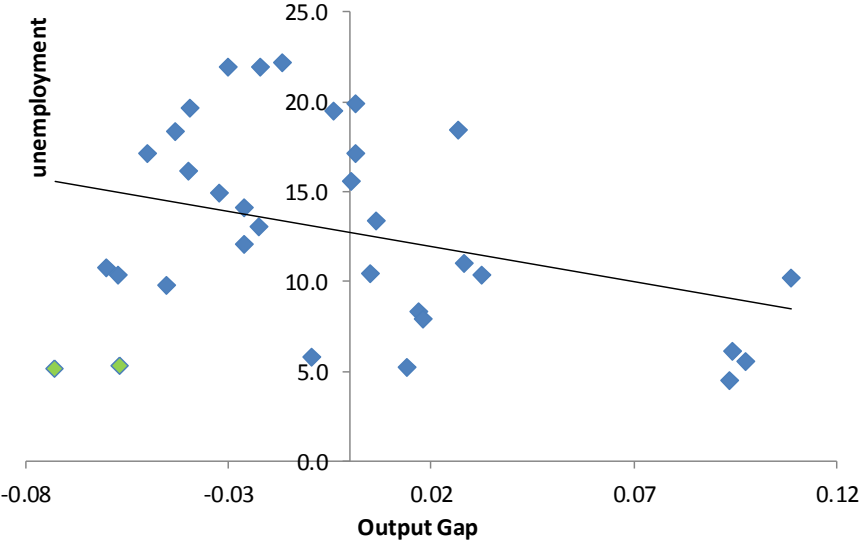
In a third extension, we consider as explanatory variables past values of real growth and the unemployment rate, and we find that some of the lagged values of the variables in the specification using quarterly data are significant, as discussed in the Appendix.

4. Conclusion

The relation between unemployment and real growth is weaker in Trinidad and Tobago, compared with the United States. The relation is clearly affected by a possible underestimation of the unemployment rate related to the business cycle in recent years and seems to be stronger when we use annual data instead of quarterly data. This result also reinforces the importance of improving employment and GDP statistics indicators in the country.

Further studies should also include changes of Okun's coefficient with business cycles. Knotek (2007) showed that the coefficient is on average smaller (in absolute value) in expansions than during recessions. Consistent with the results of Trinidad and Tobago, Knotek also found that the correlation has decreased over time, and his results are consistent with ours.

Although unemployment has been decreasing over the past few years, labor productivity indicators have decreased since the third quarter of 2011. Moreover, unemployment programs could be affecting the supply of low-skilled labor: the hourly rate paid by these programs, in

general, is de facto higher than the minimum wage agreed because actual hours worked per day are between 4 and 8. Recently, the private sector has complained of the distortions that this kind of program generates in the labor market and the subsequent negative impact on labor productivity.

Going beyond the simple relation of Okun is a need to better understand trends in labor productivity in Trinidad and Tobago, especially by gender and by industry. Large resource revenues transferred to the population—even in the form of free tertiary education— may lead to a fall in worker productivity if there is a negative impact of generous transfers on motivation and worker incentives. Moreover, there is anecdotal evidence that tertiary education graduates are not able to find jobs commensurate with their skills (with the exception of the energy sector). These graduates are thus likely to emigrate to advanced economies, eroding the productive base further. Finally, to facilitate the policy decision process, the government needs to also focus on improving output and labor statistics.

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Appendix: Estimation of Okun's Law

To study the long-run relation between economic growth and unemployment in Trinidad and Tobago, we estimated the coefficient that results from Okun's Law using an annual sample from 1980 to 2012. We also performed some test for the short-medium term relation using quarterly data from the third quarter of 2000 to the second quarter of 2012.[8]

Analyzing Figure 2, we can predict that the unemployment rate follows a unit root process (it is declining, as opposed to trend-stationary), which will require some correction of the econometric analysis.

We define the unemployment rate by u_t, and the natural log of the real GDP by y_t. Following the standard approach of Okun's Law, we regress the changes in unemployment rate on real GDP growth as displayed in the following equation.

$$\Delta u_t = \alpha^s + \beta^s \Delta y_t + \varepsilon_t^s$$

For the annual data, the results show a significant and negative β, the coefficient on output: a 1 percent decrease in real GDP is associated with a 0.16 percentage point increase in the unemployment.

Adjusting the variables for seasonality, we estimate the same regression using quarterly data. The results show an insignificant coefficient, probably because of the bias in the shorter sample.

A second specification of Okun's law relates the level of unemployment to the output gap as shown in the following equation.

$$u_t = \alpha^g + \beta^g (y_t - y_t^n) + \varepsilon_t^g$$

where y_t^n denotes the potential output (defined as the output level when employment is at the natural level because there is no under-utilized capacity); and $y_t^g = y_t - y_t^n$ represents the output gap. To estimate the potential output we calculate the output trend of the constant GDP using the Hodrick-Prescott filter.

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[8] Quarterly data of real GDP is only available since 2000 and is measured by the Central Bank.

To run the regression that relates unemployment level and the output gap in the nonenergy sector, we use annual data from 1996 to 2012.[9] In this case, we obtained that a 1 percent increase in the nonenergy output gap implies –0.13 percent point change in the unemployment rate, but the coefficient is not significant at the 15 percent level. Again, this could be the result of a shorter sample.

In a third extension of the Okun's Law, we consider as explanatory variables past values of real growth and unemployment rate. We want to test whether including lags improves the explanatory power of our regression.

$$\Delta u_t = \alpha^l + \beta^l \Delta y_t + \beta_1^l \Delta y_{t-1} + \beta_2^l \Delta y_{t-2} + \gamma_1^l \Delta u_{t-1} + \gamma_2^l \Delta u_{t-2} + \varepsilon_t^l$$

We include one and two lags in both variables. When we use annual data, the lag coefficients for both variables are not significant. Instead, in the model with quarterly data, the second lag of real growth and the first lag of the change in the unemployment rate are significant (see Table 2).

Figure 6 suggests that there has been much variability in the GDP series. Figure 7 conducts a rolling correlation between unemployment and growth. The strong vaiability in the correlation—which was actually positive in 2008—again suggests a weakly robust relationship of the two variables.

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[9] To avoid the problem of nonstationarity of the unemployment rate, we run the regression without the constant and we used an auto-regressive process to correct the series.

Table 2. Regression Results

Regression	(1)	(2)	(2)^	(3)
α (constant)	0.25	-	-	0.21
AR process	-	0.97***	0.97***	-
β (Real GDP Growth)	-0.16***	-	-	-0.11*
β (Output Gap)	-	-0.15*	-0.17**	-
β (Real GDP Growth) t-1	-	-	-	-0.07
β (Real GDP Growth) t-2	-	-	-	0.03
γ (Ch_unemploy) t-1	-	-	-	0.09
γ (Ch_unemploy) t-2	-	-	-	0.04
Sample	1981 -2012	1980 - 2012	1980-2010	1983-2012
Number of Observations	32	31	29	30
R- Square	0.4	0.8	0.8	0.4

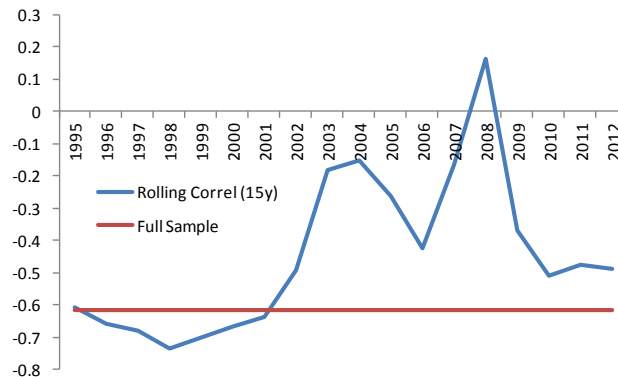*Coefficients are significant at ***1% Percentile, ** 5% Percentile and 10% Percentile*

^ Regression (2) ^ is the equal to (2) but with different sample

Figure 6. Distribution and Statistics of Annual GDP Growth
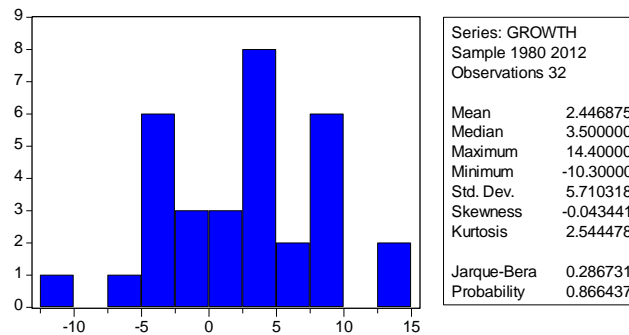
Source: Authors'calculations

Figure 7. Slope Coefficient (Rolling Correlation)

Source: Authors'calculations

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