

## Box 1

### A NEW ESTIMATE OF THE NON-INFLATIONARY RATE OF UNEMPLOYMENT

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The job market is one of the channels through which macroeconomic dynamics influence the welfare of the population. Therefore, it must be considered in any analysis of the effects of monetary policy. Within this dimension, a useful measure is the labor market gap, which is understood as the difference between the observed rate of unemployment and its noninflationary level. This section describes a new neo-Keynesian model that is adapted for the Colombian economy and designed to estimate this gap and its relationship to other variables.

It is important to determine if the job market is “loose” or “tight.” In the first case, the demand for labor exceeds the supply. This situation tends to pressure wage hikes and these, in turn, add to inflation. In the second case, the demand for labor is less than the supply of labor. This results in downward pressure or in lower wage hikes and less inflation. An estimate of the job market gap allows us to assess which of the two cases applies to the economy and to what degree. This information helps to identify potential inflationary pressures in the job market.

The model (described in detail in Amador, 2017) essentially consists of five equations that characterize the behavior of inflation, output, the short-term interest rate, the real exchange rate, and unemployment. These provide a structure whereby it is possible to adequately identify the job market gap, among other variables. Models of this type are often used as tools in forecasting and policy analysis (Coats et al., 2003) and to help understand past economic events (Carabenciov et al., 2008). Similar approaches are commonly employed to estimate the noninflationary levels of different macroeconomic variables that are relevant to informing monetary policy decisions (see, for example, Laubach and Williams, 2003, and González et al., 2013).

The variable of greatest interest to the new model is the unemployment rate, inasmuch as, unlike previous work, it includes a formula for Okun’s law. This law pertains to

the negative relationship, observed in the data, between the unemployment rate and the output of an economy (Okun, 1962). The version used here implies that, if unemployment is above (below) its noninflationary level, output will tend to be below (above) its respective noninflationary level. Hence, the job market would be expected to contribute to lower (higher) inflation, if the unemployment rate were above (below) its noninflationary level.

It is important to point out that the model does not estimate this relationship in an isolated way, since it takes into account the past and future behavior of all other variables, in addition to how they are related to one another. Accordingly, the results respond to the joint dynamics of the different macroeconomic variables, maintaining their consistency as a whole.

One innovative aspect of the model is that it uses monthly data. Although the job market data from the so-called Large Integrated Household Survey (GEIH in Spanish) conducted by the National Bureau Statistics (DANE in Spanish) are monthly, it was not until recently that the only data available were the quarterly output figures from the national accounts. This model uses the Economic Monitoring Index (ISE in Spanish), which is an indicator of monthly economic activity that conforms to the methodology of the quarterly national accounts. This allows for more frequent forecasts and policy simulations than previous contributions.

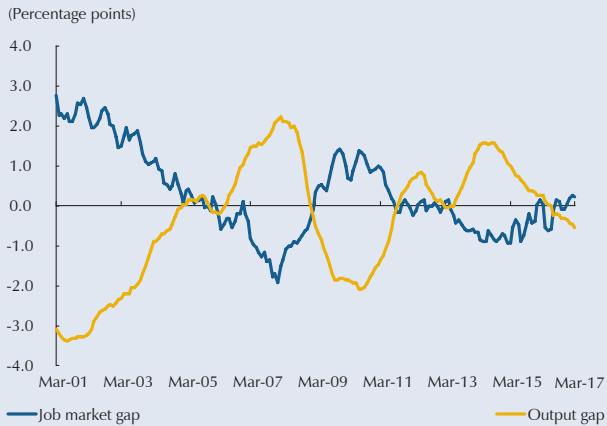
Graph B1.1  
Unemployment Rate and its Non-inflationary Level in the Thirteen Major Metropolitan Areas  
(Seasonally adjusted moving quarter)



Source: DANE and Banco de la República’s calculations based on Amador (2017).

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Graph B1.2  
The Job Market Gap and the Output Gap



Source: Banco de la República's calculations based on Amador (2017)

Graph B1.1 shows the seasonally adjusted unemployment rate for the country's thirteen major metropolitan areas and its respective estimated non-inflationary level estimated for the 2001-2017 period. Graph B2.2 demonstrates the relationship between the job market gap and the output gap. In other words, it shows the percentage difference between output (measured by the ISE) and its noninflationary level. As Okun's law indicates, there is a negative relationship between these two variables.

The results indicate the behavior of the job market gap coincides with the history of Colombia's business cycles. At the beginning of the period in question, this gap was quite positive, in keeping with the large increase in unemployment that was observed after the crisis in 1998-1999. Then, it slowly closed during the course of time, exhibiting a high degree of persistence. A negative gap was observed between 2006 and 2008, coinciding with several increases in inflation. Between 2008 and 2011, the gap was positive once again, reflecting the increase in unemployment due to the international crisis in 2008-2009. During the period of economic growth from 2012 to 2015, the gap was negative. By the end of 2016, this indicator would have been very close to zero, mirroring the economic slowdown that followed the drop in oil prices.

However, it is important to be especially careful when analyzing the latest results. Even though the job market gap was in positive territory during the first three months of 2017, one must take into account that wage adjustments involve a significant degree of indexing to past inflation. Although the indicator suggests the job market's contribution to inflation would be negative, indexing prompts

wages to be adjusted currently at high rates relative to the inflation target and causes them to converge more slowly towards that target.

Despite its usefulness, what is presented here has important limitations. Accordingly, the high degree of uncertainty involved must be taken into account, not only the uncertainty inherent in the statistical estimators, but also the uncertainty that comes with the specification and choice of the models.

Consequently, estimates of the noninflationary unemployment rate, as well as its variability in time and uncertainty, are incorporated into the wide range of information Banco de la República uses in its diverse efforts to analyze the state of the job market and the economy in general.

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