Okun and Jamaica at 50: How Does Unemployment React to Growth?

Stevonne Nugent
Juan Pedro Schmid

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 Stevonne Nugent: stevonnen@iadb.org; Juan Pedro Schmid: jpschmid@iadb.org

Abstract[1]

Jamaica is projected to exit a prolonged recession that has left deep scars in the socioeconomic conditions of the country. Besides increasing macroeconomic vulnerabilities and halting economic growth, advances in poverty and unemployment were reversed. Unemployment bottomed in 2009 at 9.5 percent but increased over the following years until reaching more than 16 percent by April 2013, and poverty increased from 9.9 percent in 2007 to 17.6 percent in 2010. Following the literature on Okun's rule of thumb, we explore how the projected recovery will be reflected in the labor market. Results indicate that there is an association between GDP growth and unemployment—a 1 percent growth in GDP results in a 0.3 percent reduction in unemployment. These values indicate that under current growth projections, unemployment in Jamaica will remain above the psychologically important threshold of 10 percent for several years.

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Jamaica is projected to emerge from a prolonged recession that has adversely affected the socioeconomic conditions of the country. Unemployment bottomed in 2009 at 9.5 percent but increased over the following years until reaching more than 16 percent by April 2013, and poverty increased from 9.9 percent in 2007 to 17.6 percent in 2010. Following the literature on Okun's rule of thumb, we explore how the projected recovery will be reflected in the labor market. Results indicate that there is a relation in Jamaica between GDP growth and unemployment—a 1 percent growth in GDP results in a 0.3 percent reduction of unemployment. These values indicate that under current growth projections, unemployment in Jamaica will remain substantially greater than 10 percent for several years.

Jamaica's economic performance has been disappointing, with an average growth of 1.5 percent since 1980, consistently less than that of Latin America and the Caribbean. In the Latin America and the Caribbean region, only Haiti had lower average growth than Jamaica over the past two decades. Jamaica is today poorer on a per capita basis than it was in 1990. The global economic downturn affected Jamaica strongly. Since the end of 2007, Jamaica has contracted in 17 out of 22 quarters. The deep and long recession has had important effects on Jamaica's socioeconomic development, reflected in part in the recent decline in Jamaica's Human Development Index rank from 83rd to 85th out of 185 countries. Similarly, the unemployment rate has been increasing steadily from the low of 9.4 perecent in 2007, reaching 16.3 percent as of April 2013 (see Figure 1a). In the same period, employment increased until 2008 and has since then retreated slightly. The condition of the labor market is reflected in the poverty rate, which climbed to 17.6 percent as of 2010 after bottoming less than 10 percent in 2007.[2]

Jamaica's economy is projected to recover in FY2013/14, with a growth rate of 0.8 percent that should accelerate close to 3 percent over the next 2 years. In the following sections, we explore the implications of the variations in GDP for unemployment.

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[2] On the basis of the weak economic performance, it is likely that poverty increased further since 2010. However, the results of the 2012 Jamaica Survey of Living Conditions have not yet been published, and the survey was not conducted in 2011 because it was a census year.

Figure 1a. Real GDP, Employed and Unemployed Labor Force, 2000–2012
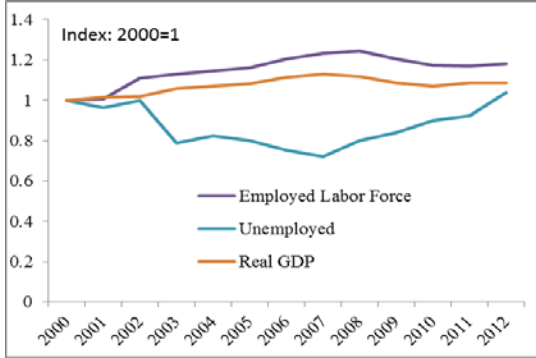
Figure 1b. Real GDP Growth and Change in Unemployment Rate, 2000–2012
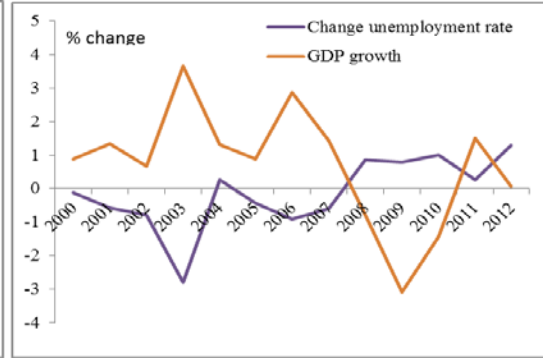
Source: Bank of Jamaica and Statistical Institute of Jamaica.

Okun (1962) first described a rule of thumb for a negative short-run relation between unemployment and output. Okun assumed that shifts in aggregate demand cause output to fluctuate around its potential. Firms react to the changes in output by adjusting employment, which, in turn, lead to changes in the unemployment rate in the opposite direction. We can express these relations as follows:

$$E_t - E_t^* = \gamma(Y_t - Y_t^*) + \varphi_t, \gamma > 0; \quad (1)$$
$$U_t - U_t^* = \delta(E_t - E_t^*) + \mu_t, \delta > 0; \quad (2)$$

where E_t is the log of employment, Y_t is the log of output, U_t is the unemployment rate, and $*$ indicates a long-run level. Combining (1) and (2) gives Okun's law:

$$U_t - U_t^* = \beta(Y_t - Y_t^*) + \varepsilon_t, \beta < 0 \ (3)$$

There are probably as many studies that have confirmed the relation as there are that have shown that the relation can be absent or depend on other factors as well (for a discussion, see Ball et al. 2012; for an application to the Caribbean, see Craigwell and Maurin 2002). Nevertheless, Okun's law has become part of the core ideas that comprise economics (Blinder 1997). For the United States, the relation usually states that a 1 percent deviation of output from potential causes an opposite change in unemployment of 0.4 to 0.5 percentage point (Knotek 2007). However, the specific value for β varies by country, depending on γ—how firms react to changes in output and δ—how the workforce reacts to any changes in employment.

Assuming that the natural rate of unemployment is constant and that potential output grows at a constant rate, we can estimate the difference version that relates changes in the unemployment rate to GDP growth.

$$\Delta u_t = \alpha^d + \beta^d \Delta y_t + e_t{}^d \quad (4)$$

In this specification, α^d/β^d is the growth rate necessary for keeping the unemployment rate stable. As productivity increases, the economy must grow to keep the unemployment rate constant (assuming that participation is constant). For this reason, we expect the α^d/β^d ratio to be positive.

Application of Okun's Law to Jamaica
Yearly Data

The right column in Figure 2a shows the overall relation between changes in unemployment and GDP growth using yearly data (for the relation over time, see also Figure 1b). The relation is negative, as expected, but the wide spread of the observations around the fitted line indicates that the relation is not very strong. More surprising is that, on average, unemployment decreases when GDP growth is equal to or smaller than zero. The ordinary least squares regression confirms the results from the scatter diagram with a reduction in the unemployment rate by 0.18 percent from 1 percent GDP growth and a decrease in unemployment of 0.14 percent when GDP is constant (see the more detailed discussion and Appendix Table 1a). As such, the results imply that either the workforce or productivity decreases when GDP stagnates and, as such, unemployment does not increase in recessions. The other two columns clarify the result by splitting the observation period into 1980–1995 and 1996–2012. The graphs and the corresponding regressions (see Appendix Table 1) indicate that the relation was weak before 1995 but has since become stronger and more consistent. After 1995, 1 percent of GDP growth implies 0.37 percent of reduction in the unemployment rate. However, again reflecting little progress in productivity, unemployment does not change when GDP growth is flat. Rolling regressions confirm that the relation and its strength vary over time. The relation is mostly absent (low values and high standard errors) before the mid-1990s, becomes strongly negative with a decrease in standard errors from the late 1990s until the world economic crisis, and then vanishes again.

Figure 2a. Scatter Plot Between Yearly Changes in Unemployment and GDP Growth
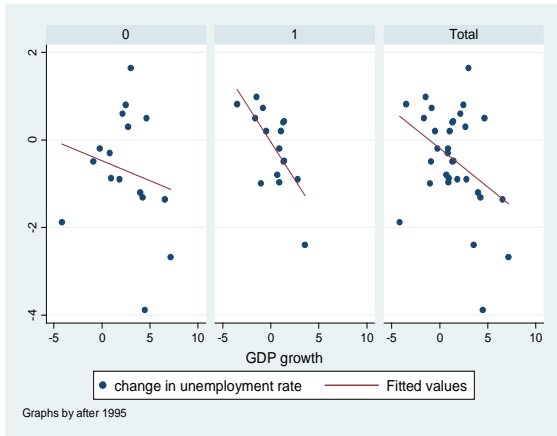
Figure 2b. Rolling Regression Between Changes in Unemployment and GDP Growth, 1980–2007
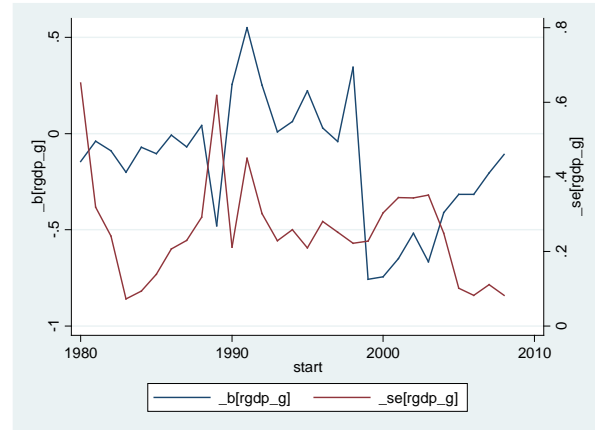
Source: Authors' calculations based on STATIN data.

Quarterly Data

Regressing quarterly changes in the unemployment rate on contemporaneous GDP growth does not show any stable relation between the two variables as Okun predicted. Trying different lagged versions was not fruitful either. As such, we cannot find a short-term relation between changes in GDP and changes in the unemployment rate.[3]

However, using year-over-year quarterly data changes, we find a statistically significant negative relation between GDP growth and changes in unemployment (Figure 3 and Appendix Table 2a and 2b).[4] The corresponding estimation indicates that on average, a 1 percent GDP growth translates to a 0.35 percent reduction of the unemployment rate. The unemployment rate increases by 0.22 percent if GDP is constant; as such, GDP needs to grow to keep unemployment constant. Figure 3 indicates that the effects vary before and after crisis. In the post-2007 period, the relation breaks down, but the increase in the unemployment rate from stagnating GDP is substantially higher during that period.

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[3] Regressing change in unemployment on the contemporaneous GDP growth alone gives a statistically significant but positive relation. However, the effect disappears when quarterly dummies are included to control for seasonal effects.

[4] Using year-over-year could introduce autocorrelation in the errors, but tests indicated that correcting for them did not substantially change the results.

Figure 3. Scatter Plot Between Yearly Changes in Quarterly Unemployment and GDP Growth
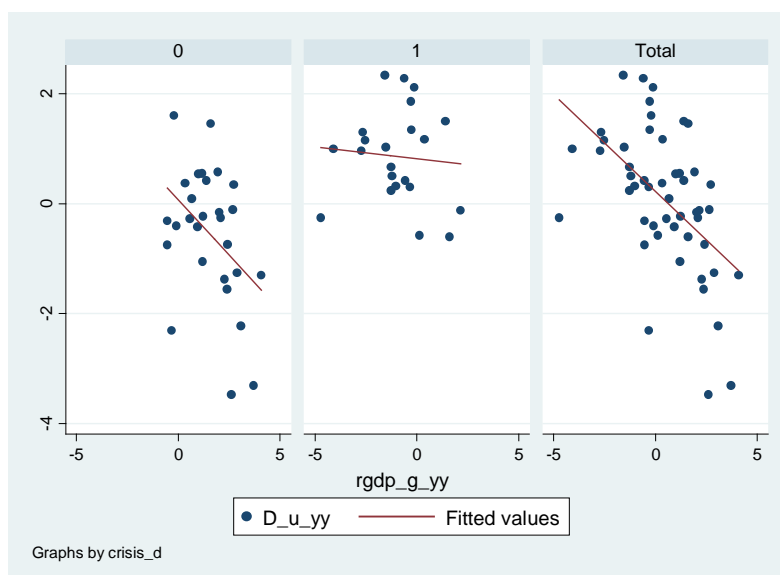
Source: Authors' calculations based on STATIN data.

Discussion and Conclusion

As has been shown for other countries, unemployment in Jamaica reacts to changes in GDP as predicted by Okun's law. The effects are not very strong—a 1 percent change in GDP implies a 0.35 percent change in the unemployment rate in the opposite direction—and the relation does not always hold. Results indicate that the relation varies over time—it was weaker before 1995 and during the world economic crisis. Different reasons can be responsible for the varying relation because the association between unemployment and growth depends on labor supply and labor demand consideration. Not all companies react in the same way to varying production (e.g., public service). Also, employment programs have been introduced repeatedly during downturns, which would compensate for any layoffs. Given the known low level of productivity, it is reasonable to expect that companies react to higher production first by increasing productivity. This is especially true when confidence about the sustainability of growth is low as has been the case since the start of the world economic downturn.

The aforementioned results can be used to project the evolution of unemployment for the next few years. Since bottoming at 9.4 percent in 2007, the Jamaican unemployment rate has

increased steadily to 16.3 percent as of April 2013. Simulations that (a) use the growth rate projected in the current International Monetary Fund Extended Fund Facility and (b) assume that the unemployment rate decreases by 0.35 percent for every percentage point in economic growth indicate that unemployment will be slightly higher than 14 percent when the program ends in March 2017. Doubling the projection period to March 2020, unemployment is expected to decrease to 11.5 percent. Using the same parameters, the results indicate that lowering unemployment to the psychologically appealing mark of 10 percent by the end of the Extended Fund Facility would require a growth rate of 4.6 percent, which is triple the projection. Reaching 10 percent by March 2020 requires a growth rate of 2.3 percent (Figure 4).

To conclude, our results indicate that unemployment will remain a major issue in Jamaica for the short to medium term. The government is amid a strong fiscal consolidation that could negatively affect the recovery of the employment situation. At the same time, a weak labor market could deteriorate support for the fiscal consolidation itself. Finding labor market policies that support growth are not straightforward. For example, the World Bank's Enterprise Survey indicates that labor regulations and availability of a skilled workforce are not major constraints for companies in Jamaica. Instead, the current major labor market issue is the low demand resulting from weak growth performance. This situation supports the current focus of the government on growth-facilitating reforms, some of which are related to the labor market. Labor market flexibility and acquisition of skills and improvements in labor productivity are important but so are access to finance and reduction of red tape for small and medium companies, which play an important role in job creation.[5] For the short term, a well-targeted employment program— especially if it leads to skills acquisition—could be an option to bridge a possible time gap until employment picks up substantially.

Jamaica's labor productivity has been decreasing over an extended period of time. Our results indicate that unemployment could have been even higher if labor productivity would have increased in line with other economies. However, in the medium to long term, productivity increases are the foundation of economic growth.

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[5] See forthcoming CJA Policy Brief #3 on the business climate in Jamaica for a discussion of major constraints that Jamaican companies face.

**Figure 4. Projected Unemployment Rate Under Extended Fund Facility Growth Projections
2004/05 to 2019/20**
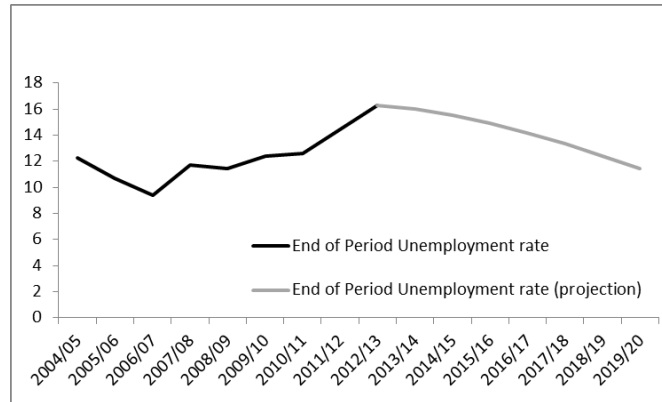
Source: Authors' calculations based on STATIN data.

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Appendix

Yearly Regressions:

Equation 3 was estimated for Jamaica using annual data (1980–2012). Results indicate that a 1 percent change in the growth rate is associated with an overall 0.18 percent decline in the unemployment rate (see column 1 in Appendix Table 1a). Furthermore, the value for the constant would indicate that zero real output growth in a given year was associated with a decrease in the unemployment rate of 0.14 percent in that year. However, the value is not statistically significant from zero at any relevant level of significance. The rate of real GDP growth associated with a stable unemployment rate would be $\frac{\alpha^d}{\beta^d} = 0.78$ percent, or 0, given the low level of significance for the constant, but certainly much lower than the 4 percent found in Knotek's (2007) replication of Okun's analysis for the United States.

As discussed in the main text, the relation varies over time. We explore this by including interaction terms for the period after 1995:

$$\Delta u_t = \alpha^d + \alpha^{1995} + \beta^d \Delta y_t + \beta^{1995} \Delta y_t + e_t{}^d \quad (5)$$

where α^{1995} and β^{1995} represent a dummy and an interaction with GDP growth for after 1995.[6] Using an interaction term for the period after 1995, the results in column 2 of Appendix Table 1a indicate that Okun's rule of thumb was valid in Jamaica only for the latter period. The effect of changes in the growth rate on the unemployment rate after 1995 is –0.36 percent (–0.10 + –0.26) and –0.10 before (not statistically significant). There is again no statistically significant relation associated with zero growth and changes in unemployment (see also Figure 2a in the main text).

Appendix Table 1a. Ordinary Least Squares Estimation of Annual Data, 1980–2012

Variable name	(1)	(2)
Real GDP growth	–0.18	–0.10
	(0.08)*	0.09

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[6] Note that significance for post-1995 effects have to be determined jointly. See test for interaction variables below.

Real GDP Growth × After 1995		–0.26
		(0.19)
After 1995		0.47
		(0.47)
Constant	–0.14	–0.45
	(0.23)	(–0.38)
Adjusted R^2	16.44	14.17

Dependent variable: change in unemployment rate.

No. of observations: 32.

$*p = .05. **p = .01.$

Appendix Table 1b. Significance Test of Interaction Variable

Real GDP Growth + Real GDP Growth × After 1995 = 0
$F(1, 28) = 5$, Prob $> F = 0.03$

Quarterly Regressions:

Equation 3 was also estimated for Jamaica using quarterly data (1998Q1–2013Q2). For the whole period, results indicate that a 1 percent real quarterly output growth year over year is associated with a statistically significant 0.35 percent decrease in the quarterly unemployment rate compared with 1 year earlier (see column 1 in Appendix Table 2a). The rate of real GDP growth associated with a stable unemployment rate is $\frac{\alpha^d}{\beta^d} = 0.63$ percent, but the value is again not statistically significant.

We follow the literature by allowing different coefficient after 2007, during the world economic recession. The resulting effect becomes close to zero at –0.5 (–0.40 + 0.35) and is not statistically significant at any satisfactory level. As such, the relation disappeared during the world recession.

Table 2a. Results From Estimation of Quarterly Data

Variable name	(1)	(2)
Real GDP growth	–0.35	–0.40
	(0.08)*	(0.15)*
Real GDP Growth × Crisis		0.35
		(0.21)
Crisis		0.75
		(0.40)
Constant	0.22	0.06
	(0.16)	(0.31)
Adjusted R^2	26.10	35.2

Dependent variable: change in unemployment rate.

No. of observations: 50.

*$p = .05$. **$p = .01$.

Table 2b. Significance Test of Interaction Variable

Real GDP Growth + Real GDP Growth × Crisis = 0

$F(1, 46) = 0.10$, Prob > $F = 0.75$

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