Structural determinants of trade union membership in Colombia*

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Primera versión recibida el 22 de marzo de 2011; versión final aceptada el 8 de julio de 2011

Resumen: Tanto las causas con efectos de la participación sindical han sido ampliamente estudiados en la literatura. Sin embargo, la baja disponibilidad de información estadística ha dificultado un mayor número de estudios para el caso de Colombia. Haciendo uso de la información de la Gran Encuesta Integrada de Hogares de 2007, este documento presenta una primera estimación de los determinantes de la participación sindical en Colombia considerando los posibles efectos a nivel regional y sectorial. Los resultados proveen evidencia de que la participación para el caso colombiano apoya la evidencia presentada por Johnson (2005) para países con sistemas de negociación colectiva similares.

Palabras clave: Sindicatos, salarios, contrato de trabajo, Colombia.

Abstract: Both causes and effects of trade union membership have been widely reviewed by economic literature. However, since it is difficult to find data,the determinants of trade union membership have not been analized for Colombian case. In this document we present the first estimation of the structural determinants of trade union membership for Colombia, which includes some specific features as

* El artículo hace parte de la agenda interna del Grupo de Investigación Facultad de Economía Universidad del Rosario, cuyo proyecto adopta el mismo nombre.

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region and economic sector effects, using the 2007 Integrated Household Survey (GEIH). We find that trade union density is determinated by similar factors to the ones reported by Johnson (2005) forother labour markets with similar collective labour bargaining systems.

Key words: Trade unions, wage workers, labour contract, Colombia.

Résumé : Les causes et les effets du syndicalisme ont été largement étudiés dans la littérature économique. Cependant, pour le cas colombien le manque de l'information statistique a empêché un plus grand nombre d'études. En utilisant les informations tirées de l'Enquête Intégrée auprès des Ménages de 2007, il est possible d'établir une première estimation des déterminants de la participation des travailleurs dans les syndicats, tout en tenant compte deseffets au niveau régional et sectoriel. Les résultats obtenus se rapprochent de ceux obtenus par Johnson (2005) pour des différents pays avec un processus de négociation syndicaletout à fait similaire à celui de Colombie.

Mots clef : Syndicats, salaires, contrat de travail, Colombie.

JEL Clasification: J41, J51, J52.

Introduction

Economic analysis of trade union membership in Colombia has been limited bytwoissues. First, it is difficult to find data which would allow researchers to developan empirical investigation on the causes and effects of unionisation. Second, cross-country evidence on the subject is hard to analyse due to the heterogeneity in the collective bargaining model among countries (developed countries against less-developed ones), whiletrade liberalization processes have led to different consequencesonunion membership(for a detailed review of these processes for Latin American countries, seeGodio, 1993; Cook, 1998 and Domboisand Pries, 2000).

Nonetheless, we enjoythe enormous advantage of having two compilations of studies available, which made a great advance in the understanding of the determinants of trade union membership, and the consequences of unionisation in Latin America. These compilations are Aidt and Tzannatos (2002), and Kuhn and Márquez (2005). In the former the authors present a reflection about the relevance of some particular aspects that shouldbeen take into account for the Colombian case. They also recognise that the current interest on labour standards is a result of the expansion of international trade and the liberalisation of financial markets. Differences in labour standards are a possible source of social dumping, whereas the outsourcing model of production causes some worries about the possible effect of heterogeneous labour standards between countries, over investment and trade. Regarding to these, Aidt and Tzannatos identify two opposite positions. The first one,usually associated with developed countries, states that the differences in labour regulation have a propensity to be discriminatory against the countries with higher labour standards, and thereby higher respect for workers'

rights (Pérez-López, 1988). Opposite to this one is the position associated with less-developed countries, whichclaims that labour regulation reduces economic efficiency and growth, and there foregoes against the higher objective of fighting poverty (Herzenberg, 1990).

Striving to achieve consensus over the basic labour principles, ILO has defined the Social Clause as an acknowledgment of five basic labourstandarts:

- Elimination of all forms of captive or forced labour
- Freedom of association
- Elimination of discrimination in employment and occupation
- Abolition of child labour
- Effective recognition of rights to collective bargaining

Aidt and Tzannatos recognise that most of the international debate on trade unions and fair trade labour standards gravitate around freedom of association and collective bargaining, and thereby they use the OECD's (1996) study to show the heterogeneity across countries in the observance of labour standards. A summary of this country-case heterogeneity is presented in Table 1. The objective of our research is to identify the influence of the "structural" determinants (Johnson, 2005) of trade union membership for the Colombian case.

Table 1
Labour standards in a selected sample of countries, 1970-1994

Group	Definition	Countries
Group 1	Freedom of association as a whole. Enforced by law and respected in practice.	OECD members, except South Korea, Mexico and Turkey. Also Bahamas, Barbados, Israel, Malta and Suriname.
Group 2	Some restrictions, but it is possible to establish independent workers' organizations, and trade union confederations.	Argentina, Brazil, Chile, Ecuador, Ethiopia, Fiji, Hong Kong, India, Jamaica, Papua New Guinea, Peru, South Africa, Venezuela and Zambia.
Group 3	Several restrictions to the freedom of association. There are rigorous requirements for registration, and political interference as well as discrimination against trade unions, place a burden over the formation of independent workers' organizations, and trade union confederations.	Algeria, Bangladesh, Bolivia, Taiwan (China), Colombia, Ghana, Guatemala, Honduras, Kenya, Mali, Malaysia, Morocco, Nigeria, Pakistan, Philippines, Sri Lanka, Thailand, Tunisia and Zimbabwe.
Group 4	Freedom of association barely exists.	Cameroon, China, Egypt, Indonesia, Iran, Kuwait, Siria and Tanzania.

Group 1: Countries that allow freedom of association and collective bargaining, *Groups 2 and 3*: Countries that establish some level of restriction to workers' rights, *Group 4*: Countries that suppress those rights.

Source: OECD (1996) quoted by Aidt and Tzannatos (*op. cit.*, p. 3)

This document is organised in five sections including this introduction. The following section presents the main theoretical and empirical approaches to the determinants of trade union membership. In section 3 we present a brief reference to the particularities of the Colombian case. In the fourth section we describe the socioeconomic features of the trade union members; we also present an empirical model of the structural determinants of trade union membership. In section five we conclude.

I. Determinants of trade union membership

The study of the determinants of trade union membership was motivated by the generalized reduction of the trade union density in the industrialized countries during the 70's (e.g. Britain'strade union density changed from 55% to 41%; and in US, from 23% to 16% –Mason and Bain, 1993–). In that context, two questions have been responsed: *i)* how was the dynamic of trade union density? and, *ii)* what is the profile of trade union members?. On the fomer, Bain and Elsheikh (1976) argue that business cycles and employer policy are the gross determinants of union growth. Among explanations of byssiness cycles effect, it is possible to find a *hysteresis* effect because low (and stable) unemployment rates cause little effect on trade union density, but high (and unstable) unemployment rates produce a negative and significative effect on trade union density. While changes in public policy that affect workers' interests, incentive the seeking of more bargaining power.

Regarding the trade union members'profile, studies on microeconomic causes of union membership, find that married males, with less children, older, and more educated, have a higher probability of beign trade union members (Van Den Berg and Grift, 2001; Manda *et al.*, 2005).

Theorethical economic literature on trade unions has been focused mainly on the behavior of these organisations as rational agents which maximise their benefitsthrough the wage bargaining process. Nevertheless, Schnabel (2003) offers an outlook on the determinants of trade union membership. As this author shows, the main theoretical approach on the determinants of membership is the one on supply and demand for trade union services. Given that our document is focusedon the demand side, we present the demand specification of Schnabel (*op. cit*):

$$D = d(\underset{-}{p}, \underset{+}{y}, \underset{+}{wdiff}, \underset{+}{z}, \underset{-}{s}, \underset{+}{t})$$

Where p is the price of access to the union services, so the higher the affiliation fee the lower the demand for those services; y is the individual's income; *wdiff* stands for the wage differential between union members and non-members; z are all the non-pecuniary rewards that a worker receives for being member of the trade union (e.g. a dental plan); s is the price of substitute services, such as unemployment insurance or the intervention of a third party during the bargaining processes. Nonetheless, it is important to state, as Schnabel (*op. cit.*) does, that these explanatory variables are hard to measure, therefore during empirical studies it is usual to use the workers' socioeconomic characteristics as *proxies*.

This formalisation of the demand for trade union servicesarises from the analysis made of opportunity cost by workers when deciding whether or not to join the trade union. In this sense, the worker will join the union if $U^U > U^{NU}$, where U^U is the net expected utility of joining the trade union, and U^{NU} the net expected utility of not joining[1].

Taking into account this principle of opportunity cost, the economic literature highlights two main aspects: *i)* What are the determinants of trade union membership?; and *ii)* What are the effects of trade unions over economic performance? It is worth mentioning here the suveys by Kuhn and Márquez (*op. cit.*) and Aidt and Tzannatos (*op. cit.*), which are very useful tools, due to their extensive compilation of empirical studies.

The Aidt and Tzannatos survey focuses on the second question: what are the effects of trade unions over economic performance. It compiles the results of more than 1,000 studies which analyze the economic effects of trade unions and collective bargaining. Nonetheless, these results are not conclusive. The authors-emphasise the importance of case-by-case analysis, and by these means recognise the incidence of each country's specific context over the results; not only atan aggregate level (political, legal framework), but also at amicroeconomic level (specific effects of sectoral composition and workers' characteristics).

On the other hand the Kuhn and Márquez compilation includes studies aimed at answeringboth aspects of literature on the economics of tradeunionism. Johnson (2005) is one of the studies included in this survey. It analyses the determinants of the trade union density rate for six countries (Canada, United States, Mexico, Nicaragua, Ecuador and Venezuela) using comparable surveys from 1998. She uses the Canadian case as a benchmark (given its elevated trade union density rate), and tries to identify the structural determinants of trade union membership, that is: characteristics of workers and jobs, among other features. According to this classification, the legal, historical and political frameworksare all considered non-structural determinants. Through her research, the following determinants of trade union membership are considered structural ones (*i.e.* as factors which increase the probability of joining the trade union): *i)* Work in the manufacturing, utilities or transport sector; *ii)* Work in professional, administrative or manual occupations; *iii)* Workers between 45 and 54 years old; *iv)* Work in a bigger firm; *v)* Work in the public sector; and, *vi)* Have a permanent labour contract (Saavedra and Torero, 2005).

Regarding the effect of trade unions over economic performance, the authors concur with Clark's (1984) argument that the diversity in estimated values of this effect is due to the real heterogeneity of the effect, and not to the variety in the definitions and estimation techniques.

1 A latent-variable approach is required for empirical verification (due to the impossibility of observing U), as in the models of binary outcome, just like those we present here.

Regarding relevant studies for Colombia, Tenjo (1975) focuses on the determinants of wage levels in the manufacturing industry, finding a positive gap in favour of unionised workers. Goode (1980) analyzes the historical consolidation of the politicised model of trade union organisation between 1971 and 1974, and also verifies the existence of a wage differential, using Tenjo's study and Colombian labour statistics from 1975.

One of the most outstanding studies for Colombia is Gómez *et al*. (1986). On chapter 3, they offer an interesting analysis on the issue of the information system in Colombian trade unions, and decompose the information of the second trade union census, applied by the Ministry of Labour between 1983 and 1984. According to this survey, the trade union density rate (measuring unionisation as a share of total employment) decreased from 16% in 1980 to 10% in 1984.

A second branch of studies for Colombia, focused on the economic effects of trade unions, analyses the factors that potentially determine the wage premiums, controlling for worker capabilities, firm characteristics and occupational position. Both Goldberg *et al*. (2003) and Attanasio *et al*. (2004) analyse the effect of trade liberalisation over the wage differentials by sector of economic activity (*industry wage premiums*). One of the plausible determinants of this gap is trade union influence. However, given the lack of information on trade unions membership in their data bases, neither of them explores this possibility. Nonetheless, they quote Edwards (1999) and anecdotic evidence to claim that trade unions have little influence in all sectors, the oil sector being the only exception. The study by *Observatorio del Mercado de Trabajo y la Seguridad Social* (2004) offers an approximation to the structural determinants of trade union membership, by the deconstruction of the descriptive statistics from two alternative sources, the National Household Survey from December 2000, and administrative records of the *Escuela Nacional Sindical (National Labour Union Academy)*. The results from both sources indicate that the structural patterns of unionisation in Colombia are similar to those found in other country-case studies. Finally, Cuesta (2005) analyses the existence of wage differentials explained by trade union membership. Sheuses data from the stage 110 of the National Household Survey (December 2000), using as instrument the existence of a trade union in the firm, disregarding the amount of workers who are actually members.Nonetheless it is important to recall that Cuesta focuses on the effects, not the causes of unionisation. She concludes that the wage differential between union members and non-members is in the range of 3% to 5% of the monthly wage.

From this revision we can conclude that the analysis of causes and consequences of unionisation in Colombia has been biased towards the consequences' side. The results we present in section IV are the first rigorous attempt to identify the structural determinants of trade union membership in Colombia, by using individual worker's information.

II. Some considerations on the determinants of trade union membership in Colombia

It is worth to mention that the specific effects of Colombian internal conflict may offer an explanation for the reduction of the trade union density rate during at least the last decade. Unfortunately, we do not haveavailable the time series required to test such hypothesis, and thus we are unable to offer a quantification of the effect that the homicides of trade union members in Colombia, controlling for other contextual aspects, could have on the membership of trade unions. Recalling Johnson's (2005) methodological approach, determinants can be classified as structural or non-structural; in the latter we can include political, historical and legal factors that have incidence on the trade union density rate[2]. Marshall and Perelman (2004) analyse, from an historical perspective, the political connotations that may influence trade union membership.

The lack of information on trade unions in Colombia has been a major issue that hinders the possibility to conduct a consolidated analysis on the impact that violence against unionised workers has over the trade union density rate. For example, Botero (2009), based on information from the Ministry of Social Protection claims that 354 union members were assassinated between 2003 and 2008; whereas López (2009) finds that the number of union member assassinations is of 482. At a theoretical level, the probability of being attacked should be included with a negative coefficient in the demand for trade union services proposed by Schnabel (2003), thus at the individual level a higher probability of being assassinated leads to a lower demand for trade union services, and the aggregate demand for services would shrink. At an empirical level, Johnson's classification of the trade union density rate's determinants, probably would show that the low levels of unionisation in Colombia, as compared to other Latin American countries are due to the unexplained component of the trade union density rate, which includes the non-structural determinants specific for each country. So the Colombian case can be compared with other cases in terms of the structural determinants. However, with regard to the non-structural determinants both the particularities of the Colombian labour law and the fact that being unionised implies an effective murder risk, should be taken into account.

III. Data and Results

It is important to note that the limitations in information have been a structural obstacle to develop studies about trade unions in Colombia. Trade union censuses were applied in 1947, 1984 and 1990. In these censuses the Labour Ministryregistered unions at the moment they were

2 It is important to recognize that for some social scientists these characteristics are actually structural ones (specific to the labour market structure of each country) and determine the evolution of the trade union membership patterns. However, in order to apply Johnson's approach we stick to her definition criteria.

being created, but it did not update the information regarding disbanded unions. This would be like having a population census which registers births but does not registerdeaths. Aditionally, in Colombia, until recent years, micro data about trade union participation was not available, so it was not possible to study neither the determinants of union membership nor its effect on the wage rate. As mentioned, Cuesta (2002) approached this decision by evaluating the existence of unions in the firm where the employee works, using the National Household Survey for the last quarter of 2000. This approach allowed herto isolate the endogenous effect of wage and union membership to calculate the effect of trade union membership on wages[3]. It must be said that given her instrumental approach, union membership is overestimated.

The employed workers' module of the Integrated Household Survey (GEIH), which has been operating since July 2006, has been significantly expanded compared to the one of the Continuous Household Survey (ECH), implemented from January 2000 to June 2006. The GEIH considers a major non-wage labour income component and has questions related to the subject's recent work history. In this case, we focus on the module "Quality of Main Job" which includes the question: *Are you a member of a trade association or union?*[4].

This question does not differentiate between trade union and association member. Our approach seeks to determine the group which responded affirmatively as a trade union member. We focus on employees, excluding the group of independent workers, including employers (that may belong to associations such as ACOPI or ANDI, and professional associations) and self employees (sole traders, taxi drivers or carriers), who generally get associated in order to increase their bargaining power. In this context, it takes into account employees of the 13 largest cities[5] for the 12 stages (months) of GEIH in 2007.

Our objective is to evaluate empirically the determinants of the decision to participate in trade unions. These determinants can be divided in two groups: first, the structural determinants (Johnson, *op. cit*) that include gender, age, education, firm size and occupational profile, and second, the non-structural determinants: particularities of the legal framework and context components such as the potential political risk of being unionised.

3 Cuesta (2002) argues that although there are two bargaining mechanisms in Colombian labour law, i.e. collective agreement and individual bargaining, pacts between union members and non-members are usual to determine the distribution of the union benefits.

4 According to Article 353 of the Labour Code, workers and self employees have the right to associate to defend their own interests by forming professional associations or unions.

5 This population corresponds to 48% of the total of workers at national level and about 61% of the urban areas as a whole.

The methodology is divided in three components: first,the trade union density rate is estimated by different groups of independent variables which are divided between endogenous and non-endogenouscharacteristics. The former include characteristics such as socioeconomic traits, region, occupational profile and contract term, while the latterare associated with the contractual characteristics. This distinction is important because union activity is determined by both individual and contractual characteristics. However, regarding the contractual characteristics the causality is not clear,the decision of joining a trade union can be a result of job stability, or good working conditions can facilitate the exercise of union activity. Secondly, we consider a classic model of structural determinants of trade union membership, following Johnson (*op. cit.*) to provide an international comparison benchmark for Colombia. Finally, we estimate a more detailed model, which evaluates the effect of the determinants of trade union membership on the probability of being a member and their path respect to age, as a variable that proxies the knowledge and experience in the labour market.

Our group of reference is made up byemployed workers with an educational level inferior than completed college[6]. For the first component of our methodology we estimate the trade union density rates for three groups of variables, socioeconomic characteristics, context and the employment contract. We control for the firms' sector (Public or Private).

For the total sample we obtained that the trade union density rate is 3.4%, the public and private sectorrate being 21.9% and 1.4% respectively. This difference between sectors is linked to the specific characteristics of the workersuch as education level and experience orfirm size, among others. When we estimate the trade union density rates for our reference group, we obtain a result of 1.8% for total, 1.05% for private sector and 14.77% for public sector.

For the first group of variables (socioeconomic characteristics), we estimated the union density rate for our reference grouphaving the firms' economic sector as a reference. These results are presented in Table 2. Itis possible to observe that the rate does not change significantly between men and women (i.e. male trade union density rate is greater only in 0.42 percentage points, pp). However, this gap changes when we check the firm's sector, being 0.51 pp higher for men in the private sector and 2.51 pp higher for women in the public sector, indicating a higher propensity of women to participate in trade unions in the public sector. By ages, estimations show an increasing pattern for both the aggregate and sector decomposition (Private and Public). In this classification it is important to note that the gap between public and private sector increases with the worker's age. Whereas for the group of

6 We use this part of the sample in order to avoid the possible overestimation of the trade union density rate that could arise from the inclusion of association members, instead of trade union members. Individuals with higher educational levels are more likely to be members of associations than of the trade unions.

31 to 40 years (the group with the highest labour participation rate) the trade union density rate in the public sector is 9.1 pp higher than in the private sector, for the older age group (54 to 65 years old) this gap amounts to 25.04 pp.

By education level, there are different results according to the employer's sector. For the private sector, as in the previous cases, we find a lower rate compared with the public sector, where there seems to be an "*inverted U*" effect, as the highest union density rates correspond both to full primary school and incomplete secondary degree.

A second group of variables includes environmental characteristics, city of residence, and some job characteristics, which consider firm size, the occupational profile and economic sector. The results are presented in Table 3. According to city classification it is not possible to establish a specific relationship between the union density rate and thedemographic size of the local labour market, which indicates that this variable suggests the existence of regional factors that stimulate trade union activity (some cities and regions in Colombia have a recognised history of labour movements, which in some cases dates back to early last century). In this context, at the aggregate level, Pasto has the highest union density, and Barranquilla the lowest one. But in the private sector Pereira has the highest rate while Cali ranks first for the public sector. There is not a clear pattern at the regional level.

Table2
Trade union density rate by socioeconomic characteristics

Criteria		Total	Private sector	Public sector
Gender	Male	1.94	1.27	13.77
	Female	1.52	0.76	16.28
Age	Less than 18	0.02	0.02	0.00
	19 to 24	0.47	0.44	1.37
	25 to 30	0.55	0.39	5.32
	31 to 40	1.42	0.89	10.80
	41 to 50	3.51	1.85	21.60
	More than 51	5.57	3.44	28.48
Education	None	0.83	0.77	8.11
	Incomplete primary	0.70	0.64	5.59
	Complete primary	1.52	1.11	24.10
	Incomplete secondary	1.36	0.87	24.45
	Complete secondary	1.78	1.08	11.97
	Incomplete college	1.99	0.97	16.80
	Technical	2.80	1.50	15.12

Source: GEIH. Authors' estimations.

Table 3
Trade union density rates by environment characteristics

Criteria		Total	Private sector	Public sector
City	Medellín	1.93	1.20	19.34
	Barranquilla	0.71	0.47	5.25
	Bogotá	1.38	0.99	8.70
	Cartagena	1.03	0.66	4.02
	Manizales	2.39	1.51	13.03
	Montería	2.01	1.28	12.38
	Villavicencio	1.57	0.81	9.23
	Pasto	3.60	1.75	25.74
	Cúcuta	2.35	1.15	27.45
	Pereira	2.70	1.81	17.43
	Bucaramanga	1.97	0.97	19.54
	Ibagué	1.64	0.67	17.38
	Cali	2.52	1.11	34.20
Firm size	1 to 10 employees	0.32	0.30	4.72
	11 to 100 employees	0.77	0.53	15.43
	More than 100 employees	3.96	2.36	15.07
Occupation profiles	Professional and technical	4.36	1.98	24.59
	Director	3.44	2.53	22.10
	Administrative staff	2.04	1.02	15.24
	Traders and sellers	0.44	0.36	28.31
	Service workers	1.88	0.86	9.42
	Farm-Forestry worker	2.13	1.46	35.46
	Non farm worker	1.58	1.30	21.31
Economic sector	Agriculture	1.11	1.11	0.00
	Mining	3.58	2.80	11.89
	Manufacturing	1.70	1.62	26.68
	Utilities	14.87	7.90	40.30
	Construction	0.54	0.29	35.46
	Trade, restaurants and Hotels	0.29	0.28	6.47
	Transportation and communications	1.03	0.78	28.95
	Financial services	3.90	3.19	24.18
	Personal and communal services	3.41	1.29	13.28

Source: GEIH. Authors' estimations.

According to size firm, there is an important difference between large firms and the remaining ones in both total employees and private sector; in contrast, in the public sector, the highest union density rate is present in firms with number of employees on the range of 11 to 100, but it is not significantly different regarding tothe largest firms. For occupational profile, in total, white-collar employees have a higher union density, which is the same result for the private sector; nevertheless in the public sector blue-collar workers show the highest union density. At the economic sector level, the utilities sector has a considerably higher rate (14.87%), mostly induced by a union density rate of 40.30% on its public part. On the other hand, economic sectorssuch as construction, trade and transport, and telecommunications have the lowest rates.

Labour contract characteristics are closely correlated with union membership; notwithstanding, the causality between the terms of the employment relationship and union membership is not clear. Table 4 presents an analysis of different characteristics of the labour contract. It is clear that greater job stability is related positively with the probability of union membership, as workers with a long-term labour contract present a higher rate than short-term workers, both as a whole and considering employer sector. The tenancy of current job, for its part, shows a significant difference between workers with more than three years relative to the rest, where there are important differences among workers with short employment spells (1 to 3 years and less than 1 year) in the public sector.

Table 4
Trade union density rates by labour contract characteristics

Criteria		Total	Private sector	Public sector
Existence of contract	Contracts	2.3	1.4	15.7
	Does not contract	0.4	0.3	5.3
Contract type	Verbal contract	0.4	0.4	3.0
	Written contract	2.6	1.5	15.8
Contract term	Long term	3.4	1.9	17.9
	Short term	0.8	0.7	3.1
Spell of employment	Less than 1 year	0.4	0.4	2.7
	1 to 3 years	0.7	0.5	6.8
	More than 3 years	4.4	2.5	18.5

Source: GEIH. Authors' estimations.

In order to support these empirical regularities we estimate binary choice models (probitones on this case) using a dummy variable which takes the value 1 if the worker is member of a union and 0 otherwise, as dependent variable; we use socioeconomic characteristics and environment variables, as well as the contract term (short term or long term) as explanatory variables. First, we consider the model for the structural determinants of union density following Johnson (*op. cit.*) as an international framework comparison, using variables such as gender, employer sector, age and occupational profile (white-collar or blue-collar); taking into account as reference groups male gender, sales sector, sellers and trader occupations, college degree and age range between 31-40 years old. These results are presented in Table 5, whereit can be seen that, in general, the structural determinants of union membership in Colombia are the same ones than in the countries analyzed by Johnson.

In particular, we verify that all variables are both individually and jointly significant. Regarding gender, women have a lower than 0.25 pp average probability of union membership relative to their male counterparts; while education and age both showed a positive effect on this probability. In addition, all sectors have a higher probability of trade union membership (the highest one being the utilities sector) than the benchmark sector, with the exception of construction. By occupational profile all occupations present a higher probability than traders and sellers, with operators having the highest probability.

Our last estimation allows for our set of standard variable definitions to compare the Colombian case with the ones of Mexico, Nicaragua, United States, Canada, Ecuador and Venezuela (Johnson, *op.cit.*), but at the expense of not considering important variables such as employer sector, firm's size, city and contract term, which are considered by Saavedra and Torero (2005) for Peru and Cassoni *et al*. (2005) for Uruguay. Therefore, we estimate four additional models where these variables are included under the following specifications: Model 1 includes all employees but does not include the term of labour contract variable, whereas Model 2 considers the same sample but does include it. For its part, Model 3 considers the employees with less than complete college degree without the labour contract term variable, and finally, Model 4 considers the same sample of Model 3 but actually itdoes include this variable.

The purpose of considering these four models is to measure the sensitivity of the marginal effects when including the term of labourcontract variable, because the implicit relationship between either short or long term labour contracts and trade union membership; and also, to verify robustness in the sample recognising the potential distortion that association members may generate.

The results, reported in Table 6, take women, workers without education, public sector employees, small firms, white-collar workers (managers, technical and administrative workers), communal services sector, Bogotá city and workers with short termlabour contract as reference groups.

Table 5
Probit model for structural determinants of trade union membership

	Marginal effect	s.d. (Marginal effect)
Woman	-0.0025***	0.0006
Agriculture	0.0045	0.0061
Mining	0.0289**	0.0126
Manufacturing	0.0116***	0.0022
Utilities	0.1317***	0.0152
Construction	-0.0049***	0.0018
Transportation and communications	0.0115***	0.0029
Financial services	0.0635***	0.0079
Personal and communal services	0.0403***	0.0028
Professional and technical	0.0414***	0.0047
Director	0.0053*	0.0028
Administrative staff	0.0094***	0.0023
Service workers	0.0058***	0.0022
Farm-Forestry Yorker	0.0167	0.0105
Non farm worker	0.0159***	0.0026
Primary	-0.0122***	0.0007
Secondary	-0.0085***	0.0009
Less than 18	-0.0124***	0.0008
19 to 24	-0.0134***	0.0007
25 to 30	-0.0102***	0.0007
41 to 50	0.0192***	0.0015
More than 51	0.0469***	0.0030
N	83621	
pseudo R^2	0.267	
p(LR Test)	0.000	

*** p<0.01, ** p<0.05, * p<0.1

Source: GEIH. Authors' estimations based in Johnson (2005)

It is possible to observe that in the four models most of the marginal effects are significant, additionally, the global test is reflected. When sample is changed, the results do not show significant differences comparing Models 1 and 3 or Models 2 and 4; then, our analysis will focus in Models 3 and 4.

In Model 3 it can be noted that for socioeconomic variables, the results are equaltothose specified in Johnson *op cit*., given that men have a higher probability of trade union membership (0.18 pp); age has an increasing effect for all levels but this effect is reversed at the highest age levels (as U-shaped) and education has an increasing effect on the probability as well.

Table 6
Probit models for structural determinants of trade union membership

	Model 1		Model 2		Model 3		Model 4	
	Marginal effect	**s.d.(Marg. effect)**	**Marginal effect**	**s.d.(Marg. effect)**	**Marginal effect**	**s.d.(Marg. effect))**	**Marginal effect**	**s.d.(Marg. effect))**
Man	0.0014***	0.0005	0.0022**	0.0009	0.0018***	0.0004	0.0030***	0.0007
Age	0.0017***	0.0001	0.0031***	0.0003	0.0008***	0.0001	0.0016***	0.0002
Age²	-1.1E-5***	0.0000	-2.1E-5***	0.0000	-4.9E-6***	0.0000	-9.6E-6***	0.0000
High School	0.0050***	0.0010	0.0054**	0.0021	0.0023***	0.0006	0.0023**	0.0012
Incomplete college	0.0121***	0.0020	0.0137***	0.0032	0.0053***	0.0011	0.0059***	0.0017
Complete college	0.0243***	0.0027	0.0281***	0.0036				
Private sector	-0.0504***	0.0033	-0.0645***	0.0041	-0.0323***	0.0033	-0.0427***	0.0044
Medium firm	0.0114***	0.0015	0.0162***	0.0033	0.0046***	0.0010	0.0064***	0.0023
Big firm	0.0172***	0.0013	0.0210***	0.0022	0.0143***	0.0013	0.0162***	0.0019
Blue-Collar	0.0042***	0.0005	0.0091***	0.0009	0.0005	0.0004	0.0015*	0.0008
Agriculture	-0.0039**	0.0017	-0.0076**	0.0035	-0.0023*	0.0012	-0.0048**	0.0023
Mining	0.0026	0.0041	0.0057	0.0079	0.0146*	0.0076	0.0297**	0.0146
Manufacturing	-0.0002	0.0008	0.0002	0.0015	0.0013**	0.0006	0.0037***	0.0013
Utilities	0.0189***	0.0041	0.0322***	0.0066	0.0158***	0.0039	0.0282***	0.0066
Construction	-0.0060***	0.0008	-0.0081***	0.0024	-0.0033***	0.0006	-0.0044**	0.0018
Trade	-0.0068***	0.0007	-0.0125***	0.0013	-0.0031***	0.0006	-0.0053***	0.0011
Transportation	-0.0010	0.0010	-0.0031	0.0019	-0.0005	0.0007	-0.0014	0.0014
Financial services	0.0096***	0.0022	0.0122***	0.0034	0.0114***	0.0027	0.0163***	0.0041
Medellín	0.0036***	0.0013	0.0046**	0.0022	0.0013	0.0009	0.0015	0.0017
Barranquilla	-0.0062***	0.0006	-0.0122***	0.0012	-0.0032***	0.0006	-0.0064***	0.0010
Cartagena	-0.0066***	0.0006	-0.0128***	0.0011	-0.0036***	0.0005	-0.0067***	0.0009
Manizales	0.0052***	0.0016	0.0091***	0.0029	0.0019*	0.0011	0.0032	0.0021
Montería	0.0145***	0.0026	0.0247***	0.0044	0.0035**	0.0016	0.0062**	0.0029
Villavicencio	0.0030*	0.0016	0.0054*	0.0030	-0.0004	0.0010	-0.0007	0.0019
Pasto	0.0207***	0.0029	0.0384***	0.0053	0.0108***	0.0025	0.0202***	0.0048
Cúcuta	0.0242***	0.0035	0.0458***	0.0067	0.0089***	0.0023	0.0172***	0.0048
Pereira	0.0134***	0.0024	0.0232***	0.0041	0.0065***	0.0018	0.0116***	0.0032
Bucaramanga	0.0034**	0.0015	0.0087***	0.0031	0.0032**	0.0014	0.0087***	0.0031
Ibagué	0.0077***	0.0019	0.0119***	0.0033	0.0005	0.0011	0.0000	0.0019
Cali	0.0102***	0.0020	0.0172***	0.0034	0.0044***	0.0014	0.0078***	0.0026
Contract term			0.0151***	0.0010			0.0088***	0.0008
N	83621		55351		67743		40817	
pseudo R^2	0.363		0.337		0.279		0.262	
p(LR Test)	0.000		0.000		0.000		0.000	

*** p<0.01, ** p<0.05, * p<0.1

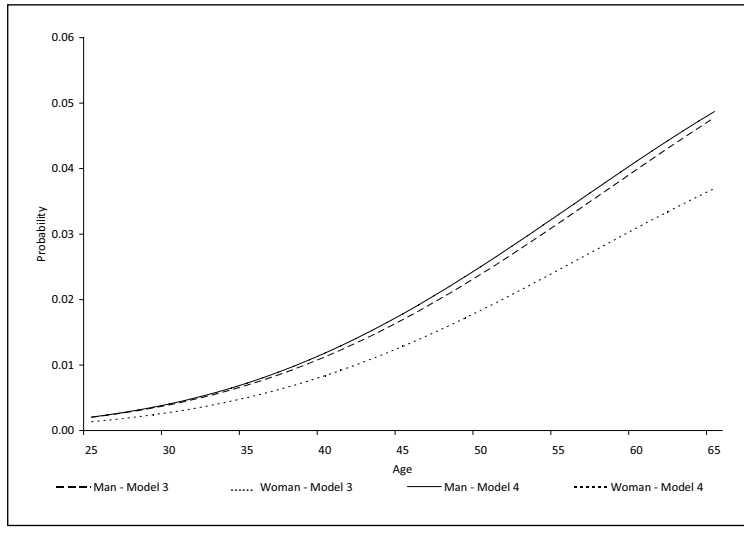
Source: GEIH. Authors' estimations based in Johnson (2005)

For environmental variables, public workers present a higher probability at 3.23 pp and firm size has a positive and significant effect. By occupation profiles, blue-collar workers have a higher probability of union membership than white-collar ones. The highest economic-sector marginal effect was found in the utilities sector and the lowest one in construction. By cities, Medellin and Bogota are not significantly different and the highest and lowest probabiliteswere found in Cartagena and Pasto, respectively.

Controlling by term of the labour contract, the results for Model 4 are not significantly different than those for Model 3. The results regarding labour contract term variable indicate that workers with long-term contractual relationships report a higher probability (0.8 pp) of becoming trade union members; while the occupational profile increases the marginal effect by three times and in this case is significant. We must note that both socioeconomic and environmental variables increase their marginal effects when the contract term variable is included.

To estimate the change on the probability related to age as a proxy of experience, as well as bargaining power, we draw path graphics for ages corresponding to 25 and 65 years, considering marginal effects of both socioeconomic and environmental variables of Models 3 and 4. In Figures 1 to 5 it can be clearly seen that age has an increasing effect on the probability of trade union membership and that this gap increases over age. Thus, taking gender as example, 25 year old males have a higher probability (by0.07 pp)of trade union membership comparedto women, but when individuals are close to 65 years of age this probability gap amounts to 1.17

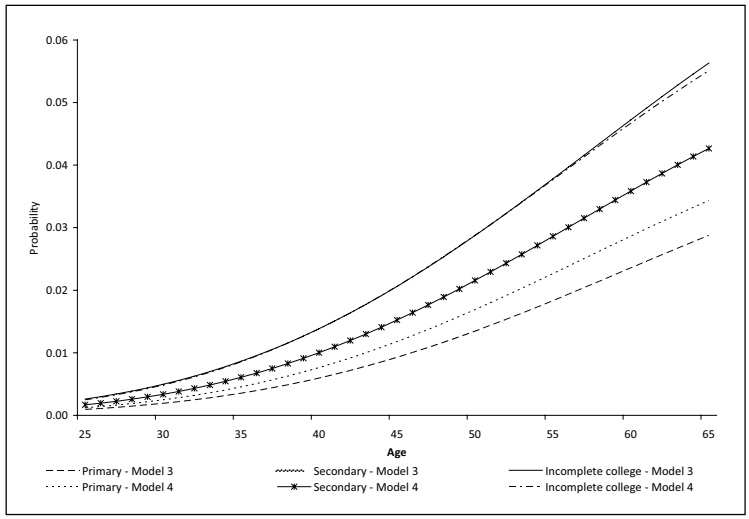
Figure 1
Probability of trade union membership by age and gender



Source: Authors' estimations

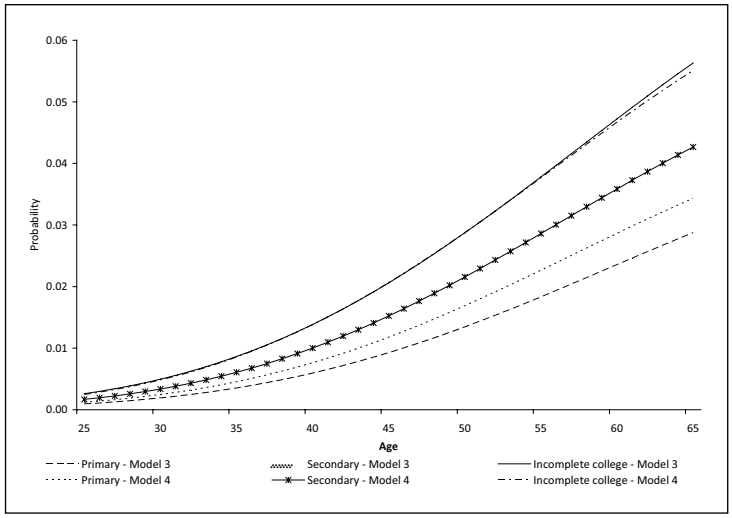
pp. The largest gap appears for employment sector, in which the difference goes from 1.36 pp to 13.05 pp when individuals are 25 and 65 years old, respectively.

Figure 2
Probability of trade union membership by age, gender and occupation profile



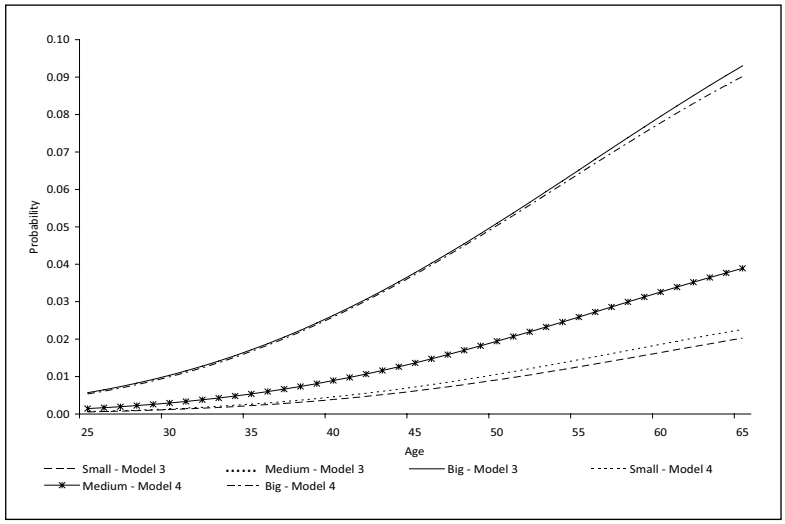
Source: Authors' estimations

Figure 3
Probability of trade union membership by age and education level



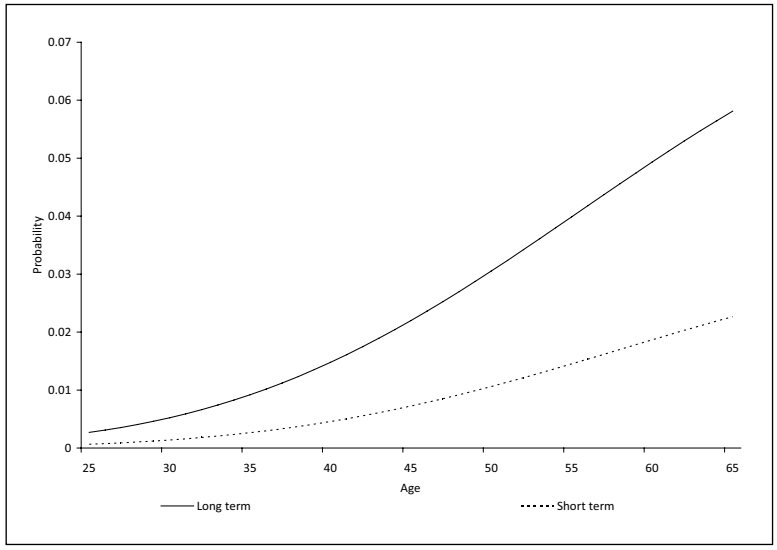
Source: Authors' estimations

Figure 4
Probability of trade union membership by workers' age and firm size



Source: Authors' estimations

Figure 5
Probability of trade union membership by age and labour contract term



Source: Authors' estimations

Concluding remarks

This study provides the first estimation of the structural determinants of trade union membership in Colombia, focusing on workers' socioeconomic features such as age, education and gender. Additionally, we estimate the influence of some other determinants including labour contract characteristics, occupation profile, employer sector, economic sector and region.

Comparing our results with the international benchmark, we find that the Colombian case supports the influence of structural determinants; particularly those related to worker's socioeconomic characteristics.

Through the estimation of more detailed models we find that workers with the following characteristics have a higher likelihood of trade union membership: male gender, high education or high experience. Likewise, public employees, blue-collar workers, workers of big firms and those who have a long-term labour contract, all show a positive effect on the probability of trade union membership. It is important to note that the gap between the probabilities of trade union membership increased with age for all the socioeconomic characteristics and work features that we consider.

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