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Job vacancies in Colombia: 1976–2012

Andrés Álvarez* and Marc Hofstetter

* Correspondence:
ca.alvarez967@uniandes.edu.co
Department of Economics and
CEDE, Universidad de los Andes,
Bogotá, Colombia

Abstract

Based on the counting of Help-wanted advertisements in print newspapers, we build national vacancy indexes and vacancy rates for Colombia for the period 1976–2012. The result is the first dataset capturing the evolution of vacancies for Colombia and the first one covering such a long period for any developing country. We publish the series in the Additional file 1; an online version is also available at <http://economia.uniandes.edu.co/vacantescolombia>.

We explain how we built the series and tackle the most important questions concerning some issues about the representativeness of the resulting vacancy rate. These series will allow tackling many questions related to the functioning of the labor markets in emerging economies, where such datasets were not available. We relate the vacancy rate with the Colombian business cycle and estimate a Beveridge curve. We find that the vacancy rate is procyclical while the latter relationship presents the expected downward slope between vacancies and unemployment with a structural change—an outward shift—around 1986.

JEL codes: E24, E32, J63, J64

Keywords: Vacancies; Help-wanted index; Unemployment; Beveridge curve; Labor market; Colombia

1. Introduction

In Álvarez and Hofstetter (2012, 2013), AH hereafter we built a 50 year-long monthly vacancies' series for the city of Bogota based on the counting of Help-wanted (HW) advertisements in the main newspaper in town, *El Tiempo*. This represented the first effort to build a proxy for vacancies in Colombia. As a matter of fact that constituted a pioneer dataset within Latin America as there are no survey-based vacancies' series in the region and only a few efforts similar (but shorter or less frequent) to those in the aforementioned paper.

We extend the scope of AH to seven main metropolitan areas using the information collected by AH and by the Banco de la República (Arango 2013). With these datasets we build national help wanted indexes and vacancy rates. Moreover, we discuss the correspondence of the vacancy rate to the business cycle in Colombia and report Beveridge curves. While we discuss some hypotheses that might explain the shifts and patterns that become apparent from this first look at the data, a rigorous analysis examining their plausibility is beyond the scope of the paper. With these datasets and the preliminary look at them we hope to spark new research in the area.

The count of HW advertisements is taken from the print versions of the main newspaper in each city. The Banco de la República will continue collecting the HW

information and making it available for public use (see details in Arango 2013). The monthly series start in 1976, the year when household surveys—and thus reliable labor market information—became available.

The seven cities are those where the DANE—the national statistical agency—performed the household surveys between 1984 and 2000: Bogota, Medellin, Cali, Barranquilla, Bucaramanga, Pasto and Manizales. Prior to 1984 the surveys are only available for the four main cities (the first four in the list); after 2000, the DANE added six cities to the survey. Population-wise, the seven cities that we focus on in this paper account for roughly half of the urban population in Colombia since the mid-seventies ¹.

Are the series a good proxy of the actual movements of unmet labor demand? As we argue in the rest of this section, the evidence based on other (developed) countries that have collected vacancy series using HW ads and the actual behavior of our series, suggest that they are indeed informative.

Given the absence of direct and/or official sources of information on vacancies, HW ads have been used as a proxy, especially in developed countries. For instance, in the US the Conference Board HW Index (CBHWI) (see Preston 1977) is a widely used dataset built using this method. We collect our raw data following a strategy that resembles that in the CBHWI.

Whether this strategy is accurate to depict the general characteristics of actual vacancy rates is a question that researchers have studied carefully. Abraham (1987) assessed whether the CBHWI adequately tracked the actual movement of job vacancies. She uses another source of data collected directly through representative surveys available for Minnesota and Wisconsin. The comparison shows that the HW index for those states tracks very closely the *movements* reflected in the data from job vacancy surveys ².

Amoah (2000) discusses the Canadian case, evaluating the performance of a very similar HW Index with official data both collected by Statistics Canada since the 1970s, concluding that "... the HWI provides incomplete information on vacancies and hence unmet labor demand. Whatever the degree of undercoverage of the HWI, that is, whatever the error in the estimates of level, what really counts is any bias in the measure of change in the unmet demand for labor. It may well be that the sources of undercoverage in the HWI are fairly constant through time, so the HWI's measures of change are relatively unbiased."(p: 16)

Thus, as Amoah (2000) concludes, job vacancies based on HW ads do not capture the *level* of the actual job vacancies but rather their movements. The same is true for our paper: our vacancy rates obtained with HW ads help estimating the dynamics of unmet labor demand, not its absolute level. As long as the importance of the HW ads as a strategy to find workers remains constant over time, the series will be a good proxy of vacancy movements. As we explain below, there is one strong reason to suspect that the importance of ads in print versions of newspapers has declined over time: the advent of internet job-search platforms. We propose a method to correct the series for this decline, and report the results of both the original uncorrected series as well as the adjusted one.

There are two potential disadvantages in our series compared to similar ones in developed countries. On the one hand, the considerable extent of informal job searching strategies in Colombia (family or friends, and other informal networks). Uribe and Gómez (2004) show that, in 2003, 86% of employees reported having searched for a job

through informal channels³. Furthermore, the readership of newspapers in the country is below that in the US: an average of 29.5% of the population for the period 1999–2009 (*Media General Survey*) while a similar measure for US shows an average of 52.7% for the same period⁴. These two facts imply that our HW data could underestimate the *level* of job vacancies more than the HWI in the US. Nevertheless, as discussed above, our series are used to understand the movements in unmet labor demand, not as an estimate of its actual level over time. Therefore, these two characteristics of Colombia vis a vis US do not affect the accuracy of the unmet labor demand dynamics.

While we have no direct ways of checking the accuracy of our estimates (i.e. comparing them to series based on surveys) our indirect tests are very encouraging. On the one hand, the dynamics of our vacancy rate are coherent with the business cycles in Colombia. Indeed, in section 4, we show that our HW series track the most salient characteristics of the cycle for almost the last 40 years. Moreover, the Beveridge curve that comes out of our data behaves also in a way consistent with the priors that we had both in terms of the slope as well as with the structural changes it suggests.

In the next section we describe how the data was collected. In section 3, we build a national HW Index (HWI) and a corresponding national Vacancy Rate (VR). We also propose modified series that take into account the fact that with the rise of online HW webpages, the traditional print versions have lost ground as outlets for the advertisements. Section 4 takes a first look at the resulting series. Finally section 5 concludes.

The whole dataset, including the raw counting of HW ads, the HW Index and Job Vacancy Rate and adjusted data, is available online at: <http://economia.uniandes.edu.co/vacantescolombia>.

2. The raw data: the HW counting

The HW information was collected in seven cities—Bogota, Medellin, Cali, Barranquilla, Bucaramanga, Pasto and Manizales by counting the HW advertisements published in the main newspaper in each town, corresponding, respectively, to: *El Tiempo*, *El Colombiano*, *El País*, *El Heraldo*, *Vanguardia Liberal*, *El Diario del Sur* and *La Patria*. The dataset covers the 1976 to 2012 period. The strategy of following only the leading newspaper in town is identical to the one used in the US for the Conference Board Help wanted index; we also used it in AH. Of course, focusing on one newspaper could be misleading if either there are other very important players in the local markets or if the relative importance of the newspapers suffers large changes over time. We argue that neither of these premises is likely to have a considerable effect on the sample.

As for the first point, there are no historical data on circulation of the newspapers in Colombia. Nevertheless, over the last few years there are survey-based data on the number of readers. Each of the chosen newspapers leads by a wide margin the respective local markets. In Bogota and Cali, where the distance between the leading newspaper and the runner-up is the smallest, the relative ratio of daily readers is above 4. In other cities like Barranquilla and Bucaramanga the ratio is above 15, while in Manizales *La Patria* is the only relevant newspaper. Moreover, as AH showed for Bogota, this gap is even larger if one looks at the relative ratio of advertisements, as the larger carrier tends to concentrate the majority of postings.

Concerning changes in the relative importance of the newspapers over time, we argued in AH that if markets are concentrated (as in Bogota) these changes might be innocuous for the series. In the case of Bogota, *El Espectador* stopped circulating for several years (except for Sunday's edition). Nevertheless, the impact on the advertisements of *El Tiempo* (main newspaper in Bogota) is negligible, as prior to the temporary disappearance of *El Espectador*, the advertisements in *El Tiempo* had a relative importance of 9:1 with respect to *El Espectador*.

As in AH the advertisements are counted in one issue per month. To choose the weekday, we first counted all advertisements within a few weeks over time to find if there are preferred weekdays for job-postings and to check if those preferences changed over time. If a certain day was a clear winner in a newspaper and that day remained the dominant one over time, we counted the advertisements the third time this day showed up each month. In case the chosen day happened to fall on a holyday, we counted the advertisements (of the same weekday) in the previous week. If the carrier did have more than one leading day or the leading day switched over time, we collected the information on the two leading days. The Additional file 1 provides further details and reports the raw values of HW announcements in each city⁵. Arango (2013) will report this dataset along with continuous updates and make them publicly available.

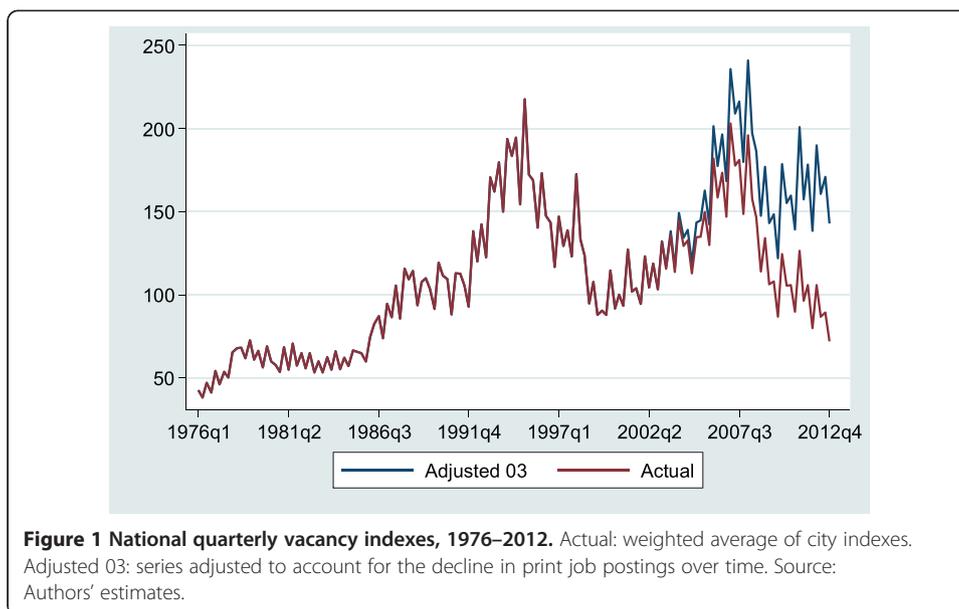
3. The national Help-wanted Index (HWI) and Vacancy Rate (VR)

The importance of newspapers as well as the propensity to post HW ads in them might be different across cities. For these reasons adding the rough HW count for the cities to obtain a national count of HW ads would be misleading. Instead, we use an analogous strategy to the one adopted by the Conference Board Help-Wanted Index (e.g., Preston 1977) in the US. We convert the city specific count of advertisements into city specific *indexes* with a common base year—in our case we set the city indexes equal to 100 in year 2000. Then, these indexes are averaged across cities using the relative weights of their respective labor forces over time. (To obtain the labor force series we had to merge several pieces of information. The assumptions made are reported in Additional file 1). The relative weights are adjusted according to the availability of HW indexes. For example, for the period 1976–1977 the weights are calculated only for the five cities for which HW data is available. Since January 1978 Barranquilla is included and finally the full set of seven cities, including Pasto, is used since January 2000.

As for most of the sample period the official labor market statistics are available on a quarterly basis, in this paper we build quarterly HWIs and VRs⁶. Of course, the HW count is monthly and researchers might want to exploit this higher frequency. The data we publish in the Additional file 1 and in Arango (2013) will allow them to do so.

The national quarterly HWI provides information about the evolution of national vacancies without taking into account the labor force growth over time. Thus it should exhibit an upward trend—as the economy and the population grow, so should the number of vacancies. The results are plotted in Figure 1; the dataset can be found in the Additional file 1.

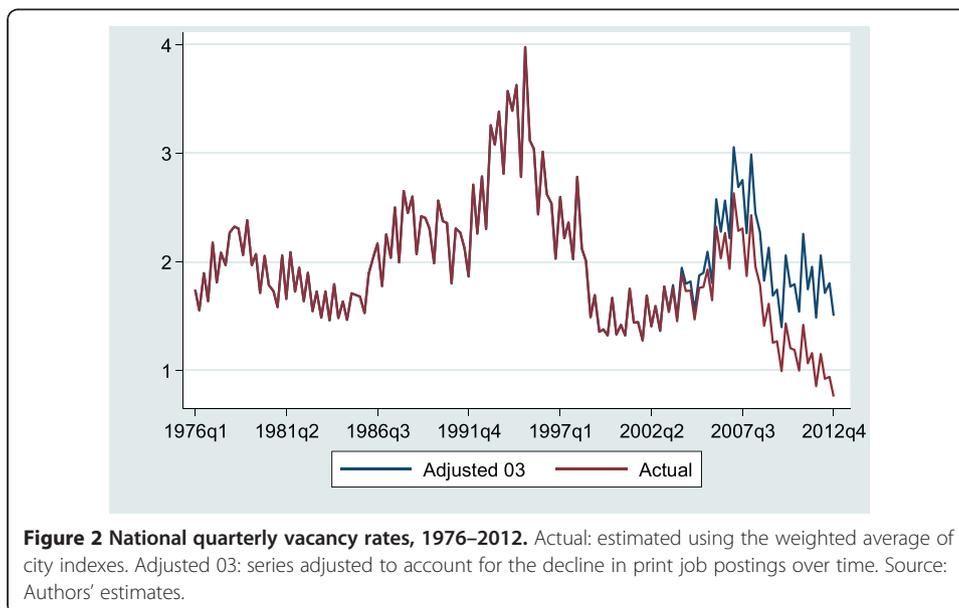
To construct a vacancy *rate*—one that takes into account the labor force growth—we follow the strategy proposed by Zagorsky (1998) for the HWI in the US, that is, we



divide the HWI by the total labor force (in millions). Results are depicted in Figure 2: the data is also available in the Additional file 1.

Note that the vacancy rate declines over the last years of the sample. For instance, it reaches the lowest level since the mid-seventies after 2010. This appears as an abnormal behavior of the labor demand as this period is characterized by a positive phase of the business cycle (see Alfonso et al. 2013). Rather than reflecting a drop in labor demand, this decline is most likely explained by the corresponding fall in the use of print newspapers in favor of Internet based HW announcements.

Vacancy series based on the HW count of ads in print newspapers face the challenge of correcting them to deal with the decline of print HW ads in favor of online postings. Facing this same problem in the US, Barnichon (2010) estimated the decline in print ads based on the diffusion of the internet. He used these estimates to adjust the historic



series based on the count of HW advertisements in newspapers. In AH we used Barnichon's adjustment to correct the series for Bogota. Nevertheless, we started adjusting the series later than Barnichon given that the internet diffusion in Bogota lagged that of the US.

In AH, focusing in Bogota, we concluded that 2001 was the right year to start the adjustment. This choice was based on two facts. On the one hand, 2001 was the year that *El Tiempo*, the main newspaper in Colombia and the one used in AH, launched what became the most popular online service for job postings, www.empleo.com. Thus it made sense to start discounting the relative importance of print outlets after that year. Moreover, an algorithm proposed in AH, explained below, confirmed that this year was an appropriate choice.

With the national series the initial hunch suggests that the adjustment should start later given that the internet diffusion in the rest of the country lagged that of Bogota. Nevertheless, setting a starting date based on the history of online platforms is difficult at the national level. Thus we rely on the same algorithm used in AH to check the most appropriate starting date to begin the adjustment. We found that the best initial date for applying Barnichon's adjustment to our national series is 2003, two years later than in AH.

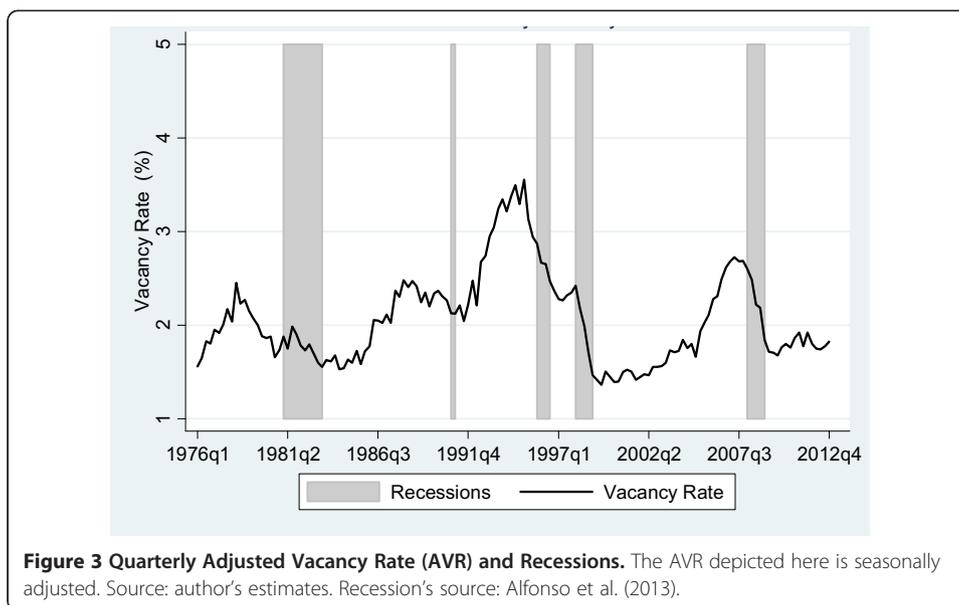
Concerning the algorithm, it is based on the estimation of a simple Beveridge curve, that is, a relationship between unemployment and vacancies. The algorithm picks the adjusting date that minimizes the gap between the predicted and the actual unemployment rate at the end of the sample (2012). In other words, the algorithm generates different adjusted vacancies' series (with Barnichon's adjustment factors), one for each possible starting year for the adjustment. For each adjusted vacancy series, it predicts unemployment for 2012 using the respective Beveridge curve estimation. Then it chooses the starting date that minimizes the described gap. 2003 is the best year according to this metric ⁷.

In Figure 1, reported earlier, the adjusted help wanted index (AHWI) is depicted along with the original one. In Figure 2, the corresponding adjusted vacancy rate (AVR) is also depicted. All series are also reported in Additional file 1.

The literature dealing with vacancy rates constructed with HW data has pointed at a number of additional problems that might bias the estimated rates over time. For instance, the relative importance of the chosen newspapers might change over time (a point we already discussed above). Moreover, if the propensity to advertise vacancies in newspapers varies across productive sectors and the relative importance of the latter changes over time, we will observe changes in the estimated vacancy rates even if the true vacancies remain unaltered. As explained in AH the problems caused by sectoral changes over time cannot be addressed in our case because we do not collect information regarding the sectors to which the advertisements belong.

4. A first look at the series

Do the adjusted series make sense? What do they tell us about the labor market in Colombia? As a first simple inspection, using the dates of recessions reported in Alfonso et al. (2013), we plot the AVR (this time seasonally adjusted) in Figure 3. The AVR peaks around the time the recessions begin; its trough also tends to coincide with



the end of the recession. The highest AVR over the 37 years studied was reached in 1995q₁, coinciding with the peak of other macroeconomic variables prior to the 98–99 crisis. For instance, real housing prices peaked during that period before the real estate bubble burst a couple of years later. The lowest AVR figures occur toward the end of the century coinciding with the worst recession of the sample period.

One additional inspection of the series comes from the relationship between vacancies and unemployment—the so-called Beveridge curve—useful to identify structural changes in labor markets. The theory behind Beveridge curves predicts a negative-sloping relationship. During economic downturns vacancies tend to decrease and unemployment to rise. The opposite happens during economic booms. Moreover, the theory also suggests that the relationship could shift due to structural changes. Estimating the slope and the intercept of the relationship and their changes over time helps interpreting the driving forces of the labor market.

In Figure 4 we depict the Beveridge curve for the period 1976–2012, using the official annual rate of unemployment (adjusted *à la* Ball et al. 2012) and the average annual AVR. The expected inverse relationship between unemployment and vacancies emerges. During bad times the points tend to move down and to the right, that is, to combinations of lower AVR and higher unemployment rates. See, for instance, how the locus moved in that direction during the 1998–99 crisis and the milder recession of the early 80s associated with the so-called debt crisis.

The plot suggests that in the mid-eighties there is an outward shift in the relationship. In Figure 5, we fit a linear Beveridge relation for the sub-periods 1976–1985 and 1986–2012. The outward movement of the curve is more evident now. Explaining the forces behind this movement is a paramount task for future research. The magnitude of the shift is very large. Note for instance that while 1980 and 2012 exhibited similar vacancy rates, the latter occurred with two percentage points of extra unemployment. The actual horizontal distance between the fitted lines is even larger than that.

What could explain the outward shift? We speculate on some possible causes and leave a more definitive answer for future research. A Beveridge curve outward movement could

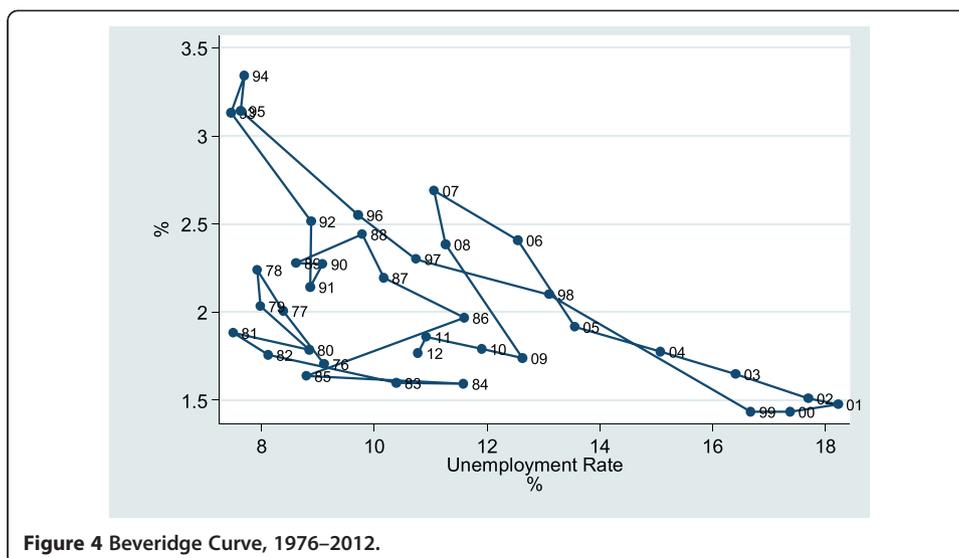


Figure 4 Beveridge Curve, 1976–2012.

be explained by increasing frictions or mismatches in the labor market. Colombia implemented at the end of the 1980s and early 1990s an important set of structural reforms including trade reforms. One possibility to explain part of the shift is that as some sectors shrank and others expanded, the set of demanded labor skills changed increasing the mismatches. This theory would imply a decrease in the job matching efficiency as an explanation for the outward shift in the curve.

A second possibility is related to increases in unemployment caused by increases in the labor force participation rate. These would raise the unemployment rate for the same vacancy rate, shifting the Beveridge curve outwards. Nevertheless, while the labor force has increased over time, the data does not point at a sharp break during the mid-80s. In a similar line, future research should estimate regional Beveridge curves using the city indexes published in the Additional file 1 and study, among others, the importance of the level and the changes in the relative female labor force participation rates to explain shifts and positions of the curves. For instance, Barranquilla's female labor force participation rates are much lower than in other cities. It also has one of the lowest unemployment rates in the country.

A third reason behind the shift could be related to more churning, that is, increases in the number of firms searching for workers and workers searching for jobs. Again in the midst of the structural reforms undertaken at the time, this is a hypothesis worth checking.

Hobijn and Sahin (2013) study recent Beveridge curve shifts in industrialized countries and conclude that rightward shifts after the Great Recession were apparent in countries where the construction employment saw a disproportionate decline occurring "on the heels of large declines in housing prices". While Jaramillo (2004) shows that that during the 1980s real housing prices in Bogota declined, there does not seem to be any sharp change in the mid-80s suggesting that the shift in Colombia could be explained a la Hobijn and Sahin. The hypothesis though could explain why in the late 90s the curve did not shift back. Indeed, the crisis at the end of the Century included a

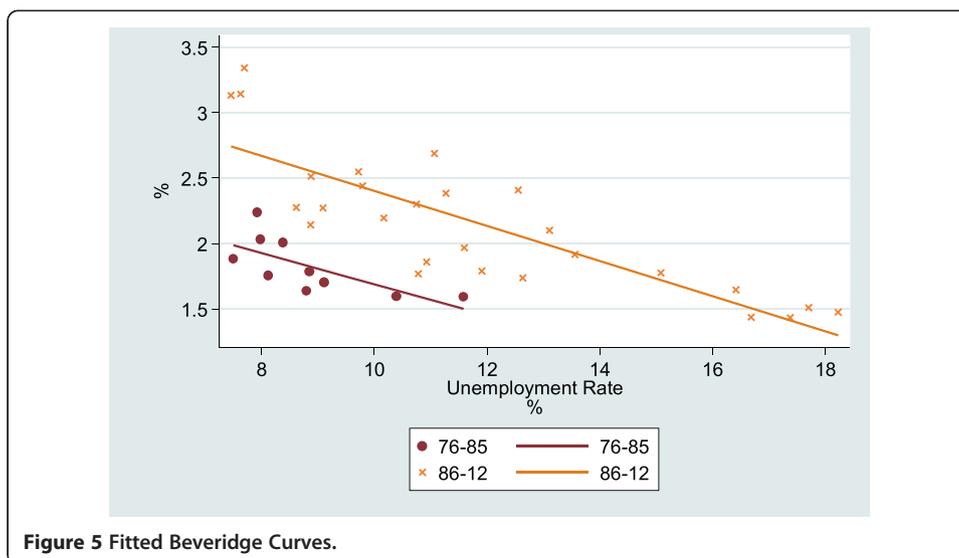


Figure 5 Fitted Beveridge Curves.

collapse of the mortgage sector and a sharp decline in real estate prices. The effects were long lasting; by 2013, the relative importance of mortgages as a proportion of the GDP was roughly half of what it was prior to the crisis.

Another possible explanation has to do with the minimum wage legislation. In 1986 there was a sharp increase in the real minimum wage (e.g., Hofstetter 2006). Whether this increase played a role in explaining the persistent shift in the Beveridge curve remains an open question. The question is worth studying given that there is evidence pointing at higher unemployment rates in regions where the minimum wage is more binding (Hofstetter 2012) and given Bernal and Cárdenas' (2004) findings about the persistence of a high wage elasticity of labor demand.

An additional element that should be part of the puzzle is the fact that in 1986 the unemployment duration reached record levels—38 weeks, compared to the 28 it had in 1980 (Lopez 1996). Guataquí et al. (2009) suggest the structural mismatch problems remain at the beginning of the 21st century. Using data from Quality Life Survey of 2003 they show incidence of unemployment is related with the informality of the search and matching mechanisms of the Colombian labor market. The stabilization of the Beveridge curve at high levels of both vacancies and unemployment provides further quantitative evidence on the deep and persistent mismatching problems of the Colombian labor market.

These hypotheses could be tested and might form a chronological story of how Colombia ended up with the worst natural unemployment rate in the Hemisphere (Ball et al. 2012).

A more rigorous statistical analysis on the shifts of the Beveridge curve and its slope is also necessary in order to better identify the chronology and forces behind it. We hope this new data will enhance our understanding of the functioning of Colombia's labor market and trigger new research on the particularities of developing countries' labor demand. Moreover, this research agenda would greatly benefit if other countries in the region put together similar vacancy series.

Conclusion

We have collected data on help wanted advertisements published in the print versions of the main newspapers in seven cities in Colombia, at a monthly frequency over the period 1976 to 2012. As explained in Arango (2013), the Central Bank of Colombia expects to continue collecting the data in the future and making it available to the public.

In this paper, using this dataset which we describe carefully, we propose a national help wanted index and a national vacancy rate. These constitute to our knowledge the first series of vacancies in emerging economies covering a long period at a high frequency. The data are useful for the analysis of the labor market and we hope to spark a new research agenda. The dataset is reported in the Additional file 1 and is also available online at <http://economia.uniandes.edu.co/vacantescolombia>.

Using help wanted ads to estimate vacancies poses several challenges. The most important one is whether the relative importance of this outlet to post job vacancies remains constant over time. We argue that during the last part of the sample the advent of online job search engines has displaced the importance of print HW ads. Thus, we propose to adjust the series to correct for the decline in the relative importance of HW ads in print newspapers. The adjustment follows the strategy proposed by Barnichon (2010) facing the same problem with series in the US.

We also take the first obvious steps to explore the resulting series. In particular, we fit a Beveridge curve and analyze the behavior of vacancy rates along the business cycle. In both cases we obtain sensible results. In particular, the vacancies move in a coherent way with the most salient features in Colombia in terms of economic fluctuations. As for the Beveridge curve, it has the negative slope that the theory predicts and a structural change—an outward shift—in the mid-eighties. In the paper we discuss some of the hypothesis that could explain the shift but it remains a task for future research to quantify which of them are more relevant.

Vacancy series in developing countries are a scarce input for researchers studying the labor markets. With the series described in the paper we provide interested scholars with a long and high frequency dataset that we hope will spark better ways of analyzing the labor markets in developing countries.

Endnotes

¹In 1985, these 7 cities accounted for 48.04% of the total urban populations. In 2012, the figure was 48.06%. See DANE (1991).

²See in particular pages 211 to 213.

³Based on some questions introduced in the Life Quality Survey of 2003 by the National Department of Statistics of Colombia. Guataquí et al. (2009) use the same dataset to study possible differences in the incidence of unemployment between population groups. They conclude that the duration of unemployment related with qualification suggest structural mismatch problems in the labor market.

⁴Estimation based on the Newspaper Association of America surveys available online at: <http://www.naa.org/Trends-and-Numbers/Readership/>

⁵In Barranquilla our dataset starts in 1978, rather than 1976; in Pasto it starts in 2000. In both cases the reason is that it was not possible to access the complete flow of print issues needed prior to these dates.

⁶We estimate the quarterly city-specific index by averaging the monthly series over the three months of respective quarters.

⁷If one minimizes the gap over the period 2010–2012 rather than only the last year, the algorithm still selects 2003 as the best year to start the adjustment.

Additional file

Additional file 1: Number of Help-Wanted announcements per city. Labor force series. Table S3.1 Vacancy Index per City, National Help Wanted Index (HWI), National Vacancy Rate in % (VR), Unemployment Rate in % (U), Adjusted national HWI (AHWI), Adjusted national VR in % (AVR).

Competing interests

The IZA Journal of Labor and Development is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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