Labor Market Flexibility in Thirteen Latin American Countries and the United States
Revisiting and Expanding Okun Coefficients

Jose Antonio Cominata Amaya
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The World Bank
Washington, D.C.
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Summary

This paper studies labor market flexibility in 13 Latin American countries since the 1960s and 1970s by looking at the sensitivity of employment and unemployment, and real wages with respect to output. It finds that price stabilization has brought real-wage stability, but that it has tended to increase uncertainty of job security. It argues that declining inflation makes labor market rigidities binding because labor markets cannot absorb output shocks through prices. Cyclical relationships are studied by constructing Okun coefficients for unemployment, employment, and wages using first differences and the cyclical component of a Hodrick-Prescott (HP) decomposition of the series.

This paper finds that compared with the United States, output fluctuations in Latin America have a small effect on the quantity variables employment and unemployment, but a large effect on real wages. For five of the six countries that implemented a price stabilization program, the wage sensitivity of output decreased. Conversely, with respect to output, unemployment-employment sensitivity tended to increase. Countries in the sample with stable inflation levels did not exhibit such an inverse relationship. The most important determinants of the flexibility indicators are labor market reforms. Long-term relationships are studied using a standard production function and the permanent component of the HP decomposition of the series. In all seven countries that implemented a price stabilization program, the output elasticity of employment increased, implying higher productivity and lower employment generation. Long-term labor shares were also computed, and it was found that in five of these countries labor shares increased, implying that labor is reaping the benefits of increased productivity.
INTRODUCTION

ECONOMIC GROWTH IS GOOD FOR WORKERS.

World Bank (1995b)

ONCE AGAIN, THE QUICK CAPACITY TO OVERCOME ECONOMIC DIFFICULTIES [IN 1995] WAS INSUFFICIENT TO MARK IMPROVEMENTS ON THE LABOR FIELD.

ILO Latin America (1996)

The two quotes above are at the heart of the debate on the impact, or lack thereof, of "Washington Consensus Reforms" on labor markets in Latin America (see Williamson 1995). This paper studies labor market flexibility in 13 Latin American countries since the 1960s and compares them with the United States by looking at the sensitivity of employment and unemployment, and real wages with respect to output in the short and long term. The two main findings in the short term are (a) Latin American labor markets adjust to output shocks predominantly through wages rather than through employment or unemployment when compared with the United States, and (b) price stabilization makes labor market rigidities binding because labor markets cannot absorb output shocks through adjustment in real wages, which explains policymakers' renewed attention to labor market issues. Thus, in high-inflation countries, a reduction in real wages, obtained through less-than-full nominal wage adjustment, counterbalances the costs imposed by labor market rigidities. This paper argues that in the long term, in stabilization countries, the output elasticity of employment increased, reflecting improvements in productivity, providing support for the hypothesis that postreform growth is not as labor-intensive. This paper also finds, however, that labor shares of income have increased, indicating that workers are reaping productivity increases in the form of wages.

To test the short-term hypothesis mentioned above, this paper estimates the response of unemployment-employment and real wages to changes in output throughout the period. It argues that out-
put shocks in each country will be reflected entirely in fluctuations in real wages (prices), employment and unemployment (quantities), or turnover (not investigated in this paper)—regardless of such factors as labor market regulations, institutions, or idiosyncrasies. I constructed Okun coefficients, which for now can loosely be defined as the effect of a 1 percent deviation of output from its trend on unemployment, employment, and wages. The paper finds that output fluctuations in Latin American economies have a smaller effect on quantity variables (unemployment and employment) and a bigger effect on real wages when compared with the United States. In particular, the paper finds large wage Okun coefficients in Latin America on the order of 1.0, while in the United States the comparable number is close to 0.5, and conversely, unemployment and employment Okun coefficients of 0.1 to 0.3 compared with 0.3 to 0.4 in the United States. The magnitude of the unemployment coefficients in Latin America is closer to those in Europe and Japan.

In the sample, there are six countries—Argentina, Bolivia, Chile, Costa Rica, Mexico, and Peru—that carried out a price stabilization program during the sample period. Brazil's stabilization plan was launched in 1994 and thus is included as a counterexample, along with Venezuela, as a country with rising inflation. Okun coefficients for real wages fell in five of the six countries and increased in Venezuela and Brazil. Conversely, in four of the six stabilizing countries the unemployment coefficients rose, and in all six countries the employment coefficients rose. Therefore, the newly acquired concern on the part of Latin American policymakers with labor market rigidities is justified. With lower inflation, real-wage adjustment is not as effective a mechanism of adjustment. Real wages are easier to adjust downward in a higher inflationary regime by awarding nominal increases below the rate of inflation. With lower inflation, adjustment to shocks—which were previously easily accommodated through real-wage adjustments—now have to be translated into layoffs and closings. Thus, employment rigidities, which have been in place for a long time, have become more binding today because the wage-adjustment channel is no longer available. It is not surprising that in countries where the quantity adjustment channel has not increased, as in Argentina, labor reform has become a high priority. The investigation of rigidities as a function of policy variables is left for future research.

Long-term relationships between these variables allowed me to address whether reforms are benefiting wage earners as much as expected. To determine whether postreform growth is generating as much employment as expected, I used a simple production function framework and constructed long-term output elasticities of employment. Long-term elasticities were constructed using the permanent component of the Hodrick-Prescott (HP) decomposition of each of the series. In many countries, a U-shaped pattern emerged, indicating that despite employment protection, import-substituting regimes had high output elasticities of employment. The United States also has a slight U-shaped pattern, indicating that productivity gains were smaller in the 1970s. Postreform growth has been associated with larger productivity gains than in the 1980s. The result was expected and is desired. Structural reforms have translated into larger gains in productivity. In the long term, it is the only way to increase welfare.

The question of the well-being of workers is better addressed by looking at labor participation in output. I constructed long-term labor shares and found that labor shares rose after reforms in four (Bolivia, Chile, Costa Rica, and Mexico) out of the six reforming countries, and the precipitous fall in Peru was contained. Moreover, Venezuela follows the pattern of a counterstabilization country. The long-term effects of structural reforms and stabilization are that output elasticity of employment increases because of productivity gains, while wages rise to more than compensate lower employment per unit of output.

The study of the transmission mechanism between output and labor market performance variables offers insights on the effects of labor market reforms in countries that have not experienced extreme price instability. This paper finds that the gradual liberalization of labor regulation in Colombia has resulted in a steady increase in the unemployment-employment sensitivity with respect to output, and has made Colombia one of the few
countries with countercyclical wages. Moreover, along with Chile, Colombia is the only country with a sustained increased labor share of output.

Panama presented an increasingly more inflexible labor market until the trend was at least partially reversed in the last few years. The 1972 labor code had devastating consequences for quantity and price adjustment channels and became a major obstacle to growth. However, legislation approved in 1995 has reversed the trend. Okun coefficients for employment and unemployment rose significantly because modifications of the law eliminated automatic conversion of temporal to permanent contracts after three months.

In Guatemala, the benefits of peace since 1986 dwarf the benefits of stabilization for any other country. There were robust and immediate improvements in short-term labor market flexibility and long-term worker well-being. The story in Uruguay is less clear; in the short term there seemed to be labor market liberalization both in quantities and prices until 1993, when a sharp reduction in both was observed. There has been a deterioration of the labor share since the early 1970s.

This paper makes three important contributions to the debate over labor market reform in Latin America. First, this is the first time that Okun coefficients or any other uniform methodology has been applied over such a long time period and wide range of countries. In fact, there is surprisingly little comparative econometric work on Latin American labor markets. In addition, this paper compares results with the United States. Second, this paper does not capture the richness provided by survey data but “looks at the forest” and takes a first crack at answering whether the labor market in country X is more or less flexible than the labor market in country Y. The study is meant to lay the groundwork for further refinements by country. Finally, this paper provides a measure of “broadness of growth.” How much of growth is translated into employment? Is growth more labor-biased in one country than in another?

From an academic point of view, the paper investigates whether basic macroeconomic relationships take different shapes across countries depending on history, customs, regulations, and institutions, despite the fact that the basic economic logic behind these factors should be quite universal. This paper stretches Okun’s contribution to bridge the often-discussed gap between macro and labor economics by claiming that his logic for the relationship between output and unemployment applies to real wages. Moreover, I argue that it is the most appropriate measure of labor market flexibility in the short term for Latin American countries, where output growth is volatile.

This paper is structured as follows: Section II describes the interpretation of short- and long-term fluctuations in our relevant variables and the justification for using real wages, unemployment, and employment as performance variables. Section III describes the transmission mechanisms among the variables, and presents estimation procedures and results. Section IV presents the long-term structural relationship between employment and output. Using a conventional production function framework and the permanent components of the series, long-term output elasticities of employment and labor shares are estimated. Section V offers a conclusion and presents future avenues of research.
REAL WAGES, EMPLOYMENT, AND UNEMPLOYMENT AS MEASURES OF LABOR MARKET PERFORMANCE

IN STUDYING LABOR MARKET FLEXIBILITY, as in other areas of economics, there are two types of variables: policy and performance variables. There is an extensive literature concentrating on the links between labor market policy variables and the resulting performance variables using microeconomic survey data.

USING PERFORMANCE VARIABLES

Since this paper concentrates on the link between output and the labor market, it was natural to concentrate on performance variables. All the idiosyncrasies of such factors as labor market regulations, institutions, and taxes will be reflected in a performance variable. Surprisingly, there is consensus that there are only three broad labor market performance variables: (a) a price variable best measured by real wages, (b) a quantity variable measured alternatively by either employment or unemployment, and (c) turnover (labor markets are peculiar in that turnover is another measure of performance). Because comparable turnover data are scarce, measuring a labor force’s ability to adjust to sector shocks is left for future research.

This paper looks into the structural relationship between output and performance variables (a) and (b) across 13 countries in Latin America and the United States for the last 20 to 30 years as a way of measuring the ability of the labor market to absorb output shocks. This is not only a simple and elegant way, but also the appropriate way, to measure labor market flexibility in an environment with volatile output.

DECOMPOSING THE SERIES INTO LONG- AND SHORT-TERM COMPONENTS

The related literature on output, employment, unemployment, and wages has divided the study of the relationships of these variables into long- and short-term categories. This work will follow that convention because of the nature and length of the time series, and for clarity. Each log series is made up of two components: a long-term trend (or permanent component), and a short-term or business cycle component. The econometric decomposition is described in section III, as shown below by equation 2.1:
\[ y = y_p + y_c \]
\[ e = e_p + e_c \]
\[ u = u_p + u_c \]
\[ w = w_p + w_c \] (2.1)

The interpretation of the coefficients is straightforward: long-term growth, \( y_p \), can be thought of as the term explained by Solow's growth literature (Solow 1957). Cyclical output variations have been traditionally explained by short-term macroeconomic models. Long-term real wages are determined by productivity, while short-term deviations depend on labor demand. The interpretation of the decomposition of employment and unemployment is more involved. Long-term employment is determined exogenously by the growth of the economically active population. This may differ from population growth because of differing age distribution parameters. Cyclical employment varies due to the changing participation rate. Traditionally, unemployment was thought of as a stationary variable that returned to its long-term value, the non-acceleration inflationary rate of unemployment (NAIRU). However, recent studies have suggested that the NAIRU may change over time. The matter is far from settled and is beyond the scope of this paper. The nature of long-term unemployment is widely covered in the literature.\(^3\)
CYCLICAL VARIATIONS AMONG
EMPLOYMENT AND UNEMPLOYMENT,
wages, and output

The literature going back to Okun (1962) has concentrated on the cyclical relationship between output and unemployment. The innovative approach of computing Okun coefficients for all three variables can provide insight into labor market flexibility across countries and time periods.

Short-term transmission mechanisms between output and the labor markets

The reasoning derived from the unemployment link can be readily applied to employment and wages. Okun postulated that each percentage point decrease in the unemployment rate is associated with an increase of 3 percent in output. This 3-to-1 ratio has come to be known as Okun’s Law, or more appropriately, Okun’s coefficient. The motivation of Okun’s paper was to establish the tremendous gains in output that would be obtained from reduced unemployment. The result was a big surprise. The finding that a 1 percent reduction of unemployment translated into a 3 percent increase in output violated the basic postulates of diminishing marginal returns to labor, and constant returns to scale. Surely if employment increased by 1 percent the effect in output would be smaller than, but close to, 1 percent. Recognizing this, Okun postulated the following transmission mechanisms, which were all reflected in the unemployment rate:

- A procyclical behavior of the labor force—that is, increased participation in the labor force during an upturn, and decreased participation during a downturn. There are two opposing forces on the size of the labor force during business cycles:
  (a) Substitution effects cause a procyclical labor force. During the upswing, wages rise, increasing the opportunity cost of leisure and drawing more participants, particularly teenagers and females, into the labor force. Conversely, in a downturn one observes a “discouraged worker” effect as people stop looking for work.
  (b) Income effects work toward a countercyclical labor force; that is, when the head of the family becomes unemployed, the rest of the household has to enter the labor force. This paper finds that contrary to Organisation for...
Economic Co-operation and Development (OECD) countries, several countries in Latin America exhibit countercyclical labor forces during the business cycles, indicating that income effects dominate, pointing to an important qualitative difference.

- Labor hoarding—that is, the average number of hours worked by each worker—moves procyclically, amplifying the fluctuations in unemployment. As output expands, firms prefer to increase the number of hours per worker and the number of shifts, rather than hiring workers, and vice versa.

- Labor productivity moves procyclically for reasons not entirely understood. Various mechanisms have been documented: (a) Labor is fixed to some degree because of overhead costs, contractual commitments, technological constraints that prevent frictionless hiring and firing, large transaction costs of layoffs, learning curves, and morale effects; (b) shifts occur in industrial composition toward more productive activities during periods of growth; (c) ladder climbing or the upgrading of labor takes place; (d) wage differentials narrow in the upswing; and (e) employment shows a lagged response to variations in output.

Okun’s coefficient assumes that all three effects change pari passu with the unemployment rate, and the combined effects are captured in the coefficient. Furthermore, Okun argued that because productivity and hours-per-worker data were notoriously unreliable, it was preferable to use a reliable statistic that embodied all of the changes above:

Ideally the measurement of potential output would appraise the various possible influences of high employment on labor input and productivity and evaluate the influences step by step... The basic technique I am reporting consists of a leap from unemployment rate to potential output... Strictly speaking, the leap requires the assumption that, whatever the influence of slack economic activity on average hours, labor force participation, and man-hour productivity, the magnitudes of all these effects are related to the unemployment rate. With this assumption, the unemployment rate can be viewed as a proxy variable for all the ways in which output is affected by idle resources. (Okun 1962, pp. 98–104)

The above quote has had a tremendous effect on the literature. Much effort in the literature for the following 30 years has been devoted to making this “huge leap from unemployment to output” a “step by step” process. Throughout the period, there has been some debate on the size of the coefficient. In general, estimates have tended to be higher than the 0.3 originally proposed by Okun, but they have been at most 0.45. With increasing quality of labor market statistics, including number of people employed and hours worked, there has been a strong consensus that in the United States, for each percentage point reduction in unemployment, the first two effects translate into increases in output of around 1.8 percent, implying that a little less than half is taken up by fluctuations in productivity. Efforts made to incorporate data on productivity explicitly are not conclusive owing to difficulties in the construction of potential output series.

Efforts to estimate Okun coefficients outside the United States have been limited to OECD countries. Results suggest that in the United States, output variations translate into larger fluctuations in unemployment when compared with Europe and Japan—in other words, the United States labor market is more flexible in quantities. The explanation for this result is not clear. A first line of argument centers on differences in the definition of unemployment across countries. However, the U.S. Bureau of Labor Statistics has constructed a compatible unemployment series for many OECD countries directly from survey data, but the results remain robust (that is, unchanged). Others argue that employment stability plays a larger role in Europe and Japan. Section III will show that as in Europe and Japan, output in Latin America translates into small fluctuations in unemployment.

The intuition for the structural relationship between output and employment requires a brief recapitulation of the definitions of employment and
unemployment. In a nutshell, variations in unemployment are usually accompanied by fluctuations in the size of the labor force. Thus, a rise of 1 percent in the employment rate does not always translate into a fall of 1 percent in the unemployment rate. Employment growth can be quite vigorous, but if a segment of the population decides to engage in job searching—women or teenagers, for example—unemployment may rise. In relation to the unemployment transmission mechanism, only the first channel does not apply because we are directly controlling for the number of workers. Procyclical hour variations and productivity still apply. Thus, we expect Okun employment coefficients to be higher than traditional unemployment Okun coefficients if the labor force fluctuates procyclically, as in OECD countries, or lower if it fluctuates countercyclically.

Macroeconomists since Adam Smith have been preoccupied with the cyclical relationship between real wages and output. Keynes wrote, in The General Theory, that “an increase in employment can only occur to the accompaniment of a decline in the rate of real wages.” However, the evidence suggests that, if anything, real wages are procyclical. The debate is far from settled, but the general consensus is that a real wage index for a country is procyclical in industrial economies. This paper finds a strong procyclical relationship in most of the Latin American countries in our sample.

Cyclical Estimation Procedures

The issue of the choice of dependent variable between output and employment-unemployment was first raised in a comment by Solow in 1973 (see Okun 1973) and has not been resolved. Conceptually and econometrically, the matter is difficult to settle because variables Granger cause each other (see Evans 1989). In a bivariate regression such as the one presented here, estimates differ only because the sum of horizontal rather than vertical squared residuals is minimized. Okun (1973) and Perry (1971) both point out that one gets slightly different results by interchanging dependent and independent variables. This paper takes output shocks as exogenous and measures the degree of adjustment in the labor market.

For the United States output and unemployment series, there is a long, involved, unsettled econometric debate on the appropriate econometric decomposition of the original series. Elements of the debate are briefly mentioned here to justify the techniques chosen. The disagreement centers on whether the series contains a unit root or is trend-stationary. If the series contains a unit root, a positive innovation leads to a revision of the forecast for all horizons, whereas if it is trend-stationary, the future path remains the same—that is, in the presence of a unit root in the series, a positive error in period t causes the entire series in levels to be shifted upward without the tendency to return to its trend. Traditionally, it was assumed that the logarithm of output deviated around a deterministic trend. Nelson and Plosser (1982) argued that output series contained a unit root, and therefore econometric models that assumed deviations around a deterministic trend were mis-specified (that is, they were yielding biased estimators). A similar debate exists in the decomposition of unemployment. Solutions include using vector autoregressors, cointegration techniques, and Kalman filters. This paper provides two alternatives: (a) Assume output is trend-stationary and “detrend the series” in order to avoid spurious correlation between the variables (the choice of detrending technique is discussed below); and (b) accept the unit root hypothesis, reject a cointegration relationship between the variables, and run the regressions in first differences.

Data

The figures in appendix 1 present plots of unemployment, inflation, real wages, output, and employment for each of the countries. In addition, the detailed sources of each of the series are presented. A constant price output series and consumer price indexes (CPIs) were obtained from various issues of the publication International Financial Statistics (IFS). There were numerous sources for information on employment, unemployment, and real wages. Real wages in industry were either taken directly or constructed from nominal wages
using the IFS CPI series. The series captured the broadest definition of industry obtained from surveys of formal establishments. Thus, they represent formal industrial wages.

With the exception of Guatemala, all of the employment and unemployment numbers in Latin America are products of urban employment surveys. This has two implications. First, rural statistics are not included, which does not allow the identification of rural-to-urban migration. (Moreover, in countries with large rural sectors, urban employment may have a small impact on the economy as a whole). Second, informal employment is included. Surveys typically ask whether a person has engaged in any productive activity, formal or informal, in the last few weeks. This fact prevents inferences of switches between formal and informal employment, leading to the issue of comparability of the definition of unemployment. A casual inspection reveals that statistical institutes in Latin America have similar surveys and follow the International Labour Office (ILO) guidelines. The better alternative is the Herculean task of constructing an employment-unemployment series directly from survey results.

The figures in appendix 1 show the great heterogeneity of the statistical properties of unemployment, real wages, inflation, and output and employment across countries in the sample. The log axes in the output and employment panels are such that the percentage increase is the same in both series. This allows inferences of productivity increases. The U.S. output series is well behaved when compared with output series in the rest of Latin America. Allowing for a break in 1973, it can be argued that output deviates around a trend (see endnote 21). It is obvious that a single deterministic trend is not the correct assumption for any of the Latin countries, and unit roots tests are period-sensitive. In most cases, there are at least three distinct growth regimes: (a) a relatively high and stable growth period in the 1960s and early 1970s, (b) a period of stagnation and instability since the debt crisis in the early 1980s, and (c) a period of renewed growth in the late 1980s until today. Only the United States and Panama show stable and positive productivity increases throughout the period.

**First Differences**

Okun’s (1962) initial method relied on first differences. Although the approach has given way to more sophisticated methods, this paper will show that improvements make a difference only when a series is “unstable.” The estimation equations are given by (3.1) below:

\[
\Delta U_{it} = \alpha_{it}^{ud} + \beta_{it}^{ud} \Delta Y_{it} + \epsilon_{it}^{ud}
\]

\[
\Delta E_{it} = \alpha_{it}^{ed} + \beta_{it}^{ed} \Delta Y_{it} + \epsilon_{it}^{ed}
\]

\[
\Delta W_{it} = \alpha_{it}^{wd} + \beta_{it}^{wd} \Delta Y_{it} + \epsilon_{it}^{wd}
\]

where \( \Delta U_{it}, \Delta E_{it}, \Delta W_{it}, \) and \( \Delta Y_{it} \) are, respectively, changes in percentage terms of unemployment, employment, real wages, and real output in country \( i \) at time \( t \). Most papers for the United States use quarterly data and introduce a lag structure. However, lags longer than four quarters are not significant. Not surprisingly, with annual data a single lag of output was discarded in most cases. For uniformity, the estimation did not incorporate a lag structure.

The advantages of using first differences to estimate cyclical variations are simplicity—errors suffer from little autocorrelation, and estimators remain consistent when the series contains a unit root with no cointegrating relationships. The Dickey-Fuller tests suggest the presence of unit roots for some of the output series in some period. However, the tests rejected cointegrating relationships among any of the labor market variables with respect to output, eliminating the need for an error correction term or a cointegration technique. The reason for the lack of a cointegrating relationship is that each of the variables possesses a different trend and the employment series has rejected the unit root hypothesis. As discussed in the section on long-term components, employment is expected to deviate around an exogenous trend equal to the growth of the economically active population. The trend in output is determined by the sum of employment growth, capital accumulation, and productivity gains. Thus, using a cointegrating technique required the assumption that variables followed a random
walk, but that the difference between their drifts was deterministic.

The disadvantages of using first differences are that (a) the technique eliminates “memory” in levels by construction in order to properly estimate series with unit roots, (b) insight into the long-term trends of each of the series is lost since one observes only the ratio of the trends in the series, and (c) the procedure implicitly assumes that the series is first difference-stationary in the relevant period. Simple inspection of the output series in appendix 1 rejects this assumption. Allowing for different intercepts in time periods corrects for this restriction, but the choice is arbitrary, and switches in long-term growth rates are discrete.

**Deterministic Detrending**

The basic procedure of using output trends and cyclical gaps was Okun’s (1962) second method, but this paper follows Weber’s (1995) exposition for clarity. The authors regress the natural logarithms of each series on a deterministic trend and use the residuals as cyclical components. The relationship is given by equation group 3.2 below:

\[
\begin{align*}
Y_t &= \alpha_1 + D_t + \theta^y_1 t + \theta^y_2 D_t + \nu_t \\
\epsilon_t &= \alpha_1 + D_t + \theta^y_1 t + \theta^y_2 D_t + \nu_t \\
\omega_t &= \alpha_1 + D_t + \theta^y_1 t + \theta^y_2 D_t + \nu_t
\end{align*}
\]

where a lower case denotes the natural logarithm of the series, \( t \) is a time trend, and \( \theta^y_1, \theta^y_2 \), and \( \theta^\omega_2 \) are long-term growth rates for output, employment, and real wages, respectively. The inclusion of dummies for changes in slopes and intercepts is crucial for some of the countries in Latin America to avoid misinterpretation of the residuals.28

“Trend” unemployment is constructed by calculating the unconditional mean, as shown by equation 3.3:

\[
u_t = \theta^u_1 + \theta^u_2 D_t + \nu_t
\]

where \( \theta^u_1 \) is the average rate of unemployment and \( D_t \) is a dummy variable, which allows for changes in the natural rate of unemployment. Okun, as well as other authors, postulated an arbitrary natural rate of unemployment—namely, 4 percent. However, choosing an arbitrary natural unemployment rate across countries seems ill-advised and calculating a “natural” rate of unemployment using a concept such as a NAIRU is well beyond the scope of this exercise.

Cyclical components are obtained by subtracting the fitted trend values from the original series, as demonstrated by equation group 3.4:

\[
\begin{align*}
y_t' &= y_t - y_t^t \\
\epsilon_t' &= \epsilon_t - \epsilon_t^t \\
\omega_t' &= \omega_t - \omega_t^t
\end{align*}
\]

where \( y_t', \epsilon_t', \omega_t' \) and \( y_t^t \) are the fitted values from equations 3.2 and 3.3, respectively.

The static ordinary least squares (OLS) Okun coefficients are given by regressing the cyclical components, as shown by (3.5):

\[
\begin{align*}
u_t' &= \beta^y_1 y_t^t \\
\epsilon_t' &= \beta^y_2 y_t^t \\
\omega_t' &= \beta^\omega_2 y_t^t
\end{align*}
\]

where \( \beta^y_1, \beta^y_2, \beta^\omega_2 \) are our second set of Okun coefficients.

A technical disadvantage of this approach is that if the series contains unit roots, deterministic detrending leads to inconsistent estimators. In practical terms, deterministic detrending poses two major setbacks—estimates are extremely period-sensitive, and it seems unreasonable to assume that long-term growth rates change abruptly and discretely.29 Given growth stability in the United States and the other OECD countries, deterministic detrending was the most popular technique used to estimate Okun’s coefficient. For unemployment, it is worth noting that even in the case of postwar United States, authors have found it necessary to allow for at least a one-time break in the natural...
rate (Evans 1989; Perron 1988; Weber 1995). For Latin American countries each of the growth regimes was allowed to have a different natural unemployment rate. The procedure is admittedly arbitrary, and results are available on request.

Since the series converges to a deterministic trend, the estimation process has the advantage that it has “memory” in levels; that is, a large deviation from its trend today results in a return to trend in the future. Therefore, the interpretation is more in accord with business cycle theories. Moreover, insight into the long-term trend of the series is gained.

**Using the Hodrick-Prescott Filter**

Hodrick and Prescott (1997) proposed an econometric procedure for “representing a time series as the sum of a smoothly varying trend component and a cyclical component.” The trend component is the sum of the squares of its second difference and the cyclical components are deviations from the trend component. The regression ran uses the cyclical component from the HP decomposition in equations 3.5, where Okun coefficients are given by betas. There are certain advantages to using the HP filter, three of which are as follows. First, it is not period-sensitive and thus there is little arbitrariness. Second, long-term trends vary smoothly over time, which is more intuitively appealing. And third, like deterministic detrending, regressions have level “memory,” and deviations from trend can readily be interpreted as business cycles. The procedure is widely used, but not without criticism. Harvey (1992) calls it “making the same mistake [as linear detrending] but in a more sophisticated way.” He proposes Kalman filters as an alternative. The biggest disadvantage of using the HP filter, as opposed to the Kalman filter, for example, is that it does not “solve” the nonstationary nature of the data and may lead to inconsistent estimators.

**Cyclical Results: Interpretation of Coefficients and General Discussion**

Results for the sample independent of the estimation process are (a) Latin American labor markets adjust to output shocks dramatically more through adjustment in real wages than U.S. labor markets, as reflected in larger Okun ratios; (b) conversely, Latin American economies tend to have lower-quantity responses to output both in terms of unemployment and employment than the United States; and (c) as inflation falls, output shocks are absorbed less through real wages, and there is a tendency for larger unemployment-employment responses.

Given the period-sensitivity of the computation of Okun coefficients, 10-year rolling regressions were constructed. Figures 3.1.a through 3.1.o present results for unemployment, employment, and wages, respectively, using the HP filter. Each coefficient in the figures represents the effect of a 1 percentage point output deviation from trend on employment, real wages, or the unemployment rate in the previous 10 years. That is, the Okun coefficient for 1971 is the result of an OLS regression using the 1961–71 sample, the coefficient for 1972 represents data for 1962–72, and so forth. Therefore, changes in the coefficients from one year to the next can be interpreted as innovations of the year incorporated. For example, the 1993 Chilean unemployment Okun coefficient dropped with respect to 1992 because the Chilean economy grew close to 10 percent that year and the country had reached full employment. If the 1993 observation were omitted, the coefficients would continue to be around the –0.5 previously reached, instead of the –0.3 reported. Coefficients capture the cyclical response for the previous 10 years; that is, they have a 10-year memory. Though each regression contained only 11 observations, the coefficients are precise, the explanatory power of the regressions is high, and each Okun coefficient computed covers a 10-year period, which is a long time for these studies. Standard errors for the United States are one-tenth the size of the employment and unemployment coefficients. Table A.2.1 shows regression results for the last window in each of the regressions.

Labor markets in Latin America adjust to output shocks predominantly through adjustments in real wages, as evidenced by large Okun ratios (see figures 3.1.a, d, g, j, m). With the exceptions of Brazil, Colombia, and Panama, the price-adjusting ability of Latin American labor markets is greater
and more volatile than that of the U.S. labor market. Okun ratios greater than 1 indicate that output fluctuations magnify wage responses in Argentina, Bolivia, Chile, Costa Rica, Mexico, Peru, Uruguay, and Venezuela. The transmission mechanism is that inflation allows for rapid real-wage adjustments through less-than-full nominal wage indexation. The observation corroborates the fact that output shocks in Latin America place a large burden on salaried employees rather than creating unemployment.

Unemployment and employment Okun coefficients in figures 3.1.b, c, e, f, h, i, k, l, n, and o indicate large and constant quantity responses of the U.S. labor market to cyclical output shocks when compared with any country in Latin America. A 1 percent output shock in the United States translates into a reduction in unemployment of between 0.35 and 0.45 throughout the period with both estimation techniques. In Latin America, with the possible exception of Chile and Bolivia, employment and unemployment Okun coefficients are lower and more volatile. Table 3.1 shows that the quantity adjustment ability of labor markets in Latin America is closer to estimates obtained for Europe and Japan. It is ironic that “Okun’s 1/3 Law” is only a law in the United States, and that in the rest of the world the unemployment and employment response to output shocks is lower and more volatile. The fact that in the United States unemployment and employment are more responsive to output does not necessarily mean that the U.S. labor market is more flexible or more efficient than others. If real wages were perfectly flexible, then unemployment would never fluctuate. Hamada and Kurosaka (1984) have argued that cultural reasons in Japan allow for greater wage flexibility in exchange for employment stability.

**Figure 3.1**

Ten-Year Rolling Wage, Employment, and Unemployment Okun Ratios: The Exception

a. Ten-Year Rolling Wage Okun Coefficients: Argentina, Bolivia, Chile, Costa Rica, Peru, and the United States (HP50)
b. Ten-Year Rolling Employment Okun Coefficients:
Argentina, Bolivia, Chile, Costa Rica, Peru, and the United States (HP50)

```
- USEI11
- ARED111
- BOE11
- CHES11
- CRRE11
- PEED111
```

```
```

```
   0.9 - USEI11
   0.8 ARED111
   0.7 CHES11
   0.2
   0.1
   0
```

```
c. Ten-Year Rolling Unemployment Okun Coefficients:
Argentina, Bolivia, Chile, Costa Rica, Peru, and the United States (HP50)

```
- US55
- ARIFS55
- BO55
- CHDOM55
- CR55
- peceo55
```

```
-0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0
```

```
```
d. Ten-Year Rolling Wage Okun Coefficients:
Brazil, Venezuela, and the United States (HP50)

![Graph showing wage Okun coefficients over time for Brazil, Venezuela, and the United States (HP50).]

e. Ten-Year Rolling Employment Okun Coefficients:
Brazil, Venezuela, and the United States (HP50)

![Graph showing employment Okun coefficients over time for Brazil, Venezuela, and the United States (HP50).]
f. Ten-Year Rolling Unemployment Okun Coefficients: Brazil, Venezuela, and the United States (HP50)

![Graph showing ten-year rolling unemployment Okun coefficients for Brazil, Venezuela, and the United States.]

- US55
- BR55
- VEDOM


-0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0


3 2.5 2 1.5 1.0 0.5 0

g. Ten-Year Rolling Wage Okun Coefficients: Mexico and the United States (HP50)

![Graph showing ten-year rolling wage Okun coefficients for Mexico and the United States.]

- USWCI55
- MXWCI55

h. Ten-Year Rolling Employment Okun Coefficients: Mexico and the United States (HP50)

i. Ten-Year Rolling Unemployment Okun Coefficients: Mexico and the United States (HP50)
j. Ten-Year Rolling Wage Okun Coefficients:
Colombia, Panama, Uruguay, and the United States (HP50)

k. Ten-Year Rolling Unemployment Okun Coefficients:
Colombia, Panama, Uruguay, and the United States (HP50)
I. Ten-Year Rolling Employment Okun Coefficients: Colombia, Panama, Uruguay, and the United States (HP50)

[Graph showing employment Okun coefficients for various countries over time]

m. Ten-Year Rolling Wage Okun Coefficients: Guatemala and the United States (HP50)

[Graph showing wage Okun coefficients for Guatemala and the United States over time]
n. Ten-Year Rolling Employment Okun Coefficients: Guatemala and the United States (HP50)

o. Ten-Year Rolling Unemployment Okun Coefficients: Guatemala and the United States (HP50)
In a previous section this paper argued that employment Okun coefficients were expected to be larger in absolute value than unemployment Okun coefficients because labor participation was procyclical. However, contrary to the situation in the United States and other OECD countries, in many Latin American countries income effects dominate and labor participation is not procyclical. In general, the employment Okun coefficient is higher than the unemployment Okun coefficient, indicating that substitution effects dominate in Argentina, Bolivia, Chile, Costa Rica, Panama, and Peru. Conversely, the employment Okun coefficient is lower in Colombia, Mexico, Uruguay, and Venezuela.

Before studying the empirical evidence, one would expect low-income countries and those with small unemployment safety nets to have a less procyclical labor force participation, because in a poor household a fall in real wages forces other members to work. However, the evidence does not support this proposition. Further investigation of the issue is warranted because it is an important behavioral difference between Latin American and Caribbean labor markets and OECD labor markets.

Figure 3.2 presents a scatter plot in which each point is the average of the last six Okun wage and unemployment coefficients from 10-year rolling windows. Compared with Latin America, the United States adjusts more through unemployment than through wages. Only Colombia has a comparable unemployment Okun coefficient, even though it is combined with countercyclical wages.

### Table 3.1 Unemployment Okun Coefficients for Some OECD Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Okun coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>0.20 to 0.25</td>
</tr>
<tr>
<td>Canada</td>
<td>0.48 to 0.56</td>
</tr>
<tr>
<td>France</td>
<td>0.25 to 0.38</td>
</tr>
<tr>
<td>Germany</td>
<td>0.21 to 0.52</td>
</tr>
<tr>
<td>Italy</td>
<td>0.28 to 0.14</td>
</tr>
<tr>
<td>Japan</td>
<td>0.036 to 0.05</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.15</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.28 to 0.48</td>
</tr>
</tbody>
</table>


Source: As noted in respective notes above.
One could argue that it is the combination of higher levels of inflation and populist governments counteracting output fluctuations by creating employment in the 1970s that caused large wage and small unemployment responses to output fluctuations.

Figure 3.2 also shows that there is a downward sloping relationship, indicating a certain degree of substitution between the wage and unemployment adjustment channels. It is interesting that the wage Okun coefficient in the United States is also around 0.5—in other words, a 1 percent output shock translates into an equal change of 0.5 percent in the real wage, and a 0.5 percent change in employment (and a 0.35 percent change in unemployment in the opposite direction). Given the similarity in the employment and unemployment responses among countries in Latin America and OECD countries other than the United States, it would be interesting to compute wage Okun coefficients to compare quantity and price flexibility simultaneously, and make an assessment of alternative flexibility combinations in labor markets for Latin America and the rest of the OECD countries.

Price Stabilization and the Flexibility of Wages, Unemployment, and Employment: Wage Stability and the Expense of Employment Uncertainty

The null hypothesis is that in periods of high inflation, shocks are absorbed through changes in real wages, as nominal wages fail to adjust fully to a change in the price level. As inflation declines, this mechanism disappears and employers are forced to cut workers or close altogether. This result can be easily obtained from any number of staggered wage contract models (see Fischer 1977 and Taylor 1979). Moreover, some authors (Arkelof, Dickens, and Perry 1996) have cited real-wage adjustments as one of the few benefits of inflation.

From the 13-country Latin American sample, the 7 countries that experienced high inflation levels with the launch date of their last successful stabilizations are Argentina (1991), Bolivia (1985–86), Brazil (1994), Chile (1974 and 1982), Costa Rica (1983–84), Mexico (1988), and Peru (1992). Brazil and Venezuela present counterexamples that add statistical power to our hypothesis because Brazil experienced rising inflation until 1994, and Venezuela has been experiencing increasing inflation since 1986. Unfortunately, for Brazil we have only one observation after stabilization. In five of the six countries that implemented price stabilization programs, there was a decrease in the degree of wage response to output fluctuations supporting the null hypothesis. Conversely, there was an increase in the employment Okun ratios in five of the six countries, and there was an increase in the unemployment Okun ratios in four of the six countries.

Argentina, Bolivia, and Chile present the clearest cases. Inflation in Argentina rose from 20 percent in 1974 to hyperinflationary levels in 1992. The wage Okun coefficient rose steadily throughout the period until 1985, reaching almost 3, indicating a considerable ability of the labor market to absorb shocks through real-wage adjustments. An interesting development is that in 1987, with rampant inflation, the wage coefficient fell to 1.5 and stabilized there, signaling greater wage indexation in a high-inflation regime. Finally, with the implementation of the currency board in 1992, the coefficient gradually fell to 0.7, approaching the U.S. value of 0.5. Bolivia’s case mimics Argentina’s. The wage Okun coefficient increased as inflation rose until 1987, reaching a high of 3.5 that year. Subsequently, the coefficient fell to close to 2 (still a high level) as inflation fell to around 7 percent in 1996. Chile’s coefficient has dropped steadily since the late 1970s to around 0.7 in 1996. The coefficient fell despite slow growth and a flareup in inflation during the debt crisis.

Peru’s and Costa Rica’s cases are not as clear as the previous ones. Inflation rose in Peru from 1974 onward, surpassed 50 percent per year since 1982, and had hyperinflationary levels from 1988 until 1992, when price stability was regained. Like Argentina and Bolivia, the wage Okun coefficient rose until 1979. Again, as in Argentina, the trend downward began in 1978 while inflation was “only” 60 percent and rising, indicating another episode of increased wage indexation. An anomaly is that there has been no reduction in the wage-
adjustment mechanism since stabilization. This may be reconciled noting that there was a massive influx of workers into the labor force after the long stagnation period, which overrode cyclical fluctuations in the real wage (see the employment discussion below). Costa Rica never experienced hyperinflation and the wage Okun ratios diminished only gradually from 1983 until 1992. In 1993 and 1994 wage Okun ratios fell abruptly as Costa Rica entered a vigorous but short-lived 3-year economic expansion fueled by favorable external conditions—the fruit of structural reforms and a tourism boom. The expansion was not reflected in more than proportional increases in real wages. In Costa Rica, small variations in output were magnified in fluctuations in real wages, but for larger swings the relationship changed.

The Mexican case presents an interesting anomaly. The wage Okun ratio continues to increase well past the launch of the stabilization plan, "El Pacto," in 1988, and the end of high inflation (see figure 3.1g). The observation can be understood in light of the active role played by organized labor in Mexico's concerted negotiations during El Pacto. As a result, real wages responded to the economic upswing and increased during the stabilization period. The wage Okun ratio fell from 1992 onward as market forces began to overtake the power of the El Pacto negotiations. Compared with the rest of Latin America, wage flexibility in Mexico continues to be high, with an Okun ratio of 2, which is comparable to the ratio in Bolivia and Peru.

Labor market flexibility in the quantity dimension tended to increase in the six-country subsample. All six countries exhibit a rise in the employment Okun coefficients after price stabilization. Figure 3.1 reveals that only Mexico and Peru do not show an increase in unemployment Okun ratios. It could be argued that countries with smaller increases in the quantity channel after a fall in the wage Okun ratios are perceived as having inflexible labor markets. As inflation fell, the wage-adjusting ability disappeared and a restrictive labor code has prevented fluctuations in the quantity variables.

Between 1978 and 1991 in Argentina there was a steady decline in the unemployment Okun coefficient, and there was a small increase under both specifications after 1991, when the currency board was instituted. The fall in the wage Okun coefficient, coupled with a small rise in the employment and unemployment coefficients, corroborates the common perception of an inflexible labor market in Argentina.

Bolivia's employment Okun coefficients show an increase from about 0.5 in 1985 to almost 0.7 in 1989, surpassing the United States, falling to 0.5 in the early 1990s before climbing to above 0.8 in 1996. The results suggest that stabilization is associated with the initial climb, but that the wave of structural reforms begun in 1990 also contributed to a larger quantity transmission channel. Results for unemployment Okun ratios are puzzling because they are positive, indicating that unemployment is procyclical. Appendix 2 shows the results using first differences, and they are slightly countercyclical. Both specifications show increased sensitivity of unemployment to output since inflation was brought under control in 1987.

Chile presents an excellent example of a continuous increase in the ability of labor markets to absorb shocks through quantities. The employment Okun coefficient is smaller than 0.3 and rises to almost 0.8, and the unemployment Okun coefficient is smaller than 0.1 and rises to almost 0.5, approaching the quantity adjustment flexibility exhibited in the United States. Results corroborate conventional wisdom that Chilean labor markets are flexible. Note that this result may not be entirely desirable. Output shocks have caused large swings in unemployment, which hovered at around 6 percent throughout the 1960s, and rose to 22 percent in 1982 before falling to 6 percent in 1992. Real wages in the industrial sector started to increase in 1976 while unemployment was still rising, indicating large productivity increases.

The combination of a very open wage channel with a relatively open quantity channel corroborates Costa Rica's open labor market reputation. Unfortunately, there is not enough data to analyze the actual inflationary period of the early 1980s. Employment and unemployment Okun ratios exhibit small, steady increases from 1983 to 1992, as the price channel was slowly closing. There is a marked increase in the Okun ratios for employment in 1995 and for unemployment in 1996. The
explanation is that the downturn was not reflected in lower real wages during 1994–96, and firms had to start laying off workers.

Peru's quantity channel has widened since stabilization, but remains low—higher only than Argentina's. Figure 3.1.b shows that employment Okun ratios have increased since 1990. In the context of the commonly held view that postreform growth is not creating employment, the result suggests that Peru's growth experience is not translating into employment creation relative to the rest of Latin America, but that the situation is improving relative to past performance. Unemployment Okun ratios have not increased. The result indicates vigorous cyclical employment creation dampened by labor force participation fluctuation. This is consistent considering that the long economic stagnation in the 1980s created a reserve of workers who have continuously joined the labor force, overriding the employment creation that has taken place.

Given that there was no change in the wage channel in Mexico during stabilization, it is not surprising to find small increases in the employment and unemployment Okun ratios until after the crisis in 1995. Overall, the Mexican labor market has changed little despite variations in inflation. Today, it could still be characterized as flexible in the price sense but relatively inflexible in the quantity sense.

Venezuela and Brazil present good counterexamples of stabilizing countries. Venezuela possessed low levels of inflation until 1986, when it surpassed 20 percent. Inflation climbed over 100 percent in 1995. As a result, the price channel has become more open. Real wages in Venezuela were steadily countercyclical until 1987. As inflation began to rise, the wage Okun coefficient rose continuously to reach a high of 1.2 in 1996. Higher levels of inflation allowed shocks to be increasingly absorbed through adjustments in real wages. The unemployment Okun coefficient was low during the last stages of import substitution in the early 1980s, and climbed steadily until 1988. Since 1988 both the employment and unemployment Okun ratios fell as inflation rose. In short, the downturn is being translated into lower real wages and not unemployment, which may explain the lack of social unrest so far.

A rise in inflation in Brazil is also reflected in higher wage Okun ratios. In figure 3.1.d we note that the wages were almost neutral until 1988, when a steady increase began raising the ratio to above 1. It is not clear why wages only began to become more responsive to output shocks in 1988, even though inflation had surpassed 100 percent per year since the early 1980s. Unlike in Argentina, there are no signs of increased wage indexation in Brazil. Unfortunately, data on quantity variables permit estimating Okun ratios only since 1986. The employment Okun ratio shows low-quantity flexibility in 1986 and further declines since 1991. The unemployment coefficient is low but has a puzzling, slight upward trend.

Labor Market Flexibility in Countries without Price Stabilization

Since 1960 Colombia has possessed moderate and relatively stable levels of inflation. A strong case of a gradual labor market liberalization is reflected in figures 3.1.j, k, and l, which show a sustained increase in the unemployment Okun ratio from about 0.1 in 1983 to over 0.6 in the early 1990s. Once again the evolution shows an import-substitution- and employment-oriented government in the late 1970s giving way to a labor market that absorbs shocks more through fluctuations in quantities. Real wages present a puzzle. Figure 3.1.j shows that from 1986 until 1994 wage Okun ratios fell from a moderate 0.75 level to countercyclical levels. Without further knowledge of the history of the country the result is difficult to interpret.

Uruguay has had even lower levels of inflation than Colombia. In contrast, quantity flexibility is maintained constant at best. The unemployment Okun ratio remained close to 0.3 from 1983 to 1992 when it began to drop, reaching 0.2 in 1996. It is puzzling that the employment Okun ratio is lower than the unemployment ratio, given the high level of gross domestic product (GDP) per capita in Uruguay. One would have expected substitution effects to dominate in this case. Moreover, it is difficult to interpret constantly negative employment coefficients since 1983.
Panama’s unique position, with the U.S. dollar as its official currency, provides an interesting contrast to the United States itself. On the one hand, cyclical relationships are steadier than they are in its Latin American counterparts, and approach U.S. estimates. On the other hand, labor markets in Panama are extremely rigid. In 1995, a 1 percent negative shock in output translated into about a 0.2 percent fall in wages, a rise in unemployment of 0.1 percent, and a fall in employment of 0.18 percent. In the United States, the same shock would produce a 0.45 fall in real wages, a 0.4 rise in unemployment, and a 0.7 percent rise in employment. Therefore, low quantity and price flexibility in labor markets corroborate the commonly held view that a major development obstacle in Panama is the inability to carry out labor market reform.

There have been some important developments in Panama’s labor markets since 1995, and the estimation results reflect them. In 1972 a highly restrictive labor code was approved. The unemployment coefficient shifted from 0.25 to a procyclical 0.1 in 1974. As employers learned to circumvent the code, the coefficient turned countercyclical again and started increasing. The first labor reform in the late 1980s was assimilated slowly throughout the period. The interesting development was in 1995, when the Balladares administration passed a labor code revision that most people considered far too modest. The unemployment Okun coefficient in first differences jumped from 0.14 to 0.29 at a time when output growth was a modest 3 percent. The employment and wage Okun coefficients show similar patterns. In short, although the labor code in Panama may still be restrictive, it has significantly improved the quantity and price-adjusting channels since 1995.

Guatemala reached a cease-fire agreement in its civil war in 1984 and signed final peace accords in 1992. With the caveat that the employment and unemployment numbers were obtained from the country’s social security agency as opposed to a survey, the employment-unemployment Okun ratios are larger than in the United States. The result is intuitive because the data reflect formal employment. Therefore, in addition to the transmission channels discussed above, there is an additional boost from the switch from the informal to the formal sector during an upswing, and vice versa.

This section has shown strong support for the null hypothesis that lower inflation reduces the real-wage-adjusting ability of labor markets to absorb shocks. The above has forced countries to absorb shocks through employment and unemployment (that is, through quantities) making labor restrictions on hiring and firing binding. Table 3.2 summarizes the results. The evolution of Okun ratios is not uniform and does not exhibit an inverse relationship between quantity and price coefficients. Therefore, only large fluctuations in inflation cause these results to emerge so clearly.

| Table 3.2 Summary of Cyclical Results Based on Okun Ratios |
|---------------------------------|----------------|----------------|----------------|
| **Country**                     | **Cyclical wage flexibility** | **Cyclical employment flexibility** | **Cyclical unemployment flexibility** |
| Stabilizing countries           |                |                |                |
| Null hypothesis                 | Fell           | Increase       | Increase       |
| Argentina                       | Fell           | Slight increase| Slight increase|
| Bolivia                         | Fell           | Increase       | Increase       |
| Chile                           | Fell           | Increase       | Increase       |
| Costa Rica                      | Slight fall    | Increase       | Slight increase|
| Mexico                          | Increase       | Slight increase| Slight increase|
| Peru                            | Fell           |                |                |
| Counterexamples                 |                |                |                |
| Null hypothesis                 | Increase       | Fell           | Fall           |
| Brazil                          | Increase       | Fell           | Steady         |
| Venezuela                       | Increase       | Fell           |                |
| Rest of the sample              |                |                |                |
| Colombia                        | Unsteady       | Fell           |                |
| Guatemala                       | Unsteady       |                |                |
| Panama                          | Steady         | Increase       |                |
| Uruguay                         | Increase       |                |                |

Source: Results from the paper.
The individual evolution of ratios depends not only on labor market reforms, but on any structural reform that affects the transmission mechanisms between output and the labor market. As an avenue for further research, the estimated Okun ratios lend themselves naturally to carrying a panel data analysis to formally test the effects of inflation on the Okun ratios and to expand the sample. Similarly, Okun ratios can be used as dependent variables to be explained by labor market policy indexes found in the literature (see Marquez and Pages-Serra 1998).
THIS SECTION PRESENTS a simple growth accounting exercise to establish long-term relationships between employment and output.  

AN ACCOUNTING FRAMEWORK

Begin by assuming a standard production function where output is a function of labor, capital, and technical change, \( Y = f(L, K, t) \). Labor growth rate is given exogenously by the growth rate of the working-age population. In countries going through a demographic transition, as is the case in most of Latin America, labor force growth can differ significantly from total population growth. Assuming unemployment in the long term is stationary, long-term employment growth has to equal the exogenous labor force growth.

In this framework, output per worker can increase due to more capital (physical and human) per worker, or to technical improvements. Solow (1957), and the entire growth literature have shown that despite controlling for capital in the long term, increases in employment translate to larger-than-proportional increases in output because of productivity improvements. This translates into a steeper slope of the log output series when compared with employment. Changes in the vertical distance between these two schedules can be explained as changes in the capital stock per worker and total factor productivity.

The figures in appendix 1 show that the United States presents a textbook case of the growth model. The log of employment deviates from a deterministic trend that remains constant. Similarly, the log of output deviates from a deterministic trend that requires “only” one break in 1973. In general, the long-term employment elasticity of output is calculated as the ratio of the slopes of the log series. As argued in section III, neither the employment nor output series in Latin America appears to be stationary around a deterministic trend. The HP decomposition carried out in section III permits using the permanent components of the series as proxies for long-term output and employment. In other words, the permanent components of the series could be thought of as the deterministic trend from which the series deviates. The decomposition creates a permanent component for each year, allowing the calculation of the long-term employment elasticity of output every year, which is an oxymoron called the “instantaneous long-term employment elasticity of output.”
The computation involves calculating the slopes of the long-term log series at each point in time by taking differences, as shown by equation 4.1:

\[ \eta^p_{it} = \frac{\frac{\dot{Y}^p_{it}}{E^i_t}}{\frac{\dot{Y}^p_{i,t-1}}{E^i_{i,t-1}}} \]  (4.1)

where \( \dot{Y}^p_{it} \) and \( \dot{Y}^p_{i,t-1} \) are the permanent components, in logs, of the output and employment series, respectively. The methodology is uniform for all countries. The elasticity is interpreted as the percentage increase in output given by a 1 percentage point rise in employment.

A disadvantage of this methodology is that because of the volatility of output series, and the depth and duration of the debt crisis in Latin America, there are times when the permanent component of output and employment have negative slopes; that is, trend growth is negative. A negative long-term output slope combined with positive labor force growth results in negative elasticities, as in Argentina and Bolivia. A long-term labor force growth close to zero occurs when the slowdown is pronounced and population growth is not very high. Zero labor force growth poses a greater problem because it results in a zero in the denominator, implying that the elasticity is undefined. This was the case for Argentina in the late 1970s and early 1990s, and for Mexico and Peru in the early 1980s, when the output elasticity of employment was unreasonably high.

As mentioned above, high output elasticity of employment is a desirable property, especially when caused by an increase in output. There is no doubt that long-term elasticities of output with respect to employment were expected to increase because of productivity gains as economies became more efficient with reform. Higher elasticities occurred in these countries because of higher output, not because of lower employment generation, which should how up as increasing unemployment. With the exception of Argentina, unemployment is not rising in any of the countries.

A related question is whether labor is being displaced by capital. The data allow us to determine the long-term labor share of output. A constant labor share of output implies that the increase in the difference between the growth rates of employment and output has been more than compensated for by an increase in wages. In logs, labor share of output for country \( i \) is given by equation 4.2:

\[ l^i = w^i - \dot{Y}^p_{it} \]  (4.2)

**Long-Term Results**

There are two results of stabilization: (a) poststabilization output growth creates fewer but better-paid new jobs than prestabilization output growth, and (b) wage earners are actually the winners because the labor share of national income increases. Figures 4.1.a through 4.1.f show the results of the instantaneous long-term elasticities and labor shares. For clarity, labor shares were arbitrarily normalized to equal 1 in 1990 for all countries. The output elasticity of employment for the United States fell from 2.5 in 1960 to almost 1 (constant returns to scale) in the mid-1970s before a steady recovery to 1.5 in 1996. The fall in productivity has been thoroughly documented, and although much has been attributed to the oil crisis, the slowdown is not entirely understood. The labor share of output has decreased a little over 20 percent since 1960. The result is consistent with the neoclassical paradigm in which an economy becomes more capital-intensive as it develops. However, this contrasts with findings from Latin America, especially after stabilization.

All six stabilization countries exhibit increases in the instantaneous long-term output elasticity of employment after stabilization. There is a U-shaped pattern similar to that of the United States, but the fall in productivity in this case occurred in the 1980s as a result of the debt crisis. For most countries there was a rise in output elasticity of employment in the late 1980s and early 1990s. As argued above, structural reforms were expected to be reflected in increases in labor productivity. In general, the development is desirable because it implies higher income per capita. Alternatively, the increase could be interpreted as growth, which is not being translated into employment in the same proportion as in the past. However, only Argentina—and to a lesser degree Peru—shows a fall in labor
Figure 4.1
Output Elasticity of Employment and Labor Shares of Output

a. Long-Term Output Elasticity of Employment for
Argentina, Bolivia, Chile, Costa Rica, Mexico, Peru, and the United States (HP5)

b. Long-Term Labor Share of Output for
Argentina, Bolivia, Chile, Costa Rica, Mexico, Peru, and the United States (HP5)
c. Long-Term Output Elasticity of Employment for Brazil, Venezuela, and the United States (HP5)

![Graph showing Long-Term Output Elasticity of Employment]

d. Long-Term Labor Share of Output for Brazil, Venezuela, and the United States (HP5)

![Graph showing Long-Term Labor Share of Output]
e. Long-Term Output Elasticity of Employment for Colombia, Guatemala, Panama, and the United States (HP5)

f. Long-Term Labor Share of Output for Colombia, Guatemala, Panama, Uruguay, and the United States (HP5)
shares of output after stabilization. This means that increases in wages are more than offsetting the increases in labor-substituting productivity. Brazil and Venezuela both show decreases in labor shares coinciding with the rise of inflation. Increases in labor shares due to structural reforms are an unexpected result, especially given the U.S. pattern of lower labor importance and the neoclassical prediction of increased capital intensity during the process of development. This issue needs to be studied further.

In Argentina the elasticity fell from around 2.5 in 1976 to small negative values during the debt crisis, before rising—gradually at first, but then strongly—to reach a high of 12! This coefficient is unreasonably high and is explained by a pronounced reduction in employment since 1994, which translated into a zero slope of the long-term employment series. The reduction in employment, compounded with stable real wages since 1990, is also reflected in a fall in the labor share of output from 1.1 in 1986 to about 0.7 in 1996. This means that labor has lost in the reform process despite strong increases in productivity, because of the fall in employment which is attributable to the rigidity of the real wage (see appendix 1).

Chile’s case presents evidence since the 1960s offering a success story of reforms. Output elasticity of employment was 1.5 in 1960, dropped to 0.5 in 1973, and climbed vigorously during price stabilization in the late 1970s. The rise was halted briefly during the debt crisis before resuming its upward trend, to reach the U.S. elasticity value of 1.5 in 1996. The result is impressive considering unemployment in Chile has fallen to 6 percent, indicating high output growth. Moreover, the labor share of output in Chile shows a continuous increase since 1960; however, a steeper increase in the importance of labor begins after 1976, when inflation fell. It is interesting that the labor share has increased steadily for 36 years in a country with capital accumulation.

The analysis for Peru is timely because the Fujimori administration is being criticized for embarking on reforms that are producing “jobless” growth. Peru did not recover from the debt crisis until 1990. The output elasticity of employment fell from 1974 until 1990. Since 1990, there has been an increase in the elasticity, signaling important productivity gains (or some degree of jobless growth). However, note that the coefficient reached only 0.87 in 1996. This is below the constant returns-to-scale threshold. Moreover, this is close to Mexico’s and much lower than Argentina’s, Chile’s, or the United States’. In short, although the coefficient has increased since the implementation of reforms, the elasticity is not high by any measure, and Peru’s output growth still translates into more-than-proportional increases in employment. The labor share has fallen precipitously and the reforms in 1990 have only managed to contain the fall. Critics are right to point out that labor is not participating enough in the benefits of the reform, but the fact is that the reforms have halted this fall. A word of caution is needed about the interpretation of the findings from Peru: The computation of real wages during the period of hyperinflation is unreliable.

Bolivia’s case is dramatic because there were large negative employment elasticities during hyperinflation, implying that output fell while employment grew in the years leading up to 1986. The productivity recovery was dramatic until 1989, but then seems to have tapered off. There are two alternative explanations: (a) Structural reforms in Bolivia were not begun until after 1990 and have not yet borne fruit; and (b) the employment series shows a steeper trend starting in 1991, perhaps signaling migration to the cities. The second explanation is more plausible when coupled with the fact that labor shares in Bolivia deteriorated from 1972 to 1986, and did not show a significant improvement until 1996. Stabilization and structural reforms in Bolivia have translated into higher labor productivity and real wages.

In Costa Rica real wages closely follow productivity gains. The output elasticity of employment fell from about 1.5 in 1976 to 0.57 in 1982 before climbing back to about 1.5 in 1990, and leveling thereafter. The labor share increased steadily until 1986 and leveled off along with the output elasticity of employment. This combination implies that real wages closely follow productivity gains.

Mexico presents an interesting contrast to the other reforming countries because the increase in the output elasticity of employment has been modest
but labor share has increased since the aggressive set of reforms began in 1988. The pattern of the output elasticity of employment is similar to Argentina's, but the elasticity's lowest value of 0.5 occurs until 1986, late in the debt crisis. The recovery is less pronounced, reaching a value of 0.9 in 1996, probably due to the fall in output in 1995. The implication is that postreform growth has been accompanied by strong employment creation. The labor share increased from 0.94 in 1987 to 1.13 in 1996, indicating that labor reaped a significant portion of the productivity gains. The result once again can be understood in the context of the importance of organized labor during the El Pacto negotiations.

Despite the fact that a successful stabilization was not launched in Brazil until 1994, the fall in the output elasticity of employment was reversed in 1990. The elasticity fell steadily from 1.5 in 1976 to almost 0.5 in 1990 before climbing back to about 1.2 in 1996. The labor share, however, fell from 1986 to 1996. The improvement in productivity, accompanied by a fall in labor share, is relevant because it is the only case of this improvement preceding price stabilization, indicating that lower inflation may be a necessary condition for improving labor shares. The fact that there was growth without a high-inflation environment and falling labor shares of output corroborates conventional wisdom that the worst adversary of labor welfare is not neoliberal reforms, but inflation.

Venezuela provides a good counterexample. The output elasticity of employment fell from about 1.2 in the early 1970s to almost zero in 1982 in the middle of the debt crisis. It climbed back to about 0.9 in 1990 and then fell to a low of 0.6 in 1996. The labor share rose despite the debt crisis. However, when inflation began to rise in 1985, the labor share fell almost 50 percent. The log series of output, employment, and wages shows that employment growth has remained constant but that output growth has slowed down—and that wages have taken the full burden of adjusting. Inflation has facilitated this adjustment. In short, lower growth in Venezuela in the second half of the 1980s has not translated into unemployment, but into lower real wages.

The framework can provide insight into non-stabilizing countries in our sample. Colombia's moderate inflation for the last 30 years translated into an output elasticity of employment that oscillated near 1 for most of the period. The labor share in Colombia has increased in an almost straight line since 1974. Both results indicate that in the long term, Colombia can be modeled as a Cobb-Douglas production function, with small, constant, labor-augmenting technical change.

Panama's unique full dollarization is a story of an overprotective labor code that has just been reversed in a significant way. Output elasticity was at a "healthy" level of 2, matching productivity gains in the United States in the 1960s. A highly restrictive labor code was approved in 1972, causing a steady decline in the elasticity of output with respect to employment. This trend continued until 1989, when the country began to grow again after the Noriega crisis and U.S. intervention. In terms of labor shares, the 1972 labor code had a detrimental effect on labor participation, indicating that employment protection was being more than offset by wage deterioration. This is a strong message for countries considering approving labor codes that overprotect employment. Not only will wages fall, but in the end the share of labor in output will be reduced.

Uruguay poses a difficult challenge for the methodology because the sign of the employment line changes twice during the relevant period. Strictly speaking, the function is not continuous at the point where the slope of employment approaches zero.

Guatemala's story makes a strong case for peace purely in terms of labor market benefits. The increase in the output elasticity of employment since peace was attained and general elections were held in November 1985 dwarfs the estimates for any other country in our sample. Although some of the most trying economic times were at the end of the decade, output continued to grow along with labor productivity. Labor share, by contrast, continued to fall until 1992, indicating that although productivity was rising, employment or real wages (or both) were not rising fast enough. This section has shown that for many countries that have undergone stabilization and structural reforms, growth has not translated into as much employment as the relationship during the 1980s would have predicted. However, low
employment productivity during the 1980s was an anomaly. Increases in productivity are desirable, especially when accompanied by rises in real wages that result in increases in labor shares. The labor sector as a whole has benefited from reforms even though each percentage increase in output has translated into less employment because of increased productivity.
CONCLUSIONS

THIS PAPER FOUND THAT real wage, employment, and unemployment Okun coefficients were good measures of labor market flexibility across countries and time, despite volatile growth as experienced in Latin America. Okun ratios provide a promising avenue of research to expand the country sample, but more important, to be used as performance indicators on the left-hand side of regressions that have labor market policies and institutions as explanatory variables.

Latin American economies adjust comparatively more through real wages than through employment or unemployment when compared with the U.S. economy. The quantity-adjusting channel in Latin America is closer to estimates in Europe and Japan. In the sample used, there appears to be some degree of substitution between quantity flexibility and wage flexibility. This paper postulates that lower inflation lowers wage flexibility. A formal test of the relationship and an expansion of the sample to include other OECD countries is left for future research.

In terms of the effects of price stabilization on transmission mechanisms, the paper finds strong support for the hypothesis that stabilization forced a switch in the pattern of adjustments to output shocks from fluctuations in real wages toward variations in employment and unemployment. The case of rising inflation in Brazil and Venezuela corroborates this paper's hypothesis and adds power to its results. Lower inflation and reforms have increased both wage stability and employment uncertainty. Countries in which labor codes have permitted variations in employment and unemployment are perceived as having flexible labor markets.

Regarding the subject of long-term trends, this paper found that long-term output elasticity with respect to employment increased for most of the countries in our sample, supporting the claim that, proportionally, postreform output growth is not generating as much employment as it did in the 1980s. However, the trend in the 1980s was an anomaly. Moreover, the result is desirable because reforms were meant to, and did, translate into increased labor productivity. A more meaningful indicator of worker well-being is that labor shares increased in many of the reforming countries, indicating that labor is a net winner of the reform process.
Appendix I: Figures, Definitions, and Sources for Appendix I: Data Graphs, United States
Colombia

Unemployment Rate

Index of Real Wages in Manufacturing

Employment and Real Gross Domestic Product

Costa Rica

Unemployment Rate

Index of Real Wages in Manufacturing

Employment and Real Gross Domestic Product

- Real Wage
- Inflation

- Ln Employment
- Ln Real GDP
Paraguay

Unemployment Rate

Index of Real Wages

Employment and Real Gross Domestic Product

Perú

Unemployment Rate

Index of Real Wages in Manufacturing

Employment and Real Gross Domestic Product
Unemployment Rates


Chile Banco Central de Chile, Dirección de Estudios, Indicadores Económicos y Sociales, 1960–1985 and Boletín Mensual del Banco Central de Chile, several issues. Unemployment rate in Greater Santiago obtained from a household survey.

Colombia UN ECLAC. From 1990–96 the unemployment rate corresponds to seven metropolitan areas; from 1974–89 it corresponds to four metropolitan areas: Bogotá, Barranquilla, Medellín, and Cali. 1974–84: average for March, June, September, and December; 1985: average for March, July, September, and December; 1986: average for April, June, September, and December; 1987: average for March, July, and September.

Costa Rica UN ECLAC. National urban unemployment rate, April–October average; 1986: October average; 1976–84, average for March, July, and November. From 1987 onward the figures are not strictly comparable with the data for preceding years owing to methodological changes.

Ecuador UN ECLAC. Country total, official estimates. From 1986 onward, the unemployment rate is based on a household survey of Quito, Guayaquil, and Cuenca.

Guatemala Country total unemployment rate, official estimates.

Honduras 1968–78: ILO; the numbers were calculated using the number of unemployed from ILO, which are official estimates; these in turn were divided by the labor force from World Development Indicators (WDI). 1980–96: UN ECLAC. Unemployment rates are estimates for five cities; 1986: urban labor survey; 1987: March, Central District.

average; 1987: July average. 1997 is an average of first and second quarter of 1997 as published by INEGI in *Estadísticas Económicas, Indicadores de Empleo y Desempleo*.

**Panama**

Dirección de Estadística y Censo de Panamá, from a household survey.

UN ECLAC: National nonagricultural unemployment rate up to 1977. After 1977 the unemployment rate is from the metropolitan region. Unemployment rate for 1980 is from a population census of that year.

**Paraguay**

UN ECLAC: Unemployment rate for Asunción, Fernando de La Mora, Lambaré, and the urban areas of Luque and San Lorenzo, annual averages; 1981: first semester; 1985: average for November and December. After 1993 the data are national urban unemployment rates.

**Peru**

UN ECLAC: Unemployment rate of Metropolitan Lima; 1978: July–August average; 1979: August–September average; 1985: Official estimates. After 1995 the figures correspond to total urban unemployment. ILO.

**Uruguay**

UN ECLAC: Montevideo unemployment rate. Two-semester average until 1979; four-quarter average, thereafter except for 1987, in which the unemployment rate is the average of the first three quarters.

**Venezuela**

Oficina Central de Estadística e Informática (OCEI): Household survey.


**United States**

*Economic Report of the President 1997.*

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**Wages in Manufacturing**

**Argentina**

ILO. Wages in the manufacturing industry; skilled and unskilled wage earners.


**Bolivia**


**Brazil**

(Rio de Janeiro): Coase (1993). The average nominal wage for industry used to construct the real wage was the annual average of IBGE's monthly average salary for workers in industry. It refers to the average wages in industry in general, deflated by the CPI for Rio de Janeiro. UN ECLAC. Average wages in basic industry, deflated by CPI for Rio de Janeiro.

**Chile**

ILO. Wages of employees in manufacturing.

**Colombia**

ILO. Index of monthly earnings in manufacturing. It includes salaried employees.

Ecuador ILO.


Guatemala ILO. Wages of employees. Prior to 1974: Guatemala City. Establishments of five or more persons employed.

Mexico ILO. October of each year. Methodology revised in 1986. Bank of Mexico, from the Encuesta Industrial.

Panama 1961–84: ILO. Wages of employees. 1985–96: Estadísticas Panameña. Median of weekly salaries (in Balboas). The salaries are those of males in the metropolitan area. 1995 and 1996 were monthly; they were converted into weekly.

Paraguay UN ECLAC. Wages of manual workers in Asunción; average for June and December.

Peru ILO. Wages of employees in Lima. UN ECLAC. Wages of laborers in the private sector in the metropolitan area of Lima. Average for 12 months.

Uruguay ILO. Wages of employees. Index of average monthly wages in the private sector.


United States ILO. Private sector: production and construction workers and nonsupervisory employees.

**EMPLOYMENT**

Argentina Informe Económico No. 21, 1997, and Subsecretaria de Programación Macroeconómica. Greater Buenos Aires. 1997 is for the first semester, other years are average of two surveys. Total urban employment, Ministerio de Trabajo.

Bolivia ILO. Persons aged 10 years and older; civilian labor force employed in urban areas.

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>ILO. Persons aged 12 and older. Seven main cities of the country. September of each year. 1994–96: data are from Departamento Administrativo Nacional de Estadística (DANE).</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>ILO. Persons aged 12 years and older. Civilian labor force employed. July of each year. IICE (Instituto de Investigaciones de Ciencias Económicas). Dirección General de Estadísticas y Censos 1980–96. Data are from household surveys.</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Bank of Guatemala. Number of workers enrolled in the Guatemalan Social Security System. It includes banking, insurance, and public administration sectors.</td>
</tr>
<tr>
<td>Mexico</td>
<td>INEGI. Results from the Encuesta Nacional de Empleo Urbano (ENEU) for the 16 largest cities.</td>
</tr>
<tr>
<td>Panama</td>
<td>ILO. Persons aged 15 and older. August of each year.</td>
</tr>
<tr>
<td>Peru</td>
<td>Metropolitan Lima. 1994–96 were calculated with data obtained also from Ministerio de Trabajo y Promoción Social, Dirección General de Empleo y Formación Profesional (Compendio Estadístico 1990–91). Based on a survey of establishments with 100 or more employees; and Boletin del Banco Central de Reserva del Perú.</td>
</tr>
<tr>
<td>Uruguay</td>
<td>ILO. Urban employment. Includes professional army; excludes compulsory military service.</td>
</tr>
<tr>
<td>Venezuela</td>
<td>Central Bank of Venezuela. OCEI household sample survey.</td>
</tr>
<tr>
<td>United States</td>
<td>ILO. Persons aged 16 and older. Civilian labor force employed.</td>
</tr>
</tbody>
</table>
## APPENDIX 2: REGRESSION RESULTS FOR THE LAST TEN-YEAR WINDOW—WAGE, EMPLOYMENT, AND UNEMPLOYMENT OKUN COEFFICIENTS

### Table A.2.1

Regression Results for the Last Ten-Year Window
Rolling Wage, Unemployment, and Employment Okun Coefficients

<table>
<thead>
<tr>
<th>Country</th>
<th>Unemployment First differences HP filter (y-50, u=50)</th>
<th>Employment First differences HP filter (y-50, u=50)</th>
<th>Wages First differences HP filter (y=50, u=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (SE)</td>
<td>(R²)</td>
<td>Coefficient (SE)</td>
</tr>
<tr>
<td>Argentina</td>
<td>-0.21</td>
<td>0.12</td>
<td>0.26</td>
</tr>
<tr>
<td>Bolivia</td>
<td>-0.38</td>
<td>0.37</td>
<td>0.11</td>
</tr>
<tr>
<td>Brazil</td>
<td>-0.19</td>
<td>0.04</td>
<td>0.75</td>
</tr>
<tr>
<td>Chile</td>
<td>-0.38</td>
<td>0.25</td>
<td>0.07</td>
</tr>
<tr>
<td>Colombia</td>
<td>-0.39</td>
<td>0.26</td>
<td>0.20</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>-0.35</td>
<td>0.15</td>
<td>0.39</td>
</tr>
<tr>
<td>Guatemala</td>
<td>-0.75</td>
<td>0.35</td>
<td>0.36</td>
</tr>
<tr>
<td>Mexico</td>
<td>-0.22</td>
<td>0.05</td>
<td>0.66</td>
</tr>
<tr>
<td>Panama</td>
<td>-0.29</td>
<td>0.03</td>
<td>0.93</td>
</tr>
<tr>
<td>Peru</td>
<td>-0.18</td>
<td>0.08</td>
<td>0.38</td>
</tr>
<tr>
<td>Uruguay</td>
<td>-0.2</td>
<td>0.10</td>
<td>0.20</td>
</tr>
<tr>
<td>Venezuela</td>
<td>-0.73</td>
<td>0.10</td>
<td>0.41</td>
</tr>
<tr>
<td>United States</td>
<td>-0.37</td>
<td>0.11</td>
<td>0.59</td>
</tr>
</tbody>
</table>
Figure A.2.a
Ten-Year Rolling Wage Okun Coefficients:
Argentina, Bolivia, Chile, Costa Rica, Peru, and the United States (Differences)

Figure A.2.b
Ten-Year Rolling Employment Okun Coefficients:
Argentina, Bolivia, Chile, Costa Rica, Peru, and the United States (Differences)
Figure A.2.c
Ten-Year Rolling Unemployment Okun Coefficients:
Argentina, Bolivia, Chile, Costa Rica, Peru, and the United States (Differences)

Figure A.2.d
Ten-Year Rolling Wage Okun Coefficients:
Brazil, Venezuela, and the United States (Differences)
REVISITING AND EXPANDING OKUN COEFFICIENTS

Figure A.2.e
Ten-Year Rolling Employment Okun Coefficients: Brazil, Venezuela, and the United States (Differences)

Figure A.2.f
Ten-Year Rolling Unemployment Okun Coefficients: Brazil, Venezuela, and the United States (Differences)
Figure A.2.g
Ten-Year Rolling Wage Okun Coefficients:
Mexico and the United States (Differences)

Figure A.2.h
Ten-Year Rolling Employment Okun Coefficients:
Mexico and the United States (Differences)
**Figure A.2.i**

Ten-Year Rolling Unemployment Okun Coefficients:
Mexico and the United States (Differences)

**Figure A.2.j**

Ten-Year Rolling Wage Okun Coefficients:
Colombia, Panama, Uruguay, and the United States (Differences)
Figure A.2.k
Ten-Year Rolling Employment Okun Coefficients:
Colombia, Panama, Uruguay, and the United States (Differences)

Figure A.2.l
Ten-Year Rolling Unemployment Okun Coefficients:
Colombia, Panama, Uruguay, and the United States (Differences)
Figure A.2.m
Ten-Year Rolling Wage Okun Coefficients:
Guatemala and the United States (Differences)

USWIILO
GUWIILO

Figure A.2.n
Ten-Year Rolling Employment Okun Coefficients:
Guatemala and the United States (Differences)
Figure A.2.0
Ten-Year Rolling Unemployment Okun Coefficients: Guatemala and the United States (Differences)
NOTES

1 See Williamson (1995) for the accepted definition of “Washington Consensus.”

2 See Nickell (1997) for a recent review on this subject.

3 See the Journal of Economic Perspectives (fall 1997) for a review of this subject.

4 The literature has been split in following Okun’s original convention of reporting the coefficient as the change in output per percentage point of unemployment (that is, 3) versus its reciprocal, which indicates changes in unemployment caused by a percentage change in output (that is, 0.33). For clarity, and because we always have labor market variables on the left-hand side of the regression, we will use the second option. Thus, a larger coefficient indicates greater sensitivity of labor market indicators with respect to output.

5 All the transmission mechanisms were proposed by Okun in his 1962 and 1973 papers. To my knowledge, no one has proposed any new transmission mechanisms between these two variables.

6 This has been consistently documented not only in the United States but also in Japan and in the other OECD countries. See Kuh (1966), Perry (1971 and 1977), Okun (1973), Gordon (1984) for reviews, and Hamada and Kurosaka (1984), Knoester (1986), and Kaufman (1988) for documentation of a very strong effect in Japan and in Europe. For papers on labor force participation from a supply perspective, see Friedman (1962) and Knoester (1986). The U.S. Bureau of Labor Statistics has estimated that in a recession, for every 10 workers listed as unemployed above 4 percent, there exist 3 additional potential workers not actively seeking a job.


8 See endnote 5: All of the papers present procyclical hours worked. Moreover, Black and Russell (1969) and Thurow and Taylor (1966) review the evidence. Unfortuately, owing to the lack of reliable data on the hours worked in Latin America, evidence for these countries is scarce.

9 This was identified by Okun himself and documented in Okun (1973).


12 Haddy and Tolles (1957) wrote the seminal paper on wage differential narrowing with a small output gap. Okun (1973) provides the evidence.

13 The lack of a proper lag structure was first postulated by Kuh (1966). Improvements on the estimation techniques of the coefficient, especially separating a short-term from a long-term coefficient, have corroborated his assertion, but the effect is small.

14 See Perry (1971) and Gordon (1984) for reviews of the estimations up to that time.


17 See Sumner and Silver (1989) for more on this topic.

18 There is little debate that employment deviates around a slowly evolving trend exogenously determined by natural population growth.
Evans (1989) and Clark (1987) raised the point in the
Okun literature, but the seminal paper on the subject is

Even for the United States, for which various authors
suggest the introduction of a break in the slope coeffi-
cient, Banerjee and others (1993) have suggested that the
break varies if it is allowed to be determined endoge-

nously by the data.

Using a Kalman filter to decompose the series is left for
future research. Another notable omission from the esti-
mation techniques is a vector autoregression approach to
create the cyclical components of the series. The inter-
pretation of the cyclical components is not business cycles,
but how innovations in output are translated into innova-
tions in any of the labor market performance variables.

To my knowledge no one has computed Okun wage
ratios for either the United States or other OECD coun-
tries.

Estimates for first differences are presented in appen-
dix 1. The discussion concentrates on results from the
HP estimation because there are breaks in output and
wage trends even for 10-year windows. The HP proce-
dure is more appropriate because first differences
assumes a stationary growth trend.

Actually it is the sum of the innovation of the new
year plus the fluctuation from the year dropped.

This result is in line with the literature. See Gordon
(1984) for a review. He argues that the coefficient is 0.4
instead of 0.3, as Okun originally postulated.

In general, employment is procyclical while unemploy-
ment is countercyclical; thus the coefficients have oppo-
site signs. For clarity, I did not change the signs of either.

Maloney (1997) and Hernández Licona (1998) show
strong evidence of increased labor participation in Mex-
ico as real wages fall.

It is not clear why the wage Okun coefficient rose in
1987. Moreover, it is not clear why there was a rise in
1994.

The instability of the first difference coefficient is that
the break in output growth trend lasts until about 1983;
thus the estimation is biased.
Moreover, throughout the 1980s the country's economy did not grow at all.

I owe this suggestion to Jaime Saavedra who suggested that the fall in real wages in Peru was overestimated during that period. The fact that in first differences the sensitivity has been increasing since 1990 is attributable to a break in the growth trend in 1990.

Recall that fluctuations from year to year can be interpreted as innovations.

The point cannot be overemphasized that had the 1993 observation been dropped, the coefficient would have maintained 1992 levels. In other words, quantity adjusting is not that much lower today than it was in the early 1990s.

Appendix 1 presents the coefficients under first differences, and the increase in the coefficients is more pronounced.

Cyclical fluctuations are relatively unimportant compared with the fall in real wages. Unemployment dropped until 1990, aided by the fall in real wages.

The corresponding jump in using the HP estimation process is from 0.15 to 0.20. Moreover, an extension with preliminary data from 1997 indicates a further rise of the coefficients. The genesis of this paper was a discussion about the effectiveness of the labor reform. Some argued that since unemployment had not fallen, reforms were not effective; I argued that one had to look at growth performance.

Unemployment is not discussed because in the long term, unemployment should be stationary or exhibit small variations; that is, it cannot increase or decrease continuously. There has been a renewed debate on the level and stability of the natural rate, the NAIRU, in the United States. Estimation of the NAIRU for each of the countries is beyond the scope of this paper, particularly given the instability of prices in Latin America during the period. The Journal of Economic Perspectives (1997) dedicated an entire issue to this subject.

Okun coefficients are inherently cyclical measures; they are long-term estimates of the cyclical variations. They are not long-term elasticities between the variables. The point may seem obvious, but there has been some degree of confusion in the literature about the interpretation of Okun coefficients.

Note that in fluctuations in hours worked per worker, labor hoarding is no longer an issue. The reason is that unless there are permanent increases or decreases in the work week, the effect will simply be a temporary dampening of the effect of output on employment. Permanent changes in the work week will have one-time effects on output. In the long term, fluctuations in hours worked is simply measurement error.

A good exercise for further research is to determine how much of the increments in output per unit of employment is attributable to productivity, and how much to increases in capital per worker.

Although there are changes in the long-term slope of employment, most of the variation comes from changes in output growth. Inspection of the employment series in appendix 2 confirms this assertion. In addition, "true" long-term employment growth is inherently determined by population growth.

Martinez (1997) has argued that wage increases surpassed productivity gains in the period.

Brazil has grown vigorously since 1992. However, the fact that total employment decreased since 1990 makes one suspect the data. Various sources showed employment reduction in the 1990s.

There was some degree of social unrest since 1985 until the peace accords were signed in 1989, but militant activities were reduced in 1985.


