Working Paper No. 136

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

by

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June 2002

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The 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 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 via prices. Cyclical relationships are studied by constructing Okun coefficients for unemployment, employment, and wages using first differences and the cyclical component of a Hodrick-Prescot (HP) decomposition of the series. This paper finds that compared to 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 do not exhibit such an inverse relationship. The most important determinants of the flexibility indicators, are labor market reforms.

JEL: E24
I. INTRODUCTION

This paper studies labor market flexibility in 13 Latin American countries since the 1960s and compares them to the United States by looking at the sensitivity of employment and unemployment, and real wages with respect to output in the short run. The two main findings in the short run are: (i) Latin American labor markets adjust to output shocks predominantly through real wages rather than employment or unemployment when compared to the U.S. (ii) Price stabilization makes labor market rigidities binding because labor markets cannot absorb output shocks through adjustment in real wages, which explains policy makers 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 rigidities.

To test the short run hypothesis mentioned above, this paper estimates the response of unemployment-employment and real wages to changes in output throughout the period. It argues that output shocks in each country will be reflected entirely in fluctuations in real wages (prices), employment/unemployment (quantities), or turnover (not investigated in this work) regardless of such factors as labor market regulations, institutions, or other idiosyncrasies etc. I constructed Okun coefficients, which for now can loosely be defined as the effect of a one 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 to the United States. In particular, the work finds large wage Okun coefficients in Latin American on the order of 1.0 while in the U.S. the comparable number is close to 0.5. And conversely, unemployment-employment Okun coefficients of 0.1-0.3 compared to 0.3-0.4 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 counted as a counter example along with Venezuela, as countries with rising inflation. Okun coefficients for real wages fell in five of the six countries and increased in Brazil and Venezuela. Conversely, in four of the six stabilizing countries the unemployment coefficients rose and in all six countries the employment coefficients rose. These coefficients fell in Brazil and Venezuela. Therefore, Latin American policy makers newly acquired concern 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 lay-off 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 for future research.
The study of the transmission mechanism between output and labor market performance variables sheds 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 counter-cyclical wages. Moreover, along with Chile, Colombia is the only country with a sustained increase 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 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.

Although a cliché, the benefits of peace in Guatemala since 1986 dwarf the benefits of stabilization for any other country. There were robust and immediate improvements in short run labor market flexibility. The story in Uruguay is less clear; in the short run there seemed to be labor market liberalization both in quantities and prices until 1993 where a sharp reduction in both was observed.

This paper makes two important contributions to the debate over labor market reform in Latin America: (i) In particular, it 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 for Latin American labor markets. In addition, this paper compares results with the United States. (ii) 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.

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 should be quite universal. This paper stretches Okun’s contribution by claiming that his logic for a stable relationship between output and unemployment applies to real wages. Moreover, I argue that this is the most appropriate measure of labor market flexibility in the short run for Latin American countries where output growth is volatile.

The rest of the paper is divided into three sections: Section 2 describes the interpretation fluctuations in the relevant variables and the justification for using real wages, unemployment, and employment as performance variables. Section 3, is the heart of the short run relationship between the variables. Describes the transmission mechanisms among the variables, and presents estimation procedures and results. Section 4 concludes and present future avenues of research.

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2 A longer version of the paper included a fourth section in which long run relationships were analyzed. The section is now a stand-alone piece and is available upon request from the author.
II. Real Wages, Employment, and Unemployment as Measures of Labor Market Performance

This section introduces informal arguments for using real wages, employment, and unemployment as variables to measure 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.

2.1 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 labor market regulations, institutions, that there are only three broad labor market performance variables: 3 (i) A price variable best measured by real wages. (ii) A quantity variable measured alternatively by either employment or unemployment (iii) And finally, labor markets are peculiar in that turnover is another measure of performance. Because comparable turnover data is scarce measuring 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 (i) and (ii) across 13 countries in Latin America and the United States for the last 20-30 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 hopefully also the appropriate way to measure labor market flexibility in an environment with volatile output.

2.2 Decomposing the Series into Long and Short Run Components

The related literature of output, employment, unemployment, and wages has divided the study of the relationships of these variables into long and short run categories. This work will follow that convention because of the nature, 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 3 as shown below in 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

\[3\] See Nickell, Journal of Economic Perspectives (1997) for a recent review on the subject.
variations have been traditionally explained by short-term macroeconomic models. Long-term real wages are determined by productivity, while short run deviations depend on labor demand.

The interpretation of the decomposition of employment and unemployment is more involved. Long run employment is determined exogenously by growth of the economically active population. This may differ from population growth, because of differing age distribution parameters. Cyclical employment varies due to changing participation rate. Traditionally, unemployment was thought of as a stationary variable that returned to its long run value, the NAIRU (non-acceleration inflationary rate of unemployment). However, recent studies have suggested the NAIRU may change over time. The matter is far from settled and is beyond the scope of this paper. The discussion of the nature of long run unemployment is widely covered in the literature.4

III. Cyclical Variations Between 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 style coefficients for all three variables can provide insight into labor market flexibility across countries and time periods.

3.1 Short Run Transmission Mechanisms Between Output and the Labor Markets

The intuition obtained for 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% in output. This 3:1 ratio has subsequently come to be known as Okun’s Law, or more appropriately, Okun’s coefficient.5 The motivation of his 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% reduction of unemployed translated into a 3% increase in output violated the basic postulates of diminishing marginal returns to labor, and constant returns to scale. Surely if employment increased by 1% the effect in output would be smaller than, but close to, 1%. Recognizing this, Okun postulated the following transmission mechanisms, which were all reflected in the unemployment rate:6

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4 See the 1997 issue of the Journal of Economic perspectives for a recent review on the subject.

5 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 (i.e. 3) vs. its reciprocal which indicates changes unemployment due to a percentage change in output (i.e. 0.33). For clarity, and because we always have labor market variables on the left hand side of the regression, I use the second option. Thus, a larger coefficient indicates greater sensitivity of labor market indicators with to output.

6 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.
(i) A pro-cyclical behavior of the labor force; i.e. increased participation in the labor force during an up-turn and decreased participation during a downturn. There are two opposing forces on the size of the labor force during business cycles: a) Substitution effects causing a pro-cyclical labor force. During the up-swing, wages rise increasing the opportunity cost of leisure and drawing more participants, particularly teenagers and females, into the labor force. Conversely, in the down turn one observes a “discouraged worker” effect as agents stop looking for work. b) Income effects working toward a counter-cyclical labor force; that is when the head of the family becomes unemployed the rest of the household have to enter the labor force. This paper finds that contrary to the OECD, several countries in Latin America exhibit counter-cyclical labor forces during the business cycles indicating income effects dominate and pointing to an important qualitative difference.

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

(iii) Labor productivity moves pro-cyclically 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 to lay off, learning curves, and morale effects. b) Shifts 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 up-swing. e) Employment shows a lagged response to variations in output.

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7 This has been consistently documented not only in the U.S. but also in Japan and for the OECD. See Kuh 1966, Perry 1971 and 1977, Okun 1973, Gordon 1984 for a more recent review, and Hamada and Kurosaka 1984, Knoester 1986, and Kaufman 1988 for a documentation of a very strong effect in Japan and in Europe. For a paper on labor force participation from a supply perspective see Friedman 1962 and Knoester (1986). The Bureau of Labor statistics estimated that in recession conditions for every 10 listed as unemployed over and above 4% there exists three additional potential workers not actively seeking a job.

8 William Maloney, and Gonzalo Hernandez Licona (1997) present evidence for Mexico.

9 See Footnote 6: All of the papers present pro-cyclical hours worked. Moreover, Black and Russel 1969 and Thurow and Taylor 1966 review the evidence. Unfortunately, due to the lack of reliable hours worked data in Latin America the evidence for these countries is scarce.

10 This was identified by Okun himself. It was documented by Okun 1973.


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

14 The lack of an proper lag structure was first postulated by Kuh (1966). Improvements on the estimation techniques of the coefficient specially separating a short run vs. a long-run coefficient have corroborated his assertion but the effect is small.
Okun’s coefficient assumes all three effects change *pari passu* with the unemployment rate, and the combined effects is 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 form 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.

*(Arthur Okun 1962)*

The quote above had a tremendous effect on the literature. Much effort in the literature for the following 30 years was 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% implying a little less than half is taken up by fluctuations in productivity.¹⁵ Efforts made to incorporate data on productivity explicitly are not conclusive owing to difficulties in the construction of potential output series.¹⁶

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 to Europe and Japan – in other words, the U.S. 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 directly from survey data but the result remains robust. Others argue employment stability plays a larger role in Europe and Japan.¹⁷ Section 3 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% in the employment rate does not always translate into a fall of 1% in the unemployment rate. Employment growth can be quite vigorous but if a segment of the

¹⁵ See Perry (1971) and Gordon (1984) for reviews of the estimations up to that time.

¹⁶ See Gordon (1984), and Kaufman (1988) for a recent decomposition of the literature.

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. Pro-cyclical 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 pro-cyclically as in the OECD or smaller if it fluctuates counter-cyclically.

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 pro-cyclical. The debate is not settled but the general consensus is that a real wage index for a country is pro-cyclical in industrial economies. The paper finds a strong pro-cyclical relationship in most of the Latin American countries in the sample.

### 3.2 Cyclical Estimation Procedures

The issue of the choice of dependent variable between output and employment-unemployment was first raised by Solow in 1973 (see Okun 1973) and has not been resolved. Conceptually and econometrically, the matter is difficult to settle because both variables Granger cause each other. In a bivariate regression like the one presented here, estimates only differ because one minimizes the sum of horizontal rather than vertical squared residuals. 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 the exogenous and measures the degree of adjustment in the labor market.

For United States output and unemployment series, there is a long, involved, and unsettled econometric debate on the appropriate econometric decomposition of the original series. Elements of the debate are mentioned here to justify the techniques chosen. The disagreement centers on whether the series contain a unit root or are trend stationary. If series contain a unit root, a positive innovation leads to a revision of the forecast for all horizons, where 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

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19 See Evans (1989).

20 There is little debate that employment deviates around a slowly evolving trend exogenously given by natural population growth.

21 Evans (1989) and Clark (1987) raised the point in the Okun literature but the seminal paper on the subject is Nelson and Plosser (1980).

22 See Greene (1990) for an introduction to the subject and Hamilton (1994) for a more rigorous exposition.
deterministic trend were mis-specified. A similar debate exists in the decomposition of unemployment. Solutions include using Vector Autoregressors, cointegration techniques, and Kalman filters. This paper provides two alternatives: (i) 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. (ii) 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 presents plots of unemployment, inflation, real wages, output and employment for each of the countries. In addition, to the detailed sources of each of the series are presented. A constant price output series and consumer prices indices were obtained from various issues of the International Financial Statistics (IFS). There were numerous sources for employment, unemployment and real wages. Real wages in industry were either taken directly or constructed from nominal wages using the IFS consumer price index 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 product of urban employment surveys. This has two implications: First, rural statistics are not included, which does not allow identification of rural to urban migration. (Moreover, in countries with large rural sectors, urban employment may have 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 inferencnes of switches between formal and informal employment, leading to the issue of comparability of the unemployment definition. A casual inspection reveals that statistical institutes in Latin America have similar surveys and follow the International Labor Office (ILO) guideline. The better alternative is the Herculean task of constructing employment/unemployment series directly from survey results.

Figures in Appendix 1 show the 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

\[ \text{For output, there has been an extensive literature on the subject just for the United States and the matter is not settled. In a recent reference Perron (1988) argued that deviations of log post-war US real GDP with a break in the trend coefficient in 1973 are stationary. Banerjee et al (1992) argue the stationary depends on whether the break is imposed or endogenously determined by the data. For the unemployment case see JEP 1997, and Evans 1989, Perron 1990, and Weber 1993.} \]

\[ \text{Weber (1995) presents a recent review of the effects of estimation techniques for the U.S. Although the effects are significant the magnitude in the difference of point estimates is small.} \]

\[ \text{The statistics for Guatemala come from the National Security Agency implying that only formal employment is included. The series were included because of the lack of another source and also because of the time period covered.} \]

\[ \text{The crude, but accurate, reasoning from some of the agencies is that in the “campo” one cannot be unemployed, poor but not unemployed.} \]
same in both series. This allows inferences of productivity increases. The United States output series is “well behaved” when compared to output series in the rest of Latin America. Allowing for a break in 1973, it can be argued output deviates around a trend (see footnote 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: (i) A relatively high and stable growth period in the 1960s and early 1970s. (ii) A period of stagnation and instability since the debt crisis in the early 1980s (iii) 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) first method relied on first differences. Although the approach has given way to more sophisticated methods, the paper will show that improvements make a difference only when series are “unstable.” The estimation equations are given by 3.1:

\[
\begin{align*}
\Delta U_{it} &= \alpha^u_{it} + \beta^u_{it} \Delta Y_{it} + \varepsilon^u_{it} \\
\Delta E_{it} &= \alpha^e_{it} + \beta^e_{it} \Delta Y_{it} + \varepsilon^e_{it} \\
\Delta W_{it} &= \alpha^w_{it} + \beta^w_{it} \Delta Y_{it} + \varepsilon^w_{it}
\end{align*}
\]

(3.1)

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 U.S. 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, estimation did not incorporate a lag.

The advantages of using first differences to estimate cyclical variations are simplicity, that errors suffer from little autocorrelation, and that estimators remains consistent when the series contain 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. But the tests rejected cointegrating relationships between any of the labor market variables with respect to output eliminating the need for an error correction term or a cointegration technique. The intuition for the lack of a cointegrating relationship is that each of the variables possesses a different trend and the employment series rejected the unit root hypothesis. 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 to use a cointegrating technique required the assumption that variables followed a random walk but that their difference between their drifts was deterministic.

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27 Labor productivity is increasing (decreasing) if the slope the output series is steeper (flatter) than the employment series.

28 Dickey-Fuller tests are available from the author upon request.

29 Engle and Granger (1987) argued the point. Johansen’s maximum likelihood cointegration estimation was actually the authors original choice of estimation technique but the variables rejected the tests.
The disadvantages of using first differences are that: (i) The technique eliminates “memory” in levels by construction and in order to properly estimate series with unit roots. (ii) Insight into the long-term trends of each of the series is lost since one only observes the ratio of the trends in the series. (iii) The procedure implicitly assumes that the series are first difference stationary in the relevant period. Simple inspection for output series in Appendix 1 rejects the assumption. Allowing for different intercepts in time periods corrects for this restriction but 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 follow Weber’s (1995) exposition for clarity. The author regresses the natural logarithms of each series on a deterministic trend and uses the residuals as cyclical components. The relationship is given by equation 3.2:

\[ y_{it} = \alpha_i + D_i + \theta_{yi}^t t + \theta_{yi}^D D_i t + v_{it} \]
\[ e_{it} = \alpha_i + D_i + \theta_{ei}^t t + \theta_{ei}^D D_i t + v_{it} \]
\[ w_{it} = \alpha_i + D_i + \theta_{wi}^t t + \theta_{wi}^D D_i t + v_{it} \]

where a lower case denote the natural logarithm of the series, \( t \) is a time trend, and \( \theta_{yi}^t, \theta_{ei}^t, \) and \( \theta_{wi}^t \) are long-term growth rates for output, employment, and real wages, respectively. The inclusion of dummies for changes in slopes as well as intercepts is crucial for some of the countries in Latin America in order to avoid misinterpretation of the residuals.\(^{30}\)

“Trend” unemployment is constructed by calculating the unconditional mean.

\[ u_{it} = \theta_{ui}^u + \theta_{ui}^D D_i t + v_{it} \]

where \( \theta_{ui}^u \) is the average rate of unemployment and \( D_i \) is a dummy variable which allows for a one time change in the natural rate of unemployment. Okun, as well as other authors, postulated an arbitrary natural rate of unemployment, i.e. 4%. However, choosing an arbitrary natural unemployment rate across countries seems ill advised and calculating a “natural” rate of unemployment using a concept like 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 shown in equation 3.4:

\[ y_{it}^c = y_{it}^t - y_{it}^a \]
\[ u_{it}^c = u_{it}^t - u_{it}^a \]
\[ e_{it}^c = e_{it}^t - e_{it}^a \]
\[ w_{it}^c = w_{it}^t - w_{it}^a \]

where \( y_{it}^t, u_{it}^t, e_{it}^t, \) and \( w_{it}^t \) are the fitted values from equations 3.2 and 3.3 respectively.

\(^{30}\) In some countries more than one break was allowed in the trends.
The static Ordinary Least Squares (OLS) Okun coefficients are given by regressing the cyclical components in equations 3.5:

\[ u_t^c = \beta_{u}^{mt} y_t^c \]
\[ e_t^c = \beta_{e}^{mt} y_t^c \]
\[ w_t^c = \beta_{w}^{mt} y_t^c \]

(3.5)

where \( \beta_{u}^{mt} \), \( \beta_{e}^{mt} \), \( \beta_{w}^{mt} \) are our second set of Okun coefficients.

A technical disadvantage of this approach is that if the series contain unit roots, deterministic detrending leads to inconsistent estimators. In practical terms, deterministic detrending poses to major setbacks: (i) Estimates are sensitive to the periods chosen even by a year given the large output fluctuations which occurred in Latin America (ii) It seems unreasonable to assume that long term growth rates change abruptly and discretely.\(^{31}\) Given growth stability in the U.S. and the rest of the 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 post-war United States, authors have found it necessary to allow for at least a one-time break in the natural rate.\(^{32}\) 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 upon request.

Since the series converge to a deterministic trend, the estimation process has the advantage that it has “memory” in levels; i.e. 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 proposed an econometric procedure for “representing a time series as the sum of a smoothly varying trend component and a cyclical component.”\(^{33}\) The trend component is the sum of the squares of its second difference and the cyclical components are deviations from the trend component.\(^{34}\) The regression ran uses the cyclical component from the HP decomposition in equations 3.5 where Okun coefficients are given by betas. Particular advantages of using the HP filter here include: (i) It is not period sensitive and thus there is little arbitrariness; (ii) long term trends vary smoothly over time which is more intuitively appealing; and (iii) 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

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\(^{31}\) Even for the United States where various authors suggest the introduction of a break in the slope coefficient, see Banerjee et al (1992) have suggested that the break varies if it is allowed to be determined endogenously by the data.


\(^{34}\) IBID
criticism. Harvey (1992) calls it “making the same mistake [as linear detrending] but in a more sophisticated way.” Harvey 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 non-stationary nature of the data and may lead to inconsistent estimators.35

3.3 Cyclical Results

3.3.1 Interpretation of Coefficients and General Discussion

Results for the sample independent of the estimation process are: (i) Latin American labor markets adjust to output shocks dramatically more through adjustment in real wages than in the United States as reflected in larger Okun ratios.36 (ii) Conversely, Latin American economies tend to have lower quantity responses to output both in terms of unemployment and employment than the United States. (iii) As inflation falls output shocks are absorbed less through real wages and there is a tendency for larger unemployment/employment responses.

Given period sensitivity of the computation of Okun coefficients, ten year rolling regressions were constructed. Figures 3.2 present results for unemployment, employment, and wages respectively using and the HP filter.37 Each coefficient in Figure 3.2 represents the effect of a one-percentage point output deviation from trend on employment, real wages or the unemployment rate in the previous 10 years. i.e. the Okun coefficient for 1971 is the result of an OLS regression using the 1961-1971 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.38 For example, the 1993 Chilean unemployment Okun coefficient dropped with respect to 1992 because Chile grew close to 10% that year and the economy had reached full employment. If the 1993 observation were left out, 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 ten years; i.e. they have a ten-year memory. Though each regression only contained 11 observations, the coefficients are precise, the explanatory power of the regressions is high and each Okun Coefficient computed covers a ten-year period which is a long time for these studies. Standard errors for U.S. 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.

35 Using a Kalman filter to decompose the series is left as venue for future research. Another notable omission from the estimation techniques is a Vector Autoregression approach to create the cyclical components of the series. The interpretation of the cyclical components is not business cycles but how innovations in output are translated into innovations in any of the labor market performance variables.

36 To my knowledge, no one, has computed Okun wage ratios for either the U.S. or the rest of the OECD.

37 Estimates for first differences are presented in the Appendix. 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 procedure is more appropriate since first differences assumes a stationary growth trend.

38 Actually it is the sum of the innovation of the new year plus the fluctuation from the year dropped.
Labor markets in Latin America adjust to output shocks predominantly through adjustments in real wages as evidenced by large Okun ratios (see Figures 3.2). With the exception of Brazil, Colombia, and Panama, the price adjusting ability of Latin American labor markets is greater and more volatile than in the United States. Okun ratios greater than one indicate 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 output shocks in Latin America place a large burden on salaried employees rather than creating unemployment.

Unemployment and employment Okun coefficients in Figures 3.2 indicate large and constant responses of the U.S. labor market to cyclical output shocks when compared to any country in Latin America. A one percent output shock in the U.S. translates into a reduction in unemployment of between 0.35-0.45 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 U.S. 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.

Previously, this paper argued that employment Okun coefficients were expected to be larger in absolute value than unemployment Okun coefficients because labor participation was pro-cyclical. However, contrary to the situation in the U.S. and the rest of the OECD, in many Latin American countries income effects dominate and labor participation is not pro-cyclical. In general, the employment Okun coefficient is higher than the unemployment indicating 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. A priori, one would expect low income countries and those with small unemployment safety nets to have a less pro-cyclical labor force participation because in a poor household a fall in real wages fell forces other members to work. However, the evidence does not support the proposition. Further investigation of the issue is warranted because it is an important behavioral difference between LAC and OECD labor markets.

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

40 In general employment is procyclical while unemployment is countercyclical. Thus the coefficients have opposite signs. For clarity, I did not change the signs of either.

41 Maloney (1997) and Hernandez Licona (1998) show strong evidence of increased labor participation in Mexico as real wages fall.
Table 3.1: A Comparison of “Okun’s Laws”

<table>
<thead>
<tr>
<th>Country</th>
<th>Okun Coefficient</th>
<th>Country</th>
<th>Okun Coeff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States (a)</td>
<td>0.33 to 0.457</td>
<td>Colombia</td>
<td>0.52</td>
</tr>
<tr>
<td>Canada (b)</td>
<td>0.48 to 0.56</td>
<td>Chile</td>
<td>0.36</td>
</tr>
<tr>
<td>U.K. (a,b)</td>
<td>0.28 to 0.48</td>
<td>Venezuela</td>
<td>0.32</td>
</tr>
<tr>
<td>France (b)</td>
<td>0.25 to 0.38</td>
<td>Uruguay</td>
<td>0.29</td>
</tr>
<tr>
<td>Germany (b,c)</td>
<td>0.21 to 0.52</td>
<td>Costa Rica</td>
<td>0.22</td>
</tr>
<tr>
<td>Italy (b)</td>
<td>0.14 to 0.28</td>
<td>Brazil</td>
<td>0.18</td>
</tr>
<tr>
<td>Netherlands ©</td>
<td>0.15</td>
<td>Panama</td>
<td>0.17</td>
</tr>
<tr>
<td>Japan (a,d)</td>
<td>0.036 to 0.05</td>
<td>Peru</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Argentina</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paraguay</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bolivia</td>
<td>0.009</td>
</tr>
</tbody>
</table>

1 United States. Moosa (1997), Okun (1973)
2 Moosa (1997)
3 Knoester (1986)

Figure 3.1 presents an scatter plot in which each point is the average of the last six Okun wage and unemployment coefficients from ten year rolling windows. Compare with Latin America, the U.S. adjusts more through unemployment rather through real wages. Only Colombia has a comparable unemployment Okun coefficient even though it is combined with counter-cyclical wages. 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 response to output fluctuations.
Figure 3.1 also shows 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 U.S. is also around 0.5, i.e. a 1% output shock translates into an equal change of 0.5% in the real wage and a 0.5% in employment (and 0.35% 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 U.S., 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.

3.3.2 Price Stabilization and Wage-Unemployment-Employment Flexibility: Wage Stability at 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. Moreover, some authors have cited real wage adjustments as one of the few benefits of inflation.

From the 13 country Latin American sample, the seven which experienced high inflation levels with the launch date of the last successful stabilization are: Argentina (1991), Bolivia (1985-86), Brazil (1994), Chile (1974 and 1982), Costa Rica (1983-84), Mexico (1988), Peru (1992). Brazil and Venezuela present counter examples that add statistical power to our hypothesis because Brazil experienced rising inflation until 1994 and Venezuela has been experiencing rising inflation since 1986. Unfortunately, for Brazil we only have one observation after stabilization. In five of the six countries which experienced 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 [unemployment] Okun ratios in five [four] of the six countries.

Figure 3.2a indicates Argentina, Bolivia and Chile present the clearest cases. Inflation in Argentina rose from 20% in 1974 to hyperinflationary levels in 1992. The wage Okun coefficient rose steadily throughout the period until 1985 reaching almost 3 indicating a large ability of the labor market to absorb shocks via real wage adjustments. An interesting development is that in 1987 with rampant inflation, the wage coefficient falls to and stabilizes at 1.5 signaling greater wage indexation in a high inflation regime. Finally, with the implementation of the currency board in 1992, the coefficient gradually falls to close 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 in 1987. Subsequently, the coefficient has fallen to close to 2 (still a high


level) as inflation fell to around 7% in 1996.\footnote{It is not clear why the wage Okun coefficient rose in 1987. Moreover, it is not clear why there was rise in 1994 .} Chile’s coefficient has dropped steadily since the late 1970s to around 0.7 in 1996.\footnote{The instability of the first difference coefficient is that the break in output growth trend lasts until about 1983 and thus the estimation is biased.} The coefficient fell despite slow growth and a flare 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 onwards, surpassed 50% per year since 1982 and had hyperinflationary levels from 1988 until 1992 when price stability was regained.\footnote{Moreover, throughout the 1980s the country did not grow at all.} Like Argentina and Bolivia, the wage Okun coefficient rose until 1979. Again, like in Argentina, the trend downwards begins in 1978 while inflation was “only” 60% and rising indicating another episode of increased wage indexation.\footnote{I owe this suggestion to Jaime Saavedra who suggested the fall in real wages in Peru over estimated during that period. The fact that in first differences the sensibility is increasing since 1990 has to do with the fact there is a break in the growth trend in 1990.} An anomaly is that there is no reduction in the wage adjustment mechanism since stabilization. The latter 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 employment discussion below). Costa Rica never experienced hyperinflation and the wage Okun ratios diminish 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 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.

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\footnote{It is not clear why the wage Okun coefficient rose in 1987. Moreover, it is not clear why there was rise in 1994 .}
The Mexican case presents an interesting anomaly. The wage Okun ratio continues to increase well past the launch of the stabilization plan, the “Pacto” in 1988 and the end of high inflation. (see Figure 3.2). The observation can be understood in light of the active role played by organized labor in Mexico’s concerted negotiations during the Pacto. As a result, real wages increased during the stabilization period and the real wage responded to the economic up-swing. The wage Okun ratio fell from 1992 onwards as market forces begin to overtake the power of the Pacto negotiations. Compared to the rest of Latin America, wage flexibility in Mexico continues to be high, with an Okun ratio of 2. The ratio is comparable to Bolivia’s and Peru’s.

![Figure 3.2b: The Exception](image)

**Figure 3.2b: The Exception**

*10 Year Rolling Wage Okun Coefficients*

Mexico and the United States (HP50)

Labor market flexibility in the quantity dimension tended to increase, albeit slightly, in the six country subsample. Figures 3.2 b and c show that all six countries exhibit a rise, in the employment Okun coefficients after price stabilization and that only Mexico and Peru do not show an increase in unemployment Okun ratios. It could be argued that countries with lower 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 U.S., 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 began in 1990 also contributed to a larger quantity transmission channel. Results for unemployment Okun ratios are puzzling because they are positive

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48 Recall that fluctuations from year to year can be interpreted as innovations.
indicating unemployment is pro-cyclical. The appendix 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’s presents an excellent example of a continuous increase in the ability of labor markets to absorb shocks via quantities. The employment Okun coefficient is smaller than 0.3 and rises almost 0.8 and the unemployment Okun coefficient is small that 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 this result may not be entirely desirable. Output shocks have caused large swings in unemployment, which hovered at around 6% throughout the 1960s, rose to 22% in 1982, before falling to 6% 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 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 down turn was not reflected in lower real wages in 1994-96 and firms had to start laying off workers.

Peru’s quantity channel has widened since stabilization but it still remains low, only higher than Argentina’s. Figure 3.2 shows employment Okun ratios increased since 1990. In the context of the commonly held view that post reform 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 which 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 suffered little changes despite variations in inflation. Today, it could still be characterized as flexible in the price dimension but relatively inflexible in the quantity dimension.

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

50 The Appendix presents the coefficients under first differences and the increase in the coefficients is more pronounced.
Venezuela and Brazil present good counterexamples to stabilizing countries. The results are presented in Figures 3.2 g, h, and i. Venezuela possessed low levels of inflation until 1986 when it surpassed 20%. Inflation climbed over 100% in 1995. As a result, the price channel has become more open. Real wages in Venezuela were steadily counter cyclical 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 is low during in the last stages of import substitution in the early 1980s and climbs steadily until 1988. Since 1988 both the employment and unemployment Okun ratios have fallen as inflation rose. In short, the downturn is being absorbed through adjustments in real wages.

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51 Cyclical fluctuations are relatively unimportant compared to the fall in real wages. Unemployment dropped until 1990 aided by the fall in real wages.
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. From Figure 3.2g we note that the wages were almost neutral until 1988 when a steady rise 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% per year since the mid 1980s. Unlike Argentina, there are no signs of increased wage indexation. Unfortunately, data on quantity variables permits 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.

Figure 3.2 g: The Counterexamples  
10 Year Rolling Wage Okun Coefficients  
Brazil, Venezuela and the United States (HP50)

Figure 3.2 h: The Counterexamples  
10 Year Rolling Employment Okun Coefficients  
Brazil, Venezuela and the U.S. (HP50)
3.3.3 Labor Market Flexibility in Countries without Price Stabilization

This subsection briefly discusses the remaining set of countries that did not experience price stabilization: Colombia, Guatemala, Panama, and Uruguay. The results are presented in Figures 3.3 a, b, and c. The evolution of Okun ratios is not uniform. Therefore, only large fluctuations in inflation cause these results to emerge so clearly. The individual evolution of ratios depend not only on labor market reforms but on any structural reform which affects the transmission mechanisms between output and the labor market.
Colombia possessed moderate and relatively stable levels of inflation since 1960. A strong case of a gradual labor market liberalization is reflected in Figure 3.2, which shows 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 import substitution and employment-oriented government in the late seventies giving way to a labor market that absorbs shocks more through fluctuations in quantities. Real wages present a puzzle. Figure 3.2 shows that from 1986 until 1994 wage Okun ratios fell from a moderate 0.75 to counter cyclical 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 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 U.S. itself. On the one hand, cyclical relationships are steadier than its Latin counter parts and approach U.S. estimates. On the other, labor markets in Panama are extremely rigid. In 1995, a one percent negative shock in output translated into about a 0.2% fall in wages, a rise in unemployment of 0.1% and a fall in employment of 0.18%. In the U.S., the same shock would produce a 0.45 fall in real wages, a 0.4 rise in unemployment and a 0.7% 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 labor market reform.

There have been important developments in Panama’s labor markets since 1995 and the estimation results reflect them. In 1972 a very restrictive labor code was approved. The unemployment coefficient shifts from 0.25 to a procyclical 0.1 in 1974. As employers learn to circumvent the code the coefficient turns countercyclical again and starts increasing. The first labor reform in the late 1980s is 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 jumps from 0.14 to 0.29 at a time when output growth was a modest 3%. The employment and wage Okun coefficients show similar patterns. 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 1984 and signed final peace accords in 1992. With the caveat that the employment and unemployment numbers were obtained from the social security agency as opposed to a survey the employment/unemployment Okun ratios are larger than the U.S. The result is intuitive because the data reflects 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 via 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 exhibit an inverse relationship between quantity and price coefficients. Therefore, only large fluctuation in inflation cause these results to emerge clearly. The individual evolution of ratios depends not only on labor market reforms but also 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 implement a panel data analysis to formally test the effects of inflation of the Okun ratios and to expand the sample. Similarly, Okun ratios can be used as dependent variables to be explained by labor market policy indices (i.e. Marquez and Pages-Serra 1998).

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52 An extension with preliminary data from 1997 indicates a further rise of the coefficient. The genesis of this work was a discussion about the effectiveness of the labor reform in Panama. Some argued that since unemployment had not fallen, reforms were not effective; I argued one had to look at growth.
### Table 3.2: Summary of Cyclical Results Based on Okun Ratios

<table>
<thead>
<tr>
<th>Country</th>
<th>Cyclical Wage Flexibility</th>
<th>Cyclical Employment Flexibility</th>
<th>Cyclical Unemployment Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stabilizing Countries</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Null</td>
<td>Falls</td>
<td>Increases</td>
<td>Increases</td>
</tr>
<tr>
<td>Hypothesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>Falls</td>
<td>Slight Increase</td>
<td>Slight Increases</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Falls</td>
<td>Increases</td>
<td>Slight Increases</td>
</tr>
<tr>
<td>Chile</td>
<td>Falls</td>
<td>Increases</td>
<td>Increases</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Slight Fall</td>
<td>Increases</td>
<td>Increases</td>
</tr>
<tr>
<td>Mexico</td>
<td>Increases</td>
<td>Slight Increases</td>
<td>Slight Falls</td>
</tr>
<tr>
<td>Peru</td>
<td>Falls</td>
<td>Slight Increase</td>
<td>Slight Increase</td>
</tr>
<tr>
<td><strong>Counter Examples</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Null</td>
<td>Increases</td>
<td>Falls</td>
<td>Falls</td>
</tr>
<tr>
<td>Hypothesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venezuela*</td>
<td>Increases</td>
<td>Falls</td>
<td>Falls</td>
</tr>
<tr>
<td>Brazil</td>
<td>Increases</td>
<td>Falls</td>
<td>Steady</td>
</tr>
<tr>
<td><strong>Rest of the Sample</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Colombia</td>
<td>Unsteady</td>
<td>Falls</td>
<td>Increases</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Unsteady</td>
<td>Falls</td>
<td>Increases</td>
</tr>
<tr>
<td>Panama*</td>
<td>Steady</td>
<td>Increases</td>
<td>Increases</td>
</tr>
<tr>
<td>Uruguay</td>
<td>Increases</td>
<td>Falls</td>
<td>Falls</td>
</tr>
</tbody>
</table>

### V. 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 importantly 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 via real wages than via employment or unemployment when compared to the U.S. 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. The 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 towards variations in employment-unemployment. The rising inflationary case of Brazil and Venezuela corroborates our hypothesis and adds power to our results. Lower inflation and reforms have increased wage stability at the expense of employment uncertainty. Countries where labor codes have permitted variations in employment and unemployment are perceived as having flexible labor markets.
BIBLIOGRAPHY


Marimon, Ramón, and Fabrizio Zilibotti. 1996. “’Actual’ Versus ‘Virtual’ Employment in Europe: Is Spain Different?” European University Institute, Florence, ECO No. 96/21, May.


Appendix I: 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</th>
<th>Unemployment HP Filter (y=50, u=50)</th>
<th>Employment First Differences</th>
<th>Employment HP Filter (y=50, u=50)</th>
<th>Wages First Differences</th>
<th>Wages HP Filter (y=50, u=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff (se) R2</td>
<td>Coeff (se) R2</td>
<td>Coeff (se) R2</td>
<td>Coeff (se) R2</td>
<td>Coeff (se) R2</td>
<td>Coeff (se) R2</td>
</tr>
<tr>
<td>Argentina</td>
<td>-0.21 0.12 0.26</td>
<td>-0.11 0.11 0.11</td>
<td>0.14 0.11 0.14</td>
<td>0.07 0.11 -0.02</td>
<td>0.64 0.16 0.64</td>
<td>0.84 0.26 0.52</td>
</tr>
<tr>
<td>Bolivia</td>
<td>-0.38 0.37 0.11</td>
<td>-0.08 0.21 0.01</td>
<td>0.27 0.89 0.01</td>
<td>0.81 0.43 0.23</td>
<td>0.37 2.34 0.22</td>
<td>2.49 1.20 0.30</td>
</tr>
<tr>
<td>Brazil</td>
<td>-0.19 0.04 0.75</td>
<td>-0.19 0.03 0.78</td>
<td>0.01 0.17 0.00</td>
<td>-0.01 0.10 -0.08</td>
<td>2.84 2.02 0.18</td>
<td>1.15 1.26 0.06</td>
</tr>
<tr>
<td>Chile</td>
<td>-0.20 0.25 0.07</td>
<td>-0.16 0.19 -0.14</td>
<td>0.78 0.47 0.23</td>
<td>0.32 0.32 0.00</td>
<td>-0.21 0.28 0.06</td>
<td>0.68 0.32 0.20</td>
</tr>
<tr>
<td>Colombia</td>
<td>-0.39 0.26 0.20</td>
<td>-0.37 0.29 0.13</td>
<td>-0.17 0.21 0.07</td>
<td>-1.17 1.38 0.04</td>
<td>0.09 0.11 0.06</td>
<td>0.90 0.64 0.16</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>-0.35 0.15 0.39</td>
<td>-0.32 0.10 0.47</td>
<td>0.19 0.71 0.01</td>
<td>0.55 0.25 0.33</td>
<td>0.19 1.75 0.00</td>
<td>0.70 0.78 0.07</td>
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<tr>
<td>Guatemala</td>
<td>-0.75 0.35 0.36</td>
<td>-0.72 0.21 0.54</td>
<td>-0.85 0.15 0.78</td>
<td>0.14 0.45 -0.04</td>
<td>0.65 0.69 0.09</td>
<td>0.32 1.56 0.00</td>
</tr>
<tr>
<td>Mexico</td>
<td>-0.22 0.06 0.56</td>
<td>-0.15 0.06 0.38</td>
<td>0.30 0.14 0.19</td>
<td>0.05 0.14 -0.12</td>
<td>0.12 1.44 0.00</td>
<td>2.29 0.33 0.82</td>
</tr>
<tr>
<td>Panama</td>
<td>-0.29 0.03 0.93</td>
<td>-0.21 0.02 0.90</td>
<td>0.32 0.33 0.12</td>
<td>0.25 0.07 0.54</td>
<td>0.38 0.55 0.05</td>
<td>0.17 0.23 0.04</td>
</tr>
<tr>
<td>Peru</td>
<td>-0.18 0.08 0.38</td>
<td>-0.10 0.05 0.27</td>
<td>0.56 0.56 0.10</td>
<td>0.19 0.22 0.06</td>
<td>4.74 2.39 0.33</td>
<td>2.51 0.29 0.88</td>
</tr>
<tr>
<td>Uruguay</td>
<td>-0.15 0.10 0.20</td>
<td>-0.18 0.11 0.04</td>
<td>0.53 11.20 0.00</td>
<td>-4.99 2.27 0.35</td>
<td>0.04 1.21 0.00</td>
<td>0.91 0.33 0.41</td>
</tr>
<tr>
<td>Venezuela</td>
<td>-0.23 0.10 0.41</td>
<td>-0.24 0.09 0.39</td>
<td>0.06 0.13 0.03</td>
<td>0.08 0.09 0.06</td>
<td>0.26 0.63 0.02</td>
<td>1.21 0.46 0.41</td>
</tr>
<tr>
<td>United States</td>
<td>-0.37 0.11 0.59</td>
<td>-0.50 0.06 0.85</td>
<td>0.62 0.13 0.73</td>
<td>0.67 0.08 0.87</td>
<td>0.18 0.24 0.05</td>
<td>0.37 0.22 0.22</td>
</tr>
</tbody>
</table>
Unemployment Rates


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

Colombia: *UN ECLAC. From 1990-96 the unemployment rate corresponds to seven metropolitan areas; from 1974 to 1989, four metropolitan areas: Bogota, Barranquilla, Medellin y 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 due to methodological changes.

Ecuador: *UN ECLAC. Country total, official estimates. From 1986, 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 WDI. 1980-96: UN ECLAC. Unemployment rates are estimates for five cities; 1986: urban labour survey; 1987: March, Central District.

Mexico: *INEGI. Encuesta Nacional de Empleo Urbano for the main cities. The unemployment rate is a four-quarter average of the metropolitan areas of Mexico City, Guadalajara and Monterrey. CEPAL. 1990-1995: Main urban areas; 1970, 1973-1989: Metropolitan areas of Mexico City, Guadalajara, and Monterrey, four-quarter average; 1987: July average. 1997 is an average of 1st. and 2d. 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 non-agricultural 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, Lambare 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 rate.

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, where the unemployment rate is the first three quarters average.

Venezuela: *OCEI: Household survey.


Wages in Manufacturing

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

Bolivia: ILO. Wages of employees; 95-96, private sector in La Paz.

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 consumer price index 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: Estadística 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.

Uruguay: ILO. Wages of employees. Index of average monthly wages in the private sector in the metropolitan area of Lima. Average for twelve months.


Employment

Argentina: *Informe Económico No. 21, 1997, and Subsecretaria de Programación Macroeconómica. Gran 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 over; civilian labour force employed in urban areas.


Colombia: ILO. Persons aged 12 years and over. Seven main cities of the country. September of each year. 1994-96: data are from DANE.


Mexico: *INEGI. Results from the Encuesta Nacional de Empleo Urbano (ENEU) for the 16 largest cities.

Panama: ILO. Persons aged 15 years and over. August of each year.

Peru: Lima Metropolitana. 1994-1996 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; and Boletín del Banco Central de Reserva del Perú.

Uruguay: ILO. Urban employment. Includes professional army; excludes compulsory military service.

Venezuela:*Central Bank of Venezuela. OCEI household sample survey.

United States: ILO. Persons aged 16 years and over. Civilian labour force employed.