Dollarization, Economic Growth, and Employment

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Documento de Trabajo N° 338

Santiago, Abril 2008

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Dollarization, Economic Growth, and Employment

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Abstract

Dollarization brought economic stability to Ecuador and higher economic growth. The labor market has not reacted accordingly and unemployment rates remain stubbornly around 10%. I use a simple econometric model of the labor market to disentangle the impact on employment of GDP growth, real wages, the cost of capital, and the real exchange rate. I found two opposing effects at work. On one hand, vigorous economic growth has led to a substantial expansion of labor demand (scale effect). On the other hand, changes in relative factor prices brought about by the dollarization process have played against employment creation (substitution effects): real minimum wages have increased while at the same time the real price of imported intermediate goods and the cost of capital have declined steadily. Together, these price changes indicate that labor is becoming a more expensive factor of production and, thus, signal for substituting labor away.

Key words: dollarization, employment, economic growth
JEL classification: E24, E27, E65, C5
1. Introduction

On January 9, 2000, the Ecuadorian government announced its decision to eliminate the sucre and adopt the US dollar as its official currency. This extreme measure was the culmination of an informal dollarization process that had taken place during the 1990s as a response to poor macroeconomic policies and rising instability. In 1990, 95% of the deposits and quasi-money in the economy were denominated in sucres. By January 2000, more than 60% of the economy was already dollarized (Beckerman and Solimano, 2002).

Dollarization brought stability to Ecuador—in terms of prices and exchange rates—and, backed by prudential fiscal management, unveiled the promise of sustained economic growth. Between 2000 and 2004, annual inflation declined from around 100% to only 3%, private investment recovered, and GDP grew at 4.5% per year. Sustained economic growth was expected to positively affect labor markets, increasing real wages and employment levels, and providing tangible welfare improvements to the population. This, unfortunately, did not seem to be the case: between 2000 and 2006, employment grew slowly and unemployment rates stubbornly remained around 10%. The sluggishness in the recovery of employment has been one of the main criticisms to dollarization.

Other economic phenomena resulting from dollarization have had a significant impact on labor markets. On one hand, minimum wages have grown 30% real terms, augmenting costs to producers and reducing labor demand. On the other hand, the prices of other production factors have reduced: the annual cost of capital declined steadily, largely as a result of the steady drop in real interest rates from over 30% in 2000 to less than 10% in 2006, and the real exchange rate appreciated, rendering imports of capital goods and technology cheaper. This ignited a substitution process away from labor towards higher productivity production processes that rely more heavily on capital and technology.

I study the working of the labor market since dollarization using an econometric model to disentangle the impact of GDP growth, real wages, the cost of capital, and the real exchange rate on employment. I answer two questions: What are the causes of the slow growth in employment after dollarization in Ecuador? How does employment respond to shocks in production, wages, and interest rates?
2. A simple model of labor demand

Almost all labor demand models are specified so as to include a scale variable (typically GDP), factor prices (real wages and cost of capital) and an indicator of the cost of intermediate inputs. Assume that there are only three inputs in the economy: capital, labor, and an intermediate imported good, $M_t$. The aggregate cost function for production level, $Y_t$, is then:

$$ C_t = w_t L_t^* + q_t K_t^* + x_t M_t^* = C(Y_t, w_t, q_t, x_t) $$

(1)

where $w$ is the real wage, $q$ is the cost of capital, and $x$ is the cost of the imported intermediate factor. Superscript * denotes levels of employment, capital, and intermediate goods that are consistent with output level $Y_t$. The derived demand for each factor can be obtained by direct minimization of the cost function for each output level. In the case of the labor:

$$ L_t^d = \frac{\partial C(Y_t, w_t, q_t, x_t)}{\partial w_t} = L(Y_t, w_t, q_t, x_t) $$

(2)

Log-linearizing equation (2) allows us to have an estimable model:

$$ \log L_t^d = \alpha_0 + \alpha_1 \log Y_t + \alpha_2 \log q_t + \alpha_3 \log w_t + \alpha_4 \log x_t $$

(3)

with homogeneity condition $\alpha_2 + \alpha_3 + \alpha_4 = 0$. The model in equation (3) is an equilibrium condition for the labor market. In that sense it represents a long-run condition; it may not verify period by period, but it must be fulfilled in the long run. For that reason, right hand side variables are called “fundamentals” hereafter.

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1 See Hammermesh (1986) for a detailed analysis.
3. Empirical analysis

For the econometric analysis I embed equation (3) in a cointegration-error correction framework:

\[
\Delta \log L_t = -\gamma \left[ \log L_{t-1} - \alpha_0 - \alpha_1 \log Y_{t-1} - \alpha_2 \log q_{t-1} - \alpha_3 \log w_{t-1} - \alpha_4 \log x_t \right] \\
+ \sum_{j=1}^k \theta_j \Delta \log L_{t-j} + \sum_{i=1}^k \eta_i \Delta \log Y_{t-i} + \sum_{i=1}^k \mu_i \Delta \log q_{t-i} + \sum_{i=1}^k \lambda_i \Delta \log w_{t-i} + \sum_{i=1}^k \phi_i \Delta \log x_{t-i} + \varepsilon_t 
\] (4)

The model fully describes the dynamics of employment. The expression in brackets is the error-correction mechanism and corresponds to the fraction of last period's deviation of employment from its long-term determinants that is corrected every period. For example, if we start from an employment level below equilibrium, the self-correcting mechanism calls for a future expansion in employment. The speed of adjustment depends on parameter \( \gamma \). Parameters \( \alpha_0, \alpha_i, \mu_i, \lambda_i \) and \( \phi_i \) capture the short-run effect of fundamentals on employment, while parameters \( \alpha_i \) are long-run elasticities.

The model was estimated using 70 quarterly observations for the 1991:1-2006:4 period. I first tested the order of integration of employment and fundamentals using the tests developed by Elliott et al. (1996) and Kwiatkowski et al. (1992). The number of lags was determined using Akaike’s criterion. All tests indicated that the series are I(1). Johansen’s (1998) tests suggest the presence of only one cointegrating vector, which I normalize to have employment as a left-hand side variable. The estimation of the vector error-correction model used three lags and the above mentioned homogeneity condition is not rejected by the data at 95% confidence using Doornik (1995) methodology. The qualitative results are invariant to changes in the scale variable (e.g., GDP excluding oil production).

**Long Run Model**

The estimated elasticity for the scale variable in equation (5) indicates that a permanent 1% growth in GDP leads to an expansion employment of around 2.3 percentage points. This is a high response: cumulative GDP growth of the Ecuadorian economy in the 2001-2006 period was 39%, implying that employment should have grown by 91%. However, it actually expanded only by 32%.

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2 Martínez et al. (2001) undertake a similar analysis of the Chilean economy.
3 Details on the data and the estimation procedure are in the Appendix.
Other factors were also at play: the wage elasticity is estimated at -0.4, implying that labor demand is sensitive to changes in real minimum wages. The increase in the latter of around 30% since dollarization would have implied a decline of 20% in labor demand in equilibrium for this reason only. The above mentioned decline in the cost of capital declined of more than 20 percentage points calls for a decline in labor demand of around 30%. Finally, the real exchange rate appreciated mildly in the period and induced a further contraction in demand of around 6%. In summary, the model predicted an expansion in employment of 33% in the seven-year period, slightly above the true value of 32%.

**Short Run Model**

The short-run model in equation (6) indicates that the labor market adjusts very slowly to disequilibrium: the estimated $\gamma$ of -0.10 indicates that in one year, only one third of the disequilibrium would be automatically corrected by market forces. This result is in line with microeconomic evidence of the substantial hiring/firing costs of the Ecuadorian labor market (World Bank, 2006).

$$\Delta \log L_t = -0.11 \times ERC_{t-1} - 0.23 \times \Delta \log L_{t-1} + 0.12 \times \Delta \log L_{t-2} + 0.10 \times \Delta \log L_{t-3} + 0.04 \times \Delta \log Y_{t-1} - 0.20 \times \Delta \log Y_{t-2} + 0.10 \times \log Y_{t-3} +$$

$$0.05 \times \Delta \log q_{t-1} - 0.07 \times \Delta \log q_{t-2} - 0.03 \times \Delta \log q_{t-3} - 0.03 \times \Delta \log w_{t-1} - 0.10 \times \Delta \log w_{t-2} + 0.01 \times \log w_{t-3} +$$

$$0.15 \times \Delta \log x_{t-1} - 0.09 \times \Delta \log x_{t-2} - 0.07 \times \Delta \log x_{t-3}$$

$$\quad (0.06) \quad (0.06) \quad (0.06) \quad (0.06) \quad (0.06) \quad (0.06) \quad (0.05) \quad (0.05) \quad (0.05) \quad (0.05) \quad (0.05)$$

(6)

The rich dynamics of the model are better appreciated when simulating employment levels in the 1991-2006 period. Figure 1 shows that it captures much of the evolution of employment, including the sustained decline of the 1990s, the recovery after dollarization in 2000, the stagnation of 2004, and the vigorous expansion afterwards.
Impulse-response analysis

The estimated model is used to simulate the response of employment to shocks in fundamentals. Each panel of Figure 2 shows the response of employment after a once-and-for-all shock to a fundamental variable. I use Pesaran and Shin (1998) generalized decomposition function which does not depend on ordering for identification. In Panel A it can be seen that the full effect of a positive GDP shock materializes only after 6 to 8 quarters. This slow response, again, reflects the existence of substantial adjustment costs to hiring and firing workers: entrepreneurs are reluctant to hire unless the improved demand situation is perceived as permanent. Panel B clearly shows the substitution effect of an increase in the cost of capital, which signals to switching towards more labor-intensive technologies and, thus, to hire more workers. The full impact is achieved relatively fast. Panel C shows the response of employment to changes in real exchange rates that indicate the relocation of resources between trade and non-traded goods sectors. Because these sectors have different labor intensities, there is a positive impact on employment every time the real exchange rate permanently appreciates. Finally, Panel D shows how employment reacts negatively to a permanent rise in real minimum wages. Although the initial impact is negligible, after a year employment begins to decline steadily and remains low for as much as three years.
5. Conclusions

The sluggishness of labor market in adjusting after dollarization in Ecuador has been the source of much criticism. This paper shows that it results from two opposing effects. On one hand, a positive scale effect arising from the vigorous economic growth process that has led to a substantial expansion of labor demand. On the other hand, a negative substitution effect that has changed relative factor prices against employment creation (substitution effects): real minimum wages have increased while at the same time the real price of imported intermediate goods and the cost of capital have declined steadily. Together, these price changes indicate that labor is becoming a more expensive factor of production and, thus, signal for substituting labor away. Since the relative price adjustment brought about by dollarization has completed, the future evolution of employment will be mostly determined by economic growth and the government’s policy on minimum wages. Lowering hiring/firing costs would allow the labor market to react faster.
References


Appendix A

Definitions and Sources of Variables

Data were obtained from publications of the Central Bank of Ecuador and INEC. GDP is in real US$ of 2000. Employment corresponds to urban areas. Wages are nominal minimum wages deflated by the CPI. The cost of capital corresponds to the ex-post real interest rate for corporations.

Testing for Unit Roots

Table A.1 presents the results of unit-root tests. The null hypothesis of non-stationary for the level of the series cannot be rejected. The first difference of the series is stationary in all cases.

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<thead>
<tr>
<th>Series Level</th>
<th>First Difference</th>
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<tbody>
<tr>
<td></td>
<td>ERS test</td>
</tr>
<tr>
<td>Null hypothesis</td>
<td>Series has a unit root</td>
</tr>
<tr>
<td>Real Wage</td>
<td>-1.71</td>
</tr>
<tr>
<td>Real GDP</td>
<td>-1.29</td>
</tr>
<tr>
<td>Employment</td>
<td>-0.06</td>
</tr>
<tr>
<td>Real Exchange Rate</td>
<td>-3.08</td>
</tr>
<tr>
<td>Real Interest Rate</td>
<td>-3.21</td>
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<tr>
<td>Critical value at 95%</td>
<td>-3.14</td>
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Note: All series seasonally adjusted using X12.