The building sector in Cali (Colombia): An economic review to its recent evolution and major determinants*

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–Introduction. –I. The house building sector in Cali: its economic importance and evolution. II. Determinants of the construction sector. –Conclusions. –References. –Appendices.

Resumen: En la literatura económica es sabido que el sector constructor constituye uno de los eslabones claves para el desarrollo económico del país. Por un lado, participa en la generación de valor agregado y por otro, contribuye de forma importante en la creación de empleo no calificado. Por esta razón, y con el ánimo de contribuir al análisis regional, el presente artículo tiene como propósito mostrar la importancia y la reciente evolución del sector edificador en Cali. Asimismo, evaluar la respuesta de la actividad constructora municipal a sus diferentes determinantes. En primer lugar, se encontró, en el análisis, fases expansivas y recesivas del renglón edificador durante las últimas dos décadas. Evidenciando, entonces, su comportamiento cíclico. Durante los años 1990-2007, el sector presentó una participación, promedio, dentro del PIB

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municipal de 16,1%. En segundo lugar, en Cali, el número de personas ocupadas tanto en la rama de edificaciones como en obras civiles entre 2001 y 2009 se ubicó en 58 mil trabajadores. Finalmente, y de acuerdo con la estimación del modelo, los determinantes del sector a nivel regional son la tasa de interés y los ingresos reales medidos a través del PIB real.

Palabras clave: Sector edificador, Cali, análisis económico regional, modelo cuantitativo, determinantes de oferta y demanda de vivienda.

Abstract : In economic publications it is well known and accepted that the building sector is one of the key links for economic development of the country. On one hand it contributes to the generation of added value and it is an important element in the creation of unskilled labor. For this reason, and with a view to contributing to regional analysis, this article proposes to show the importance and the recent evolution of the building sector in Cali, and likewise, to evaluate the response of the municipal construction activity to its different determinants. In first place, the analysis found both expansion and recessive phases in the building sector during the last two decades, establishing cyclical behavior. During the period 1990-2007, the sector showed, on average, a contribution of 16,1% in the municipal GDP. Secondly, the number of people engaged in the building sector and in civil works, between 2001 and 2009, in Cali, was 58,000. Finally, and according to the model's estimation, the determinants of the sector at regional level are the interest rate and the real income, measured by means of the real GDP.

Key words: Building sector, Cali, regional economic analysis, quantitative model, housing supply and demand determining factors.

Résumé : D'après la littérature économique le secteur du bâtiment constitue l'un des secteurs principaux pour le développement économique d'un pays. D'une part, il s'agit d'un secteur très important dans la création de richesse (valeur ajoutée) et, d'un autre, c'est un secteur important dans la création d'emplois non qualifiés. L'objectif de cet article est de montrer l'évolution récente et les déterminants du secteur du bâtiment dans la ville de Cali, dont l'intérêt porte sur la possibilité de contribuer à l'analyse économique régionale. Nous montrons que le secteur du bâtiment a présenté des phases aussi bien expansives que récessives pendant les deux dernières décennies, ce qui traduit un comportement cyclique. Pendant la période comprise entre 1990 et 2007, le secteur du bâtiment a représenté en moyenne un 16,1% du PIB de la ville. Nous montrons également que ce secteur a employé autour 58 mil personnes dans la période 2001- 2009. Finalement et en accord avec les résultats des estimations économétriques, nous montrons que les déterminants du secteur à niveau régional sont le taux d'intérêt et les revenus réels.

Mots clef : Secteur bâtiment ó immeuble, Cali, analyses économique régional, modèle quantitatif, facteurs d'offre et demande de logemen).

Clasificación JEL: C10, R10, R31, R21.

Introduction

The construction sector has been traditionally considered as one of the key links in economic growth of the country. From 2000 to 2008, this activity had an average share of 4.4% of the GDP; and in the last year, employed more than 890.000 workers. In addition, the sector has the capacity to organize and influence the economy due to its high level of links to other productive sectors. In effect, within the framework of the current global economic crisis (2008 – 2009), one of the measures of anticyclical policy developed by the national government designed to stimulate the purchase of new housing, and with the purpose of reducing the existing offer and boost construction by means of new projects. In this sense, this policy was suggested because of the faculties that the sector has as a vehicle for investment, the generation of employment and it's multiplying effects on the overall economic activity.

At regional level, during recent years, Cali has registered important advances in the dynamics of construction, after the severe deterioration suffered during the period 1995-2001. According to data from Camacol (2009), between 2002 and 2007, the sector presented sustained growth, which positively affected the socio-economic structure of the city.

With the intention of contributing to local analysis, this document proposes to show the recent evolution of the construction sector in Cali, by means of the most important variables in the sector. Likewise, the response of the municipal construction activity to its different determinants is

evaluated. Therefore, in the second part a descriptive analysis of the evolution of the sector in Cali, its major statistics and perspectives, is developed. Subsequently, an econometric model is estimated, in order to establish the relationships of the sector with its major determinants. Finally, conclusions are presented.

I. The house building sector in Cali: its economic importance and evolution

In economic publications it is well known and accepted that construction represents one of the variables that influence the performance of added production, as is defined by some of the studies carried out by Camacol (2008), Fedesarrollo (2004) and the Titularizadora Colombiana (2002). In this order of ideas, it is worth mentioning that the afore-mentioned activity is subdivided in two branches. The first branch is composed of the building sector that brings together the work of housing construction, non-residential buildings and the repair and maintenance of buildings. The second one consists of civil engineering works such as, roads, bridges and pathways, etc. In this way, and unless otherwise documented, this document focuses on the building sector, and specifically on the construction of housing.

In the national context, different analysts have studied the role that the building sector plays in Colombian economy. Amongst them are, Cardenas and Bernal (1997), who, based on a general equilibrium model simulate the impact that a boom of the building, oil, coffee and machinery and equipment segments has on some economic

variables. Results show that the building activity presents the greater impact on employment and on the increase of urban real wage of unqualified labor. In the same way, the study shows that an increase of 10 % in private investment would cause an increase of 0.33 % in economic growth; exceeded slightly by an oil boom (0.37).

On their part, Clavijo, Janna and Muñoz (2005), point out the low share of accumulated value from building within the GNP, placing it in 3% at the beginning of the current decade. Even though Cardenas and Hernandez (2006) corroborate the low share in production, they highlight the following positive aspects of the housing branch: a) the sector shows major backward links, in which a high percentage of goods that are produced by the mining and industrial activity are demanded by construction; b) the increasing behavior of construction creates a multiplying effect on the overall economy; and c) the construction activity causes a positive impact on the labor market. Mean while, taking into account the input - product matrix, Forero (2008) supports the strong interaction between the construction sector and the industrial line. In this way, the author confirms the importance of construction as a factor in the advancement of national economy.

According to recently published data by Dane (2010), the share of the building category in the GDP was 1.8% and presented a real growth rate of 10.4%, on average, between 2000 and 2009. This situation implies that the sector represents a driving force of the national economy. For its part, and according to the availability of data on national accounts, in the case

of Valle del Cauca, the sector represented 1.5% of the department's GDP from 2000 to 2007. Although in comparative terms construction represents a small contribution in the total production, its benefits are also reflected in the capacity to generate backward and forward links. In this way, it exerts great influence on economic activities of the industry and services, among them: wood and cork products, non-metallic mineral products, metallurgic products, chemical substances and products, rubber and plastic products, and financial mediation services.

However, the macroeconomic accounts of the city of Cali have been object of study by Alonso y Vergara (2009). The results produced by the study show that the building sector, in the period 1990-2007, represented 16,1% of the local product. This demonstrates the importance of construction as a percentage of the city's GDP. As with the economy in general, the building sector experiences expansion and contraction periods. Graph 1 clearly shows the cyclical behavior of the sector in Cali, from the second half of the nineteen eighties onward. For the period under discussion, two phases of sustained growth, as well as, three periods with descending growth rates can be seen.

Several authors, among them, Junguito, López, Misas y Sarmiento (1995); and Giraldo y Cortes (1994), conclude that the fluctuations of the sector in the national context tend to occur between four to five years. In this sense, the graph suggests that regional building activity fluctuates in an equal number of years, with slight monthly differences.

Graph 1

Housing construction licenses in Cali. Monthly approved area (m²)
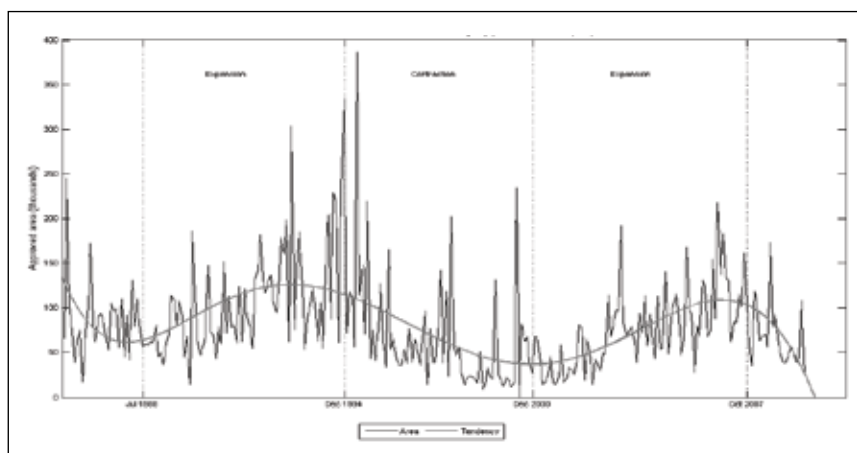
Source: Data from DANE, Construction Statistics, Graph by the authors.

The strong impulse experienced by the sector during 2003 to 2007 can be seen, on the one hand, by the increase of housing licenses, which rose from a monthly average of 44 thousand square meters, during the crisis of the late nineties, to 90 thousand square meters, in the period under study. However, the good performance is lower than that registered from 1990 to 1994. On the other hand, a set of leading indicators of the segment confirm its positive evolution; among them the increase of dispatches of cement in Valle del Cauca, and the upward movement of the new housing price index (See Graph 2).

For 2008, a decrease in the approved licenses is evident. In fact, the data provided by Camacol Valle (2009) shows a fall in the sales in housing units in Cali, from 6.600 in 2007 to 4.910 in 2008. This shows a decrease in the sales volume of 25.6%. Specifically, the sales of social interest accommodation decreased by 381 units, and for non-social accommodation by 1.309.

There are several possible reasons for the slow movement and they could be complementary. In the first instance the moderation of building activity, as a result of its economic cycle. Secondly, the global financial and economic crisis affected several of the determinants of housing construction. Finally, the high costs of construction, mainly influenced by the increase in the global demand of steel, accentuated its fall (See Graph 3).

In this context, the fluctuations of the building sector have a strong effect on the economy, affecting directly, among others, employment (Cardenas and Hernandez, 2006). Therefore, the positive impact (negative) of the construction sector contributes to the generation (destruction) of unqualified employment, which represents one of the most vulnerable classes in society. Likewise, it promotes qualified employment in the case of engineers, architects and designers, among others.

Graph 2

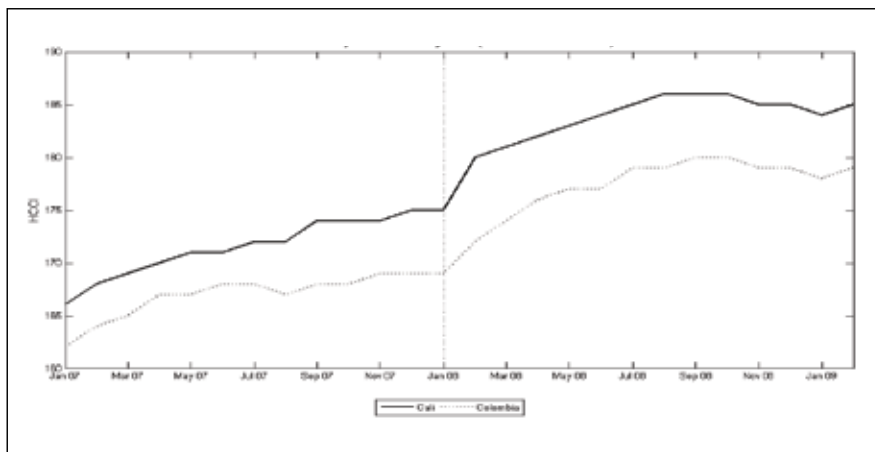| **Valle del Cauca. Dispatches of cement (jan 96 - apr 09)**	**Cali. New Housing Price Index (NHPI) 2006 IV Trimester = 100**

······ low stratum ···· medium stratum ······ high stratum
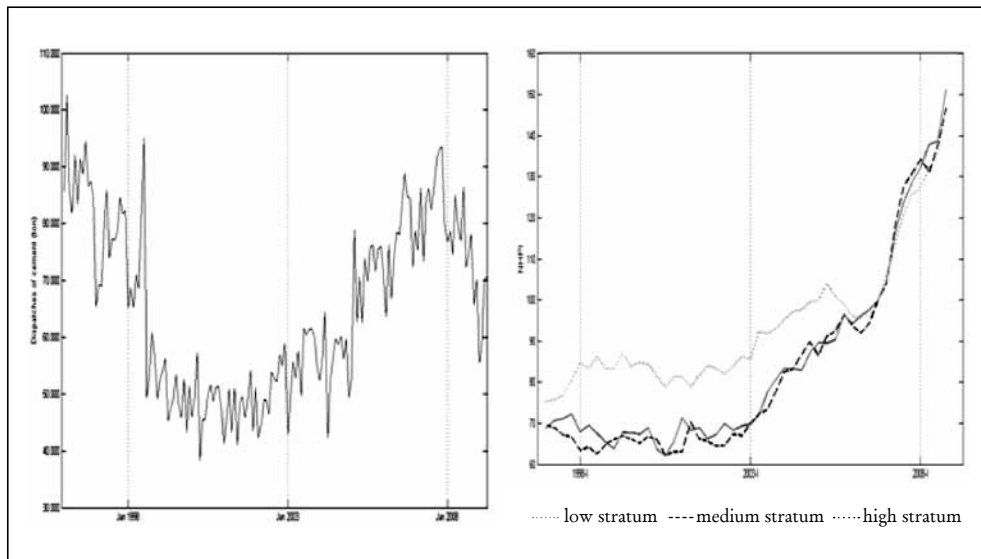
Source: Data from Dane and Instituto Colombiano de Productores de Cemento, Graphs by the authors.

Graph 3
Cali - Colombia. Housing Construction Costs Index
**January 2007 - January 2009 (December 1999 = 100)**

Source: Data from DANE, Graph by the authors.

In Cali, the number of people engaged in the building industry as well as in civil work, was on average 58,000 from July 2001 to June 2009. This is equal to a participation rate of the total municipal employment figure of 5.9. (See Graph 4). In relative terms, the country presents a lower rate (4.9%) during the same period. These reasons prompt us to consider the importance that construction has in the region's labor market, even more so when the building subsector is unskilled labor intensive. According to Forero (2008), in Colombia, between the first trimester of 2001 and 2008, the largest proportion of employment in construction took place in Bogotá, Medellín and Cali, with a share of 32, 9%, 16, 2% y 14, 2%, respectively. In other words, Cali is the third city in terms of the number of people working in the sector.

Graph 4
Cali. Employment in the construction sector (Jul 2001 – Jun 2009)
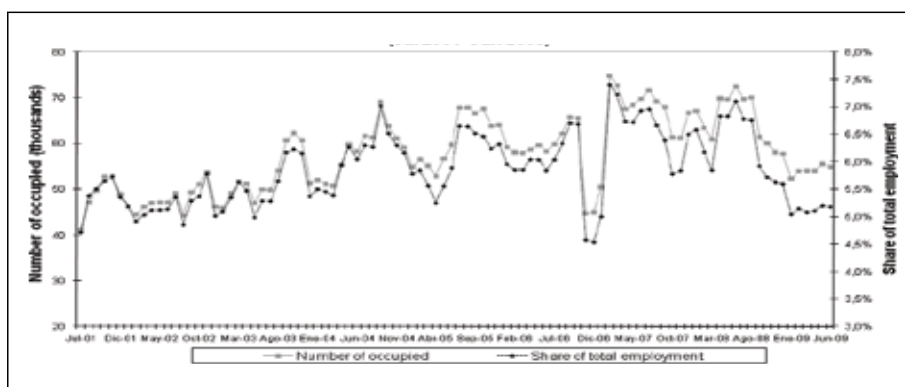
Source: Data from Dane and Camacol Valle, Graph by the authors.

II. Determinants of the construction sector

For several decades, Colombia has been the focus of study of the performance and variables linked to building activity. This is as a result of its dynamics and impact on both national and regional economies. For this reason, the relationship between housing construction in Cali and the major determinants identified in Colombian publications are validated. Specifically, this study refers to the variables found in research by Saldarriaga (2006); Cárdenas and Hernández (2006); Clavijo, Janna and Muñoz (2005); and Junguito, López, Misas and Sarmiento (1995).

In first instance, the variable 'construction licenses' becomes the key indicator that denotes the behavior of the sector. Several elements of the indicator are highlighted: 1) it shows to a great extent the evolution of construction. Research has found correlations higher than 0.90 between construc-

tion licenses and the GDP of buildings". 2) It facilitates working on a monthly and quarterly basis and without backlogs. 3) It is limited to formal construction.

In the second instance, in the work under reference, the rate of unemployment, the housing construction costs index, and the labor income, can be highlighted as determinants of the building sector. The aforementioned variables correspond to most of the cases analyzed. Based on the previous argument, it is expected that the rate of unemployment will negatively affect the construction sector, because it alters the income of families. In the same way, it is expected that the costs of construction and the interest rate negatively affect the building sector, since an increase of these variables makes construction more expensive and therefore, the acquisition of housing. For their part, it is also expected that the real income will positively affect the sector under discussion.

In effect, the correlations presented for the municipal environment between the construction licenses and their possible determinants are congruent with economic theory (See Graph 5). In other words, the inverse relation of the rate of employment, the housing construction costs index, and the interest rate, with the construction licenses, is corroborated. Correspondingly, the real income of the city shows a positive relationship.

Within this framework, a model has been estimated to establish the effects and the statistical validity of the major determinants of the building sector in Cali. The model assumes market equilibrium of the construction category; therefore, the

housing demand equals its supply. This reduced form can be defined as

$$Q = Q\,(td,\ HCCI,\ i,\ PIBr) \tag{1}$$

Where, Q is the demanded and supplied quantity of housing, in this case it is represented through construction licenses. For its part, td is the rate of unemployment; $HCCI$ is the housing construction costs index; i is the active interest rate and finally, $PIBr$ is the real income. According to the available data, the analysis period is taken between 1999 and 2008, with a quarterly frequency.

Data from Dane was used for the construction licenses and the HCCI. The Banco de la República provided the historical series of the rate of unemployment and the active interest rate in Cali. Lastly, the municipal real GDP was used to capture the effects of income in the construction sector and data were taken from de Departamento Municipal de Planeación, and ICESI University.

The first estimations presented problems. On one hand, the individual significance of the rate of unemployment and the HCCI turned out not to be statistically significant. On the other hand, the HCCI presented the opposite sign of what expected. Nevertheless, the global significance of the model turned out to be robust. Therefore, the number of independent variables was reduced. The HCCI was omitted because it presented a different sign from the economic assumptions and the rate of unemployment was excluded because it lacked statistical significance. In this sense, Saldarriaga (2006) explains that, when we dispense with some variables of the building model, this can cause bias in the accurate
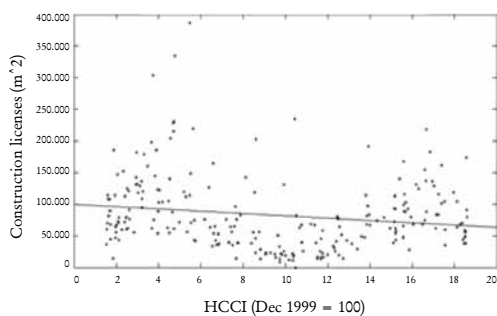
Graph 5

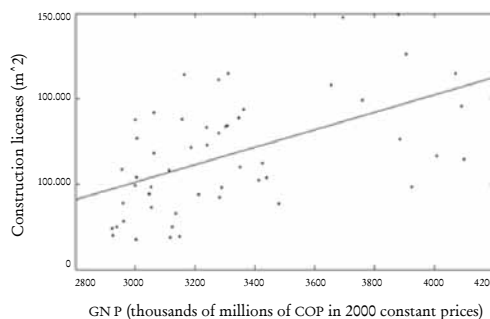**Cali. Construction licenses and rate of unemployment**
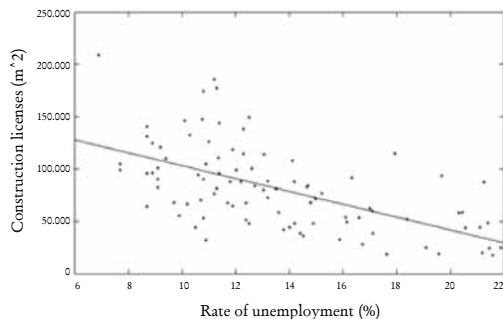
Cali. Construction licenses and interest rate
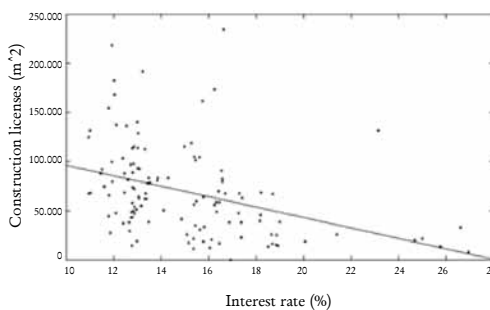
Cali. Construction licenses and HCCI

Cali. Construction licenses and GDP

Source: Data from Dane, Camacol Valle, Banco de la República and Cuentas económicas de Santiago de Cali. Graphs by the authors.

estimation of the coefficients; however, it allows us to observation the relevance of a specific variable in the sector of study.

The results produced by the model are presented in Table 1. It was confirmed that the error term was white noise, and that the estimators complied with the conditions of being unbiased, efficient and consistent. According to the estimation, the robust variables were the real GDP of Cali and the active interest rate, which turned out to be statistically significant at 1%. Along these lines, an increase of one percentage point in the interest rate has a negative effect of 1.4%. For its part, an increase of 1% in income, the activity increases by around 2.1%. Even though some of the independent variables were excluded, the variables contained explain 60% of the model.

Table 1

Determinants of the construction sector in Cali

Dependent Variable: LN construction licenses
Method: Least Squares
Date: 05/12/10
Sample: 1999Q1 2008Q4
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_PIBCALI	2.123640 *	0.559373	3.796466	0.0005
LN_INTERES RATE	-1.415214 *	0.282225	-5.014489	0.0000
C	-15.93733	8.642784	-1.844004	0.0732
R-squared	0.596367	Mean dependent var		12.09871
Adjusted R-squared	0.574549	S.D. dependent var		0.581842
S.E. of regression	0.379516	Akaike info criterion		0.972199
Sum squared resid	5.329199	Schwarz criterion		1.098865
Log likelihood	-16.44397	F-statistic		27.33373
Durbin-Watson stat	2.199726	Prob(F-statistic)		0.000000

*Significant at 1%

Source: calculations by the authors

Given the previous argument, the anti-cyclical policy promoted by the National Government, by Law 1143 of 2009, whose intention is to establish decreases in the mortgage interest rate as a mechanism to boost the purchase of new housing and therefore soften the effects of the global economic crisis (2008-2009), has become a good strategy for the construction sector since it has boosted one of its fundamental determinants.

For example, after April in 2009, when the "subsidy" of the interest rate was introduced, the building sector was reactivated. In the national context, the approved area moved from a monthly average of 676 thousand meters in the first semester of 2009 to 858 thousand meters during the rest of the year. At regional level, Cali presented an increase of 60% of the licensed area during the second semester of 2008, in relation to the first semester of the same year (Amaya, 2010).

For its part and in accordance with the quantitative model, real income stimulates substantially the construction of new household. The most recent macroeconomic figures published by the "Departamento Administrativo de Planeación" of Cali and the ICESI University, illustrate that the construction sector of the city showed signs of recovery after the profound crisis at the end of the nineties; this, in response to the sustained increase that the real GNP of Cali experienced between 2002 and 2007.

Among other arguments, the family's income is the major source in order to

acquire housing because it represents the purchase power to buy goods and services. There for, households employ part of their income to buy new housing, for both reasons: this asset represents a way to accumulate wealth and it can be associated to a greater financial, psychological and emotional solidity (Forero 2008, 26). Besides, it is well known that Colombian regulations only allow financing up to 70% of the housing's value, there for, greater income entails a greater payment capacity in a mortgage credit.

Conclusions

This article deals with the building sector taking into account several aspects. First, it describes the evolution during the past two decades and the importance of construction activity to the regional economy. This analysis reflects, on the one hand, the cyclical behavior of the sector from 1990 to 2009, demonstrating expansion and contraction periods. On the other, it shows the importance of the activity in the regional production in the participation in the GDP, as well as in the capacity to generate forward and backward links. Likewise, it makes a fundamental contribution to the creation of employment, and specifically of unqualified labor.

Secondly, by means of a qualitative exercise carried out by means of Ordinary Least Squares, it was possible to determine the interest rate and the real income (real GDP) as statistically significant determinants of the building sector in Cali. The interest rate presents an inverse relationship with the sector, while the real income presents

a positive relationship. This corroborates the signs according to economic theory. Nevertheless, variables such as the rate of unemployment and the housing construction costs index, presented opposite signs of what was expected, and did not turn out to be robust, and were not therefore included in the model.

Taking in account the previous argument, it is fundamental recommending the corresponding authorities on local economy that those decisions that seek favoring the performance of the construction activity must be designed to guarantee lower interest rates and greater income to households in Cali. However, the decreases in the interest rates depend greatly on the intervention rate of the "Banco de la República" and on the competition in the financial system. Regarding income, it is more feasible that the municipal government increases the family's available income by augmenting transfers and or subsidies; this would incentive the economic activity of the sectors.

Likewise, it is really important to start taking measurements for the systemic collection of figures of the constructor line and of those variables that may influence in its behavior, such as payments and the access to mortgage credit. Finally, it is worth noting findings presented in this article are an advance towards further research which can focus on key productive sectors, which can boost regional development, allowing more favorable economic and social welfare. In the last year, for instance, the municipal building sector positively influenced the socio-economic structure of the city.

References

ALONSO, J. Y VERGARA, S. (2009). "Análisis sectorial para el periodo 1990-2007". Julio Cesar Alonso (Ed.), *Cuentas económicas de Santiago de Cali* (pp. 33-55). Cali: DAP.

AMAYA, S. (2010). "La edificación irá para arriba: Camacol Valle". *Revista Metro X Metro*, diario El País, pp. 20-21.

CAMACOL VALLE. (2009). "*Estudio de oferta y demanda de vivienda en Santiago de Cali y área de influencia: Candelaria, Jamundí, Palmira y Yumbo*. IV trimestre de 2008". Cali: Camacol.

CAMACOL. (2008). "El sector de la construcción en Colombia: hechos estilizados y principales determinantes del nivel de actividad". *Informes Económicos*. Retrieved from. www.camacol.org, September 25th, 2009.

CÁRDENAS, M. Y HERNÁNDEZ, M. (2006). "El sector financiero y la vivienda". Estudio realizado por Fedesarrollo para Asobancaria.

CÁRDENAS, M. Y BERNAL, R. (1997). "Auge y crisis de la construcción en Colombia: causas y Consecuencias". *Revista Camacol*, Vol. 1, No. 1, pp. 8-32.

CLAVIJO, S., JANNA, M., Y MUÑOZ, S. (2005). "La vivienda en Colombia: sus determinantes socioeconómicos y financieros". *Desarrollo y Sociedad*, No. 55, pp. 101-164.

DEPARTAMENTO ADMINISTRATIVO MUNICIPAL DE PLANEACIÓN Y UNIVERSIDAD ICESI, GRUPO DE INVESTIGACIÓN CIENFI (2009). "Cuentas económicas municipales anuales". Julio Cesar Alonso (Ed.). *Cuentas económicas de Santiago de Cali: 1990-2008*, pp. 56-89, Cali: DAP.

DÍAZ, J.; GAITÁN, F.; PIRAQUIVE, G.; RAMÍREZ, M, Y RODA, P. (1993). "Dinámica de la construcción entre 1950-1991". *Planeación y Desarrollo*, Vol. XXIV, No. 2, pp.265-287.

FEDESARROLLO (2004). "Oferta y demanda en el sector constructor colombiano". *Coyuntura económica*, Vol. XXXIV, No. 1, pp. 27-41.

FORERO, G. (2008). "Impacto de la construcción de vivienda en Colombia 1990-2005. Una aproximación desde la metodología insumo-producto". *Equidad y Desarrollo*, No. 10, pp. 25-46.

GIRALDO, F. Y CORTÉS, J. C. (1994). "Los ciclos de la edificación en Colombia: 1950-1993". *Revista Camacol*, No. 60, pp. 21-41.

JUNGUITO, R.; LÓPEZ, E.; MISAS, M. Y SARMIENTO, E. (1995). "La edificación y la política macroeconómica". *Borradores de Economía*, Banco de la República, No. 41, pp. 1-27.

SALDARRIAGA, E. (2006). "Determinantes del sector de la construcción en Colombia". [en línea], disponible en: http://www.onuhabitat.org, recuperado: January 18th, 2010.

TITULARIZADORA COLOMBIANA. (2002). "El sector de la construcción y sus perspectivas". *Informes de actualidad*, No. 2, pp.1-16, [en línea], disponible en: http://www.titularizadora.com, recuperado: December 10th, 2009.

Appendices

White Heteroskedasticity Test:

F-statistic	2.063954	**Probability**	**0.106637**
Obs*R-squared	7.634411	Probability	0.105926

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/12/10   Time: 14:52
Sample: 1999Q1 2008Q4
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	48.45757	982.3485	0.049328	0.9609
LN_PIBCALI	-7.213973	130.3463	-0.055345	0.9562
LN_PIBCALI^2	0.224929	4.327651	0.051975	0.9588
LN_INTERES	6.571661	2.780848	2.363186	0.0238
LN_INTERES^2	-1.154062	0.489743	-2.356466	0.0242

R-squared	0.190860	Mean dependent var	0.133230
Adjusted R-squared	0.098387	S.D. dependent var	0.186633
S.E. of regression	0.177215	Akaike info criterion	-0.506442
Sum squared resid	1.099175	Schwarz criterion	-0.295332
Log likelihood	15.12884	F-statistic	2.063954
Durbin-Watson stat	1.228985	Prob(F-statistic)	0.106637

Source: calculations by the authors

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.510042	**Probability**	**0.479726**
Obs*R-squared	0.558797	Probability	0.454745

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/12/10   Time: 14:53
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_PIBCALI	0.043340	0.566374	0.076522	0.9394
LN_INTERES	0.009673	0.284435	0.034007	0.9731
C	-0.675452	8.751836	-0.077178	0.9389
RESID(-1)	-0.120859	0.169230	-0.714172	0.4797

R-squared	0.013970	Mean dependent var	-3.16E-15
Adjusted R-squared	-0.068199	S.D. dependent var	0.369657
S.E. of regression	0.382054	Akaike info criterion	1.008130
Sum squared resid	5.254751	Schwarz criterion	1.177018
Log likelihood	-16.16260	F-statistic	0.170014
Durbin-Watson stat	1.926610	Prob(F-statistic)	0.915936

Source: calculations by the authors

Cointegration Test - Engle-Granger
Date:05/12/10   Time: 14:59
Equation: UNTITLED
Specification: LN_LICENCIAS LN_PIBCALI LN_INTERES C
Cointegrating equation deterministics: C
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion,
    maxlag=9)

	Value	Prob.*
Engle -Granger tau-statistic	-6.838307	0.0000
Engle-Granger z-statistic	-43.65413	0.0000

*MacKinnon (1996) p-values.
Intermediate Results:

Rho - 1	-1.119337
Rho S.E.	0.163686
Residual variance	0.138302
Long-run residual variance	0.138302
Number of lags	0
Number of observations	39
Number of stochastic trends**	3

**Number of stochastic trends in asymptotic distribution.
Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 05/12/10   Time: 14:59
Sample (adjusted): 1999Q2 2008Q4
Included observations: 39 after adjustments

Variable	Coefficien	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.119337	0.163686	-6.838307	0.0000

R-squared	0.551536	Mean dependent var		-0.010101
Adjusted R-squared	0.551536	S.D. dependent var		0.555328
S.E. of regression	0.371889	Akaike info criterion		0.884865
Sum squared resid	5.255458	Schwarz criterion		0.927520
Log likelihood	-16.25486	Hannan-Quinn criter.		0.900169
Durbin-Watson stat	1.927371			

Source: calculations by the authors