

EMPLOYMENT AND DEVELOPMENT IN CALI AND THE VALLEY OF CAUCA: EVOLUTION AND A SPATIAL ECONOMETRIC ANALYSIS

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Abstract: The department of Valle del Cauca in Colombia showed an unemployment rate of 11.7% during 2016. The unemployment rate for Colombia was 9.2%, 2.5 percentage points higher than Colombia, according to the DANE. The labour market in Valle del Cauca shows great imbalances, largely the result of complexities in the city of Cali (Colombia), because the region's employment is concentrated there. We discuss the spatial patterns of unemployment and informality in the region and develop an index that explains who is employed in Cali. However, while the attraction index explains the informality, it does not explain all the unemployment in the region. This is explained better by spatial patterns.

Keywords: Spatial Labour Market, Development Economics, Regional Economics

JEL: C23, C31, R11

1. Introduction

The labour market's main problem in Valle del Cauca is its high unemployment compared with other regions of Colombia, which have equivalent levels of economic development. To date in this century, average unemployment rates in Cali and the entire department of Valle del Cauca have been above 13%. Castillo, Castro, Raffo y Mora (2018) suggest that three different moments exist for unemployment in Cali and Valle del Cauca. They say that 'A first moment of decline in the unemployment rate since 2001 (18%) until 2007 (11%), which represents a pronounced decrease of approximately 38% in the two unemployment rates during those 7 years. Then, there is an increase in the two unemployment rates from 2007 to 2011, with a more pronounced increase in the city of Cali that exceeded 15%. Finally, as of that year and until 2015, there is a decreasing tendency to reach the same levels of unemployment as nine years ago.' Thus, unemployment grows when economic activity slows and declines when economic activity accelerates.

On the other hand, Mora (2017) shows how Colombia's informality rate is one of the highest and longest in Latin America. In this context, the labour market in Cali is very complex. Cali's labour market dynamics also influence Valle del Cauca and Cauca. For example, SISBEN² data indicate that 51.3% of Cali's population are of working age,

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² The SISBEN is the Colombian System of Identification of Potential Beneficiaries of Social Programs that scores and classifies the population according to their socioeconomic conditions.

56.6% are economically active(employed or unemployed), 63% are unemployed, 58.1% are employed and 50% works in informal sector of the economy informal³.

In this article, we analyse the labour market from a regional perspective, not in an administrative sense, but rather involving two departments and many municipalities. The departments are Valle del Cauca and Cauca, and the municipalities are: Buenaventura, Buenos Aires, Caldono, Cali, Caloto, Candelaria, Corinto, Dagua, El Cerrito, Florida, Ginebra, Guacarí, Guachené, Jamundí, La Cumbre, Miranda, Morales, Padilla, Palmira, Pradera, Puerto Tejada, Santander de Quilichao, Suárez, Toribío, Vijes, Villarrica and Yumbo. These municipalities' labour indicators are about nine percentage points above those of the departments of Valle del Cauca and Cauca for 2014, as reported by the National Administrative Department of Statistics (DANE).⁴

While the Valle del Cauca department's unemployment rate was 11.7% and Cauca's was 10.8%, the region showed an unemployment rate of 20.8%; 9.1 percentage points higher than that of Valle del Cauca and 10.0 percentage points higher than that of Cauca. In the region, unemployment is higher for women and young people, the same trend that appears nationally and regionally (Mora, 2017).

Our empirical results indicated patterns of spatial behaviour in regional labour informality and unemployment. It should be noted that Cali attracts employees, which reduces informality in the region (Valle del Cauca and Cauca). However, this does not impact the region's unemployment.

This article is organised into five sections. In the second section, we discuss employment in Valle del Cauca. In the third section, we discuss the labour market from a spatial perspective. In the fourth, we provide a spatial analysis of informality in the region and present the model's results. We present our conclusions in the final section.

2. Employment in Valle del Cauca

While unemployment in Valle del Cauca was 11.7% in 2016, in Colombia it was 9.2%, 2.5% lower. The labour market in Valle del Cauca was unbalanced between 2008 and 2014. While 414,826 people were seeking work (Job Seekers), the firms offered, only 98,355 jobs (Vacant Jobs), and were available, of which 56,319 were filled (Matches). That is, 42,036 potential jobs were not filled, as shown in the following graph,

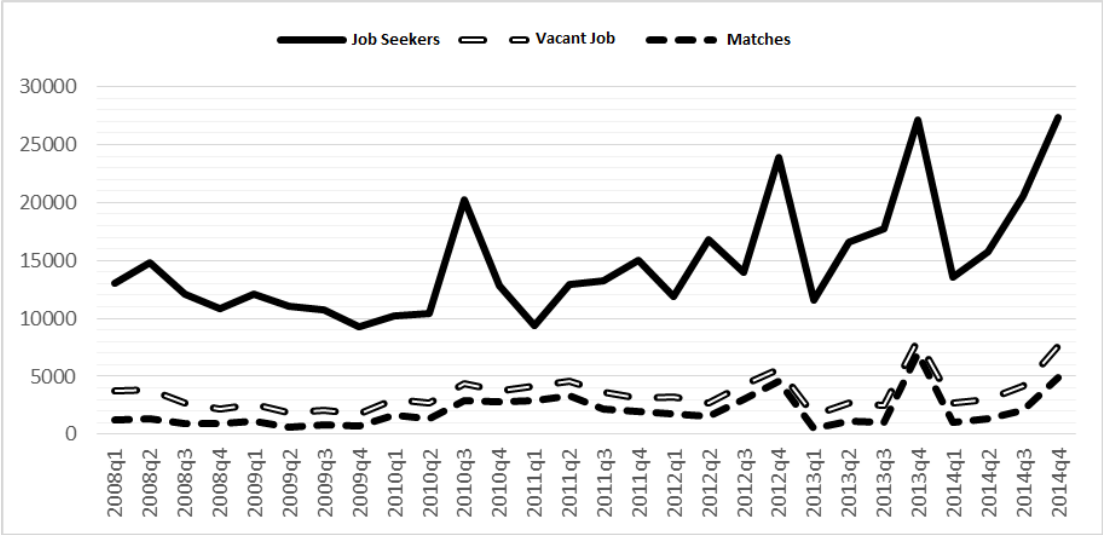
As Graph 1 shows, between 2008 and 2014, only 24% of all vacancies were filled by the unemployed and only 57% of all jobs offered by companies were filled. This situation differed for professional versus non-professional occupations (White Collar vs Blue Collar).

While the placement rate grew by 34% between 2008 and 2011, it decreased by 7.5% between 2012 and 2014. And although vacancies increased between 2008 and 2014, the increase was greater between 2012 and 2014, as shown in Table 1.

³ The definition of informality follows an institutional point of view, because it is not possible to calculate other indicators of informality. Thus, those who are not contributing to a pension fund are defined as informal. (See Mora, 2017).

⁴ These indicators excluded the municipality of Jambaló (Cauca), because it is not in the 2014 SISBEN database.

Graph 1. Job Seekers (JS), Vacant Jobs and Matches (M) for Valle del Cauca (2008–2014)



Source: Castillo, Castro, Raffo y Mora (2018).

Table 1. Growth Rates of Job Seekers, Vacancies and Matches for Valle del Cauca

Period	Total			Blue Collar			White Collar		
	JS	V	M	JS	V	M	JS	V	M
2008–2014	7%	6%	14%	7%	7%	20%	7%	0.1%	–3%
2008–2011	–0.1%	7.5%	34.0%	–1.5%	9.3%	46.2%	6.0%	2.0%	1.9%
2012–2014	7.6%	5.8%	–7.5%	9.3%	5.1%	–9.7%	0.5%	10.8%	8.4%

Source: Castillo, Castro, Raffo y Mora (2018).

When analysing matches and vacancies for white and blue collar workers, we observed that during 2012–2014, the annual growth of blue collar workers fell by 9.7%, despite the fact that annual growth in vacancies was 5.1%. The growth rate of placed white collar workers was 8.4%.

3. Spatial Analysis of the Labour Market in the Region

Spatial patterns of the labour markets and unemployment can be analysed by proximity to Cali Modelling unemployment requires two types of spatial models, one with a spatial lag and one with a spatial error. In the former, spatial dependence is added as an additional regressor, estimated by the model. Thus, according to Anselin and King (2014), the model is

$$TD_i = \rho WTD_i + \beta X_i + \varepsilon_i \tag{1}$$

where TD is the unemployment rate, ρ is the spatial autoregressive parameter, W is the spatial weight matrix, X is the set of covariables, i represents the municipality and ε is the random error term.

The model with spatial error assumes spatial dependence on the random error term, such that $E[u_i u_j]$ is non-zero. In this case, the model used is

$$TD_i = \beta X_i + u_i; u_i = \lambda W u_i + \varepsilon_i \tag{2}$$

In Equation 2, λ is a spatial, autoregressive parameter that specifies the random error term. Both types can be included in the spatial regression when the two types of spatiality are included:

$$TD_i = \rho WTD_i + \beta X_i - \lambda \beta Wu_i + u_i \quad (3)$$

To estimate Model 3, we use as covariables the Index on Non-Satisfied Basic (NBI in Spanish) for Colombia in 2010 (NBI 2010). NBI is the most popular direct method of estimating poverty in Latin America. The informality rate for young people is abbreviated as Tih, the youth population is defined by Colombian law as people from 14 to 28 years of age (Law 1622 of 2013).

Finally, our indicator of employment uses two indices. The first computes Cali's status as an employer attraction,⁵

$$Attraction = \frac{L_{Ci}}{PT} \quad (4),$$

where L_{Ci} is the labour force in Cali that comes from municipality i in the region, and where i = Buenaventura, Buenos Aires, Caldon, Caloto, Candelaria, Corinto, Dagua, El Cerrito, Florida, Ginebra, Guacarí, Guachené, Jamundí, La Cumbre, Miranda, Morales, Padilla, Palmira, Pradera, Puerto Tejada, Santander de Quilichao, Suarez Toribio, Vijes, Villarrica and Yumbo. PT is the total population in municipality i .

The second index is the constructed by discretising the importance of Cali's ability to attract employers, as follows:

$$ARI = \frac{(L_{iC} - L_{Ci})}{(L_{iC} + L_{Ci})} \quad (5)$$

In Equation (5), L_{iC} is the labour force in Cali. If Cali is a centre of employment, then the numerator is positive and negative otherwise. We discretise the index if the value is less than one and do not if it is zero. In this way, when the total workforce coming to Cali is used as a weighting factor, it can be characterised by the importance and interdependence of Cali in the region. We estimated all three models. Due to test rejections, both types of spatiality in the final regression are spatially dependent on the random error (Model 2).

Estimations in Table 2 show that the NBI negatively affects unemployment, meaning that better poverty conditions reduce unemployment. In addition, we find that an increase of youth informality and Cali's attraction as an employment centre reduces unemployment in the region. ARI (DARI) had no statistical effects. The statistical significance of lambda shows spatial dependence in the random error for the region.

⁵ These indicators are relative, because they depend on the municipality's role in job creation (in our case, for Cali).

Table 2. Spatial estimations			
Variable	Model 1	Model 2	Model 3
Constant	0.622***	0.400**	0.633**
	(0.056137)	(0.0665388)	(0.0802398)
Nbi2010	−0.004***	−0.003***	−0.004***
	(0.000676063)	(0.000496494)	(0.000960262)
Tih	−0.473***	−0.303**	−0.485**
	(0.134918)	(0.118708)	(0.145739)
Attraction			−0.179***
			(0.011093)
Dira		0.001	
		(0.00401645)	
Lambda	−0.893***	−0.947***	−0.903***
	(0,185171)	(0,165094)	(0,181651)
R-squared	0.485861	0.519011	0.488696
Log likelihood	25.42939	32.95712	25.441592
AIC	−44.8588	−57.9142	−42.8832
Breusch-Pagan test	0.5034	0.43355	0.18474
Likelihood ratio test	0.01391	0.01003	0.01373
N	27	27	27
Source: Author's calculations.			
Notes: Standard errors in parentheses. **Statistically significant at the 0.01 percent level.			
***Statistically significant at the 0.005 percent level.			

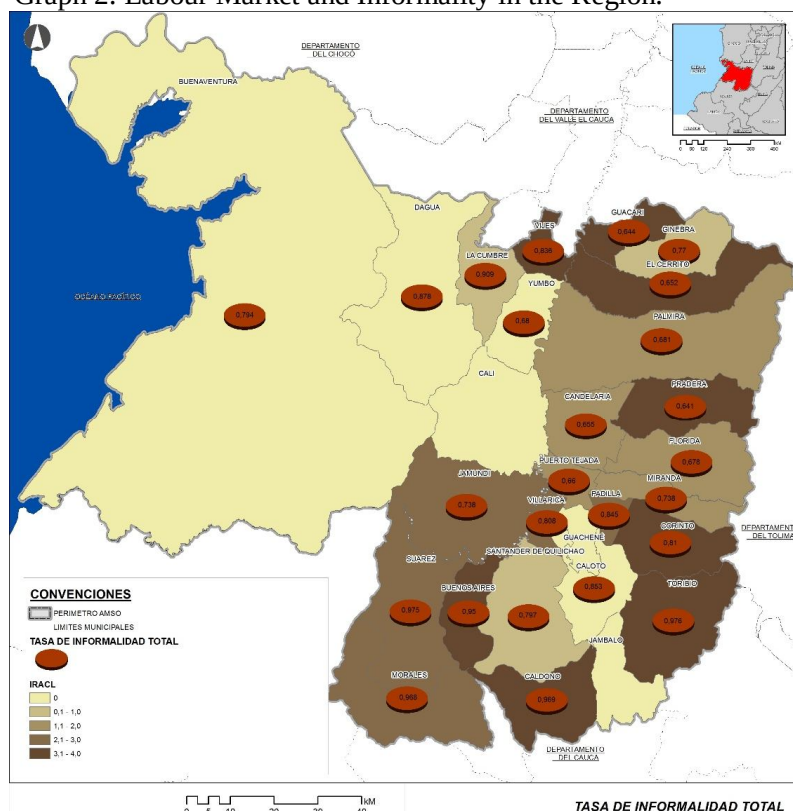
4.- Spatial Labour Informality in Cali and in the Region

Labour informality in Colombia is about 50% (Mora, 2017; Mora and Muro, 2014). This rate is similar, regardless of whether the analysis is made by a structural or an institutional vision of labour informality (Mora, 2017).⁶ We calculate institutional informality as affiliation to pension funds, using SISBEN records. Graph 2 shows the municipalities in Valle del Cauca and Cauca, as well as the relationship between informality and the attraction index.

Continuous values of IRA were discretised on five values, from negative to zero (yellow), when Cali is not an employment centre. IRA takes a value of one when the index is between zero and 25% in employment attraction, two if the IRA is between 26% and 50%, three when the IRA is between 51% and 75% and four when the IRA is above 75%. Graph 2, shows that the most of the municipalities with a high level of attraction share a similar level of informality. Geographically, in Valle del Cauca, areas near Cali have lower attraction indices than municipalities further away from Cali.

⁶ Mora (2017) discusses how informal labour estimations made by DANE do not show substantial differences regarding estimations made, using institutional informality from affiliations to pensions.

Graph 2. Labour Market and Informality in the Region.



Source: Author's calculations.

To consider the region's labour spatiality over informality, we estimated spatial models of informality, such as the youth unemployment rate. Our results show a negative relationship between informality and youth unemployment. Because of the endogeneity between youth unemployment and informality, and possible measurement errors in the attraction index, which we used as an index of unsatisfied basic needs in 2005, and the percentage of immigrants from each municipality.^{7 8}

The first column of Table 3 shows the results of the OLS regression. While the dummy of attraction index was not statistically significant, this may have been caused by the presence of unspecified spatial autocorrelation. The test for spatial autocorrelation confirms the existence of spatial autocorrelation. Tests on spatial lag (Lagrange Multiplier and Robust LM) also corroborate the existence of spatial autocorrelation. Therefore, the model should be the established in Equation (1). Meanwhile, the test for spatial autocorrelation of spatial error does not reject the null hypothesis of no spatial

⁷ Other covariables, such as the added value of each municipality in 2005, were used but were not statistically significant.

⁸ We used DANE's 2005 census data to estimate the attraction index, because only this database allows building a matrix of the origin and destination of workers. The 2005 census data was processed with the processor R + SP in REDATAM DANE.

autocorrelation of error.⁹ To consider endogeneity, we use the Anselin-Kelejian test (Kelejian Anselin, 1997), which rejects the null hypothesis of no spatial autocorrelation.

Table 3. Spatial Estimation of Informality

Variable	OLS	GMM
Constant	1.2580123** (0.2272611)	0.3302844* (0.1709728)
DIRA	-0.0012036 (0.0396617)	-0.0650869** (0.0296641)
TDJ	-1.3274858* (0.6572356)	-0.4369012** (0.1847124)
W ^{II}		0.8387234** (0.1582817)
Moran's I (error)	0.5697**	4.034*
Robust LM (lag)	6.761**	
Robust LM (error)	1.293	
Lagrange Multiplier (SARMA)	19.643**	
Anselin-Kelejian Test		
Pseudo R-squared	0.2555	0.6741
Spatial Pseudo R-squared		0.5215
N	25	25
Source: Author's calculations. Standard errors in parentheses. **Statistically significant at the 0.01 percent level ***Statistically significant at the 0.005 percent level.		

Column (3) in Table 3 estimates the informality rate, using the Generalised Method of Moments (GMM). Our results show that when Cali is considered an employment centre, informality reduces by about 8.3%. Our results show that Cali's labour market is much wider and more formal than that of other municipalities in the region and that Cali's hiring rules improve the employment situation of regional workers.

5.-Conclusions

Municipalities in the Valle del Cauca and Cauca regions show unemployment about nine percentage points above that in Valle del Cauca and Cauca departments. Unemployment problems mainly affect women and youth people.

Cali is the region's centre of employment. According to the 2015 origin and destination matrix, 31,057 workers in the region were employed, while 15,963 Cali inhabitants worked in other municipalities in the region. In other words, Cali's attraction index was 32% (15,094/47,020). This employment attraction influences forms of hiring and the quality of employment, largely generating decent employment (in particular regarding informality). These patterns are very important, especially when considered the role of manufacturing in Latin America, as discussed by Guisan (2015a, 2015b).

Our results show clear patterns of spatial behaviour in the labour market, which favours labour markets by reducing informality and unemployment. Public policy

⁹ Anselin and King show that the LM tests are sensitive to spatial autocorrelation.

recommendations are clear. In Cali, formal hiring patterns and reductions in unemployment will improve municipalities' labour markets. Cali's labour market is regional, and all the region's municipalities must agree on labour market policies.

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