Downward Wage Rigidities and Other Firms' Responses to an Economic Slowdown: Evidence from a Survey of Colombian Firms

Ana María Iregui B., Ligia Alba Melo B.
and María Teresa Ramírez G.[*]

1. INTRODUCTION

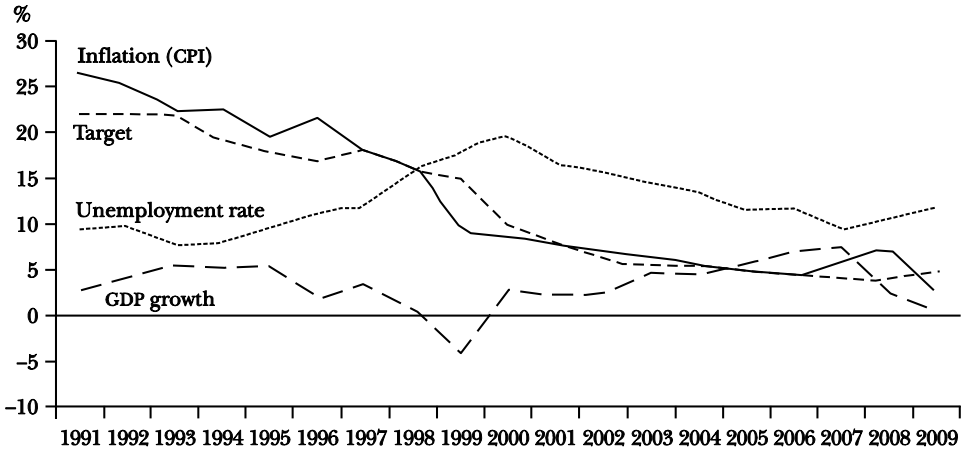
It is important to understand the nature and causes of wage rigidities, since such rigidities partly determine the persistence and volatility of inflation, as one of the main components of the firms' marginal cost. Also, wage rigidities offer a microeconomic explanation to a macroeconomic phenomenon: voluntary unemployment. As Tobin (1972) and Akerlof et al. (1996) state, when nominal wages are downwardly rigid, a certain level of inflation allows for a greater flexibility in real wages, thereby helping adjustments in the labor market.

The reduction of inflation and the adoption of an inflation targeting regime, which took place in several countries during the past two decades, have renewed interest in the study of wage rigidities, due to the impact they can have on the labor market.[1] The Colombian case is no exception.

[*] A. M. Iregui B., L. A. Melo B. and M. T. Ramírez G. are senior researchers in the Research Unit of the Deputy Governor's Office at Banco de la República (Central Bank of Colombia). This article was created for the XIV Meeting of the Central Bank Researchers Network of the Americas, November 11-13, 2009 at Salvador, Bahía, Brazil. They would like to thank Juan Carlos Guataquí for his comments and suggestions and Cindy Moreno for her research assistance. The participation of the firms that agreed to complete the survey also is appreciated. The opinions expressed herein are those of the authors and do not necessarily reflect the views of Banco de la República or its Board of Directors. Correspondence: ⟨airegubo@banrep.gov.co⟩, ⟨lmelobec@banrep.gov.co⟩ and ⟨mramirgi@banrep.gov.co⟩.

[1] See, for example, European Central Bank, *Wage Dynamics in Europe: Final Report of the*

FIGURE 1. INFLATION, UNEMPLOYMENT AND GDP GROWTH IN COLOMBIA: 1991-2009



SOURCES: DANE and Banco de la República.

Colombia has experienced a gradual fall in inflation since the beginning of the nineties; however, it was only after 1997 that inflation came close to the announced target.[2] The main decline in inflation took place between 1998 and 1999, when it went from 16.7% to 9.3%. Since then, inflation has remained in the single digit level. On the other hand, unemployment increased, reaching a peak in 1999-2000, when the economy faced a deep recession. By 2009, the scenario in Colombia was one of low inflation, high unemployment and signs of an economic slowdown (figure 1). Since the aim of this paper is to study wage rigidities, the economic conditions prevailing in the country offer a suitable context for applying a survey to Colombian firms.

To explore wage setting mechanisms, analyze the nature and sources of wage rigidities and test different theories of wage rigidities in the country, we designed and applied a survey to Colombian firms. The survey allows us to obtain answers directly from those who set wages in a firm and helps us to understand the behavior of firms and the labor market. In addition, it provides evidence for the microfoundation of the Central Bank's wage and price models, by incorporating real and nominal rigidities, and offers elements for monetary policy decisions.

A study of wage rigidities in an emerging country, such as Colombia, is also important because the country's institutions and labor market could

Wage Dynamics Network (WDN), December 2009.

[2] In Colombia, explicit inflation targets have existed since 1991. For details on the implementation of an inflation targeting regime in Colombia, see Gómez et al. (2002).

have characteristics that differentiate it from developed countries where this type of study has been concentrated. For instance, Colombia has high levels of informality. In fact, informal workers accounted, on average, for 58% of the total number of workers during the period 2001-2007. Unlike the situation in Europe, union density in Colombia is very low: less than 5% in recent years (Guataquí et al., 2009). As a result, we would expect the role of unions in explaining wage rigidities in Colombia to be less important than in Europe. Furthermore, the legal minimum wage in Colombia plays a very important role in setting wage increases (Iregui et al. 2009b). Another aspect to highlight is the presence of high non-wage labor costs, which come to 58% of base wages in 2008 (Sánchez et al. 2009).[3]

The empirical studies of wage rigidities have used information based on datasets and surveys at both the firm and worker levels. Among the studies that use datasets on both firms and workers, it is worth pointing out the International Wage Flexibility Project, which analyzes changes in individual labor incomes by using 31 databases from 16 European countries over the past three decades (Dickens et al., 2007). Other studies that have used microeconomic information in Europe and the United States are those by McLaughlin (1994), Kahn (1997), Stiglbauer (2002), Lebow et al. (2003), Schweitzer (2007), Brzoza-Brzezina and Socha (2007), Messina et al. (2008) and Knoppik and Beissinger (2009), among others. These studies offer mixed evidence regarding wage rigidity, as they vary in accordance with their respective methodology and source of information. In the Latin American context, the study of wage rigidities does not appear to have received a great deal of attention. Three exceptions are Castellanos et al. (2004) for Mexico, Iregui et al. (2009a) for Colombia and Cobb and Opazo (2010) for Chile.

On the other hand, the literature on downward wage rigidities using firm surveys dates back to the studies of Kaufman (1984) and Blanchflower and Oswald (1988) for the United Kingdom, Holzer (1990), Blinder and Choi (1990), Bewley (1995, 1998, 1999) and Campbell and Kamlani (1997) for the United States, and Agell and Lundborg (1995, 2003) for Sweden. In general, these studies found that firms do not cut wages because they do not want to affect the motivation, effort and morale of workers. Consequently, this leads to downward nominal wage rigidity.

[3] Non-wage labor costs include social security contribution (health and pensions), work injury, mandatory bonuses, paid vacations, severance pay, training and family allowances.

Similar results associated with efficiency wage theories in explaining wage rigidities were found recently by Agell and Bennmarker (2002, 2007) for Sweden, Franz and Pfeifer (2003, 2006) for Germany, Zoega and Karlsson (2006) for Iceland, Copaciu et al. (2010) for Rumania, Kawaguchi and Ohtake (2008) for Japan, and Amirault et al. (2009) for Canada. In addition, Franz and Pfeifer (2003) and Agell and Bennmarker (2002, 2007) found that the existence of collective agreements is another important factor in preventing wage cuts.

The Eurosystem Wage Dynamics Network (WDN), a research network composed of economists from the European Central Bank and the central banks of the European Union, conducted an ad hoc survey on price and wage setting behavior among nearly 17,000 firms in 17 countries of the European Union between the end of 2007 and the first half of 2008. The results of the WDN survey indicate the existence of significant downward rigidity in base wages in the European Union, with important cross-country differences. For example, downward nominal rigidity prevails in the Netherlands, Greece, Germany, Austria and Portugal, whereas downward real rigidity is more prevalent in Belgium, Finland, Luxembourg, Spain and Sweden. According to the survey, the most important reasons for preventing wage cuts are the impact on work morale and effort, preventing the most productive workers from leaving the firm, and labor regulations or collective agreements.[4]

In particular, in this paper we applied a wage setting survey to 1,305 Colombian firms in thirteen Colombian cities, taking into account nine economic sectors and three firm sizes. This survey has the advantage of using a representative sample of firms, which allows us to generalize the results to the population under study. As Campbell and Kamlani (1997), we designed the survey to obtain answers for different occupational groups, in our case, managers, professionals, technicians and assistants, and unskilled workers, since the reasons for wage rigidity may differ across types of workers. Regarding the response rate, it is important to mention that we obtained responses from 1,305 firms.

The survey asked firms how likely it is they will perform certain actions during a period of economic slowdown. Then, with the survey results and using ordered *logit* models, we empirically examine the firms' responses, taking into account the firm-specific information collected for the survey.

[4] For details on the WDN firm survey, see European Central Bank, *Wage Dynamics in Europe: Final Report of the Wage Dynamics Network (WDN)*, December 2009.

The survey also asked firms why they do not reduce wages in difficult times and provided respondents with a series of reasons based on the more relevant theories, so as to test which of them explain wage rigidities in the Colombian case. We also used ordered *logit* models to examine the firms' responses in greater detail.

The results of this study point to the presence of nominal and real downward wage rigidities in Colombia.[5] According to the survey, the most important reasons why Colombian firms do not cut wages during difficult times are to prevent loss of the most productive and experienced workers, do not affect worker's effort and productivity, and do not affect worker's motivation. These reasons are related to the efficiency wage theory, particularly to the adverse selection model, the shirking model, the gift-exchange model and the fair wage-effort hypothesis. Interestingly, these results are similar to those found in the literature for developed countries.

Survey evidence also suggests that firms can resort to other alternatives to adjust costs in difficult times, besides changes in base wages, such as reducing non-statutory benefits and variable pay, laying off employees, changing the type of employment contract and hiring new workers at lower wages. The use of these strategies varies across economic sectors and occupational groups.

This paper is divided into five sections, in addition to the introduction. In the second one, we describe the survey design and sample selection. The third section analyzes the presence of downward nominal and real wage rigidities in Colombia and empirically test firms' responses to the related questions. Section four studies the reasons for preventing wage cuts and empirically tests different theories on wage rigidities. In the fifth section, we discuss alternatives other than changes in base wages that firms could use to adjust labor costs during a period of economic slowdown. The final section presents the main conclusions.

2. SURVEY DESIGN

In this paper, the analysis is based on a survey of 1,305 Colombian firms. It was designed to explore wage setting mechanisms, the nature and sources of wage rigidities, and the link between wages and prices (Iregui et al., 2009b). The survey also collects data on several characteristics of the firms

[5] This finding confirms previous microeconomic evidence of wage rigidities in Colombia; see Iregui et al. (2009a) and Iregui et al. (2010).

in question, such as the economic sector where they operate, the kind of labor contracts they use, the existence of collective agreements and different types of remuneration, among other features, which helped us to characterize the firms in the empirical analysis.

The survey has the advantage of using a representative sample of firms. This allowed us to generalize the results to the population under study: namely 39,004 small, medium and large scale enterprises,[6] which are legally constituted and belong to all economic sectors, except the public sector.[7] The firms are located in 13 cities,[8] which account for 70% of the formal employment in Colombia.

The sample selection was done by stratified random sampling, considering nine strata and obtaining a final sample of 1,305 firms. The strata correspond to the following economic sectors: agriculture, forestry and fishing; commerce; construction; electricity, gas, water and mining; manufacturing; financial services; transport, storage and communications; education and health; and other services. In addition, firm size was considered as a domain to guarantee that all sizes were represented in the final sample. It is important to mention that responses were obtained from 1,305 firms. The firms that did not answer the questionnaire, for whatever reason, were replaced by companies with similar characteristics, such as the economic sector, size and location of the firm. To do so, we used a sample surplus to maintain its representativeness within the population under study.[9]

In the design of the questionnaire, we discussed with senior specialists in survey design and human resources managers; this enriched the survey.[10] Some questions took into account the studies by Blinder and Choi (1990); Campbell and Kamlani (1997); Bewley (1999); Agell and Lundborg (1995, 2003); Franz and Pfeiffer (2006); and Copaciu et al. (2007), who studied downward wage rigidities.

[6] Firms with less than ten employees were excluded.

[7] The public sector was excluded, because the wages of public employees are set mainly by government decree, although public enterprises were included.

[8] The cities are Bogotá, Bucaramanga, Barranquilla, Cali, Cartagena, Medellín, Manizales, Pereira and their metropolitan areas. Barrancabermeja, Buga, Tuluá, Girardot and Rionegro were also included.

[9] It is important to note that the decision to replace a firm was made after making at least five phone calls to make an appointment.

[10] A Spanish version of the questionnaire is available in Iregui et al. (2009b), Appendix 4. For additional details related to the questionnaire design, see Iregui et al. (2010).

The selected firms were contacted first by telephone; those showing interest in answering the survey were sent a letter explaining the academic purpose of the study and emphasizing the confidentiality of the information provided. Once the company agreed to participate in our survey, a face-to-face interview was scheduled to apply the questionnaire. The survey was directed to human resources personnel involved with wage policies, who should be able to answer the questions for different occupational groups (managers, professionals, technicians and assistants, and unskilled workers). The survey was carried out during the first semester of 2009, when the Colombian economy was showing signs of a slowdown in economic activity, low inflation and increasing unemployment.

Finally, it is important to mention that all the results presented hereafter are generalized for the population under study (39,004 firms). The coefficients of variation were calculated for each answer; the coefficients obtained did not exceed 5%, which is an indicator of the reliability of the population estimates.

3. DOWNWARD NOMINAL AND REAL WAGE RIGIDITIES

To assess whether wages are downward rigid, we asked firms about the likelihood of performing certain actions during a period of economic slowdown, using a scale from 1 to 4, where 1 is *not at all* and 4 is *very likely*. To allow for comparisons, we calculated the mean score of the answers. Following Blinder (1991), a mean score greater than or equal to 3.0 is considered excellent and a score of less than 1.5 is very poor; a mean score greater than or equal to 2.5 is considered to be reasonably strong.

In particular, to identify downward nominal wage rigidity (DNWR), the options of either reducing or freezing base wages were considered. For downward real wage rigidity (DRWR), the alternative of increasing basic pay at a rate lower than inflation was included.[11] Table 1 shows the percentage of responses *not at all / not likely* and *likely / very likely* for each occupational position, as well as the mean scores obtained for the aforementioned options.

The results suggest the presence of DNWR, considering that, in all cases, more than 85% of the firms indicated the option of *reducing base pay*

[11] According to Colombian law, the purchasing power of the minimum wage must be maintained. Then, the previous alternatives can be considered only for base wages higher than the legal minimum wage.

TABLE 1. HOW LIKELY IS YOUR FIRM TO CARRY OUT THE FOLLOWING ACTIONS?

Occupational group	*Do not increase base wages*	*Reduce base wages*	*Pay raises below the inflation rate*
Managers			
Mean score[a]	2.33	1.52	2.13
Responses (%)			
Not at all / not likely	54.0	85.9	59.6
Likely / very likely	46.0	14.1	40.4
Professionals			
Mean score[a]	2.33	1.52	2.17
Responses (%)			
Not at all / not likely	53.8	86.4	57.9
Likely / very likely	46.2	13.6	42.1
Technicians, assistants, and unskilled workers			
Mean score[a]	2.04	1.45	1.96
Responses (%)			
Not at all / not likely	67.7	89.3	68.2
Likely / very likely	32.3	10.7	31.8

SOURCE: Authors calculations.
[a] Average score based on the following scale: 1 = not at all, 2 = not likely, 3 = likely, 4 = very likely.

was *not at all / not likely* and the mean score was 1.5, indicating a very low likelihood of occurrence. In addition, more than half the firms replied that the alternative of *not increasing base wages* was *not at all / not likely*. The option of *pay raises below the inflation rate* had a mean score of around 2.0 for all occupational groups and it is *not at all / not likely* for about 60% of the firms in the case of managers and professionals and 70% of the firms for technicians, assistants and unskilled workers, all of which provides evidence of DRWR. It is worth mentioning that the results show no important differences by firm size. However, across sectors, the results do show some variation.[12] For instance, in financial services, the alternatives of *reducing base pay* and *not increasing base wages* have a percentage of response for *not at all / not likely* that is considerably higher than in the other sectors. In the construction sector, the alternative of *pay raises below the inflation rate* has the highest response rates for *not at all / not likely* compared to all occupations (73% on average).

The answers concerning wage rigidities are consistent with the results obtained when the firms were asked about the last annual effective wage

[12] These results may be obtained from the authors upon request.

increase. Figure 2 shows the histograms of the distribution of the average nominal wage change for each occupational position between 2008 and 2009, when the country was showing signs of a slowdown in economic activity. As illustrated, none of the companies cut wages and there is a spike around the observed rate of inflation for the year 2008, 7.67%. In the case of unskilled workers, wage changes were concentrated around this value for about 60% of the firms; however, for managers, this proportion declines to about 40%. Furthermore, wage freezes are less frequent among less-skilled workers, since they might be protected by collective agreements.

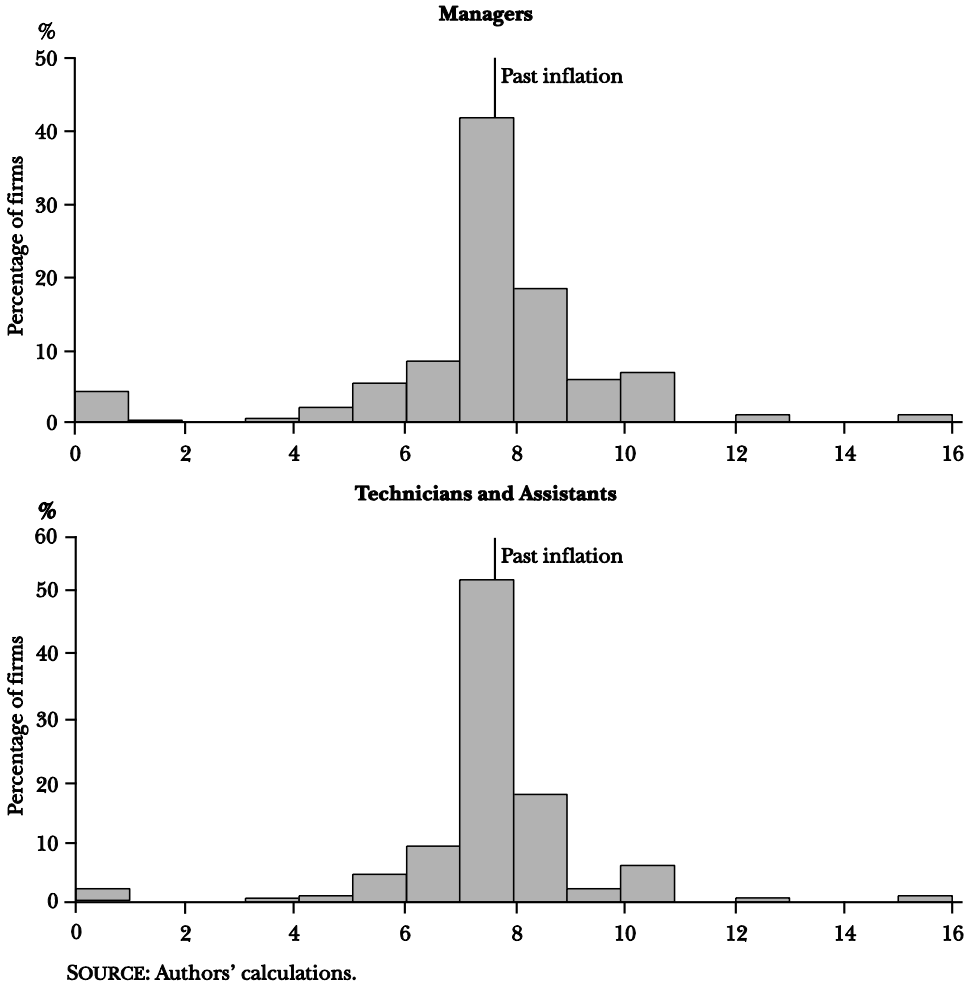
Next, to test the relevance of the firm's characteristics for the responses, we estimated ordered *logit* models for each action and occupational group. The dependent variable increases with the likelihood of carrying out such actions. It takes values from 1 to 4, where 1 = *not at all*, 2 = *not likely*, 3 = *likely* and 4 = *very likely*. The threshold parameters estimated in all the models are statistically different from one another; therefore, we maintained the four categories for the dependent variables in all the models.[13]

The explanatory variables allow for differences in economic sectors and the location of the firms (*region*); we considered trade and cities other than Bogotá (the nation's capital) as the reference categories in the regressions. Firm size also is included and is measured by the number of employees [*log (No. of employees)*]. In addition, the share of managers and professionals (*skilled workers*); the percentage of workers earning the minimum wage (*minimum wage earners*); and the share of employees with a permanent employment contract (*permanent workers*) were included to take into account the characteristics and composition of the labor force. Moreover, a dummy variable that takes the value of 1, if the firm has any form of collective agreement (*collective agreements*); and a measure of union density [*union members (%)*] were considered to evaluate the importance of collective wage agreements. Furthermore, we included dummy variables to account for the presence of flexible benefits and variable pay.[14] Finally, labor costs as a share of total costs were also included to approximate labor intensity.

[13] A Wald test was used to test the difference among the threshold parameters. The results of the tests, as well as the marginal effects for all models, may be obtained from the authors upon request.

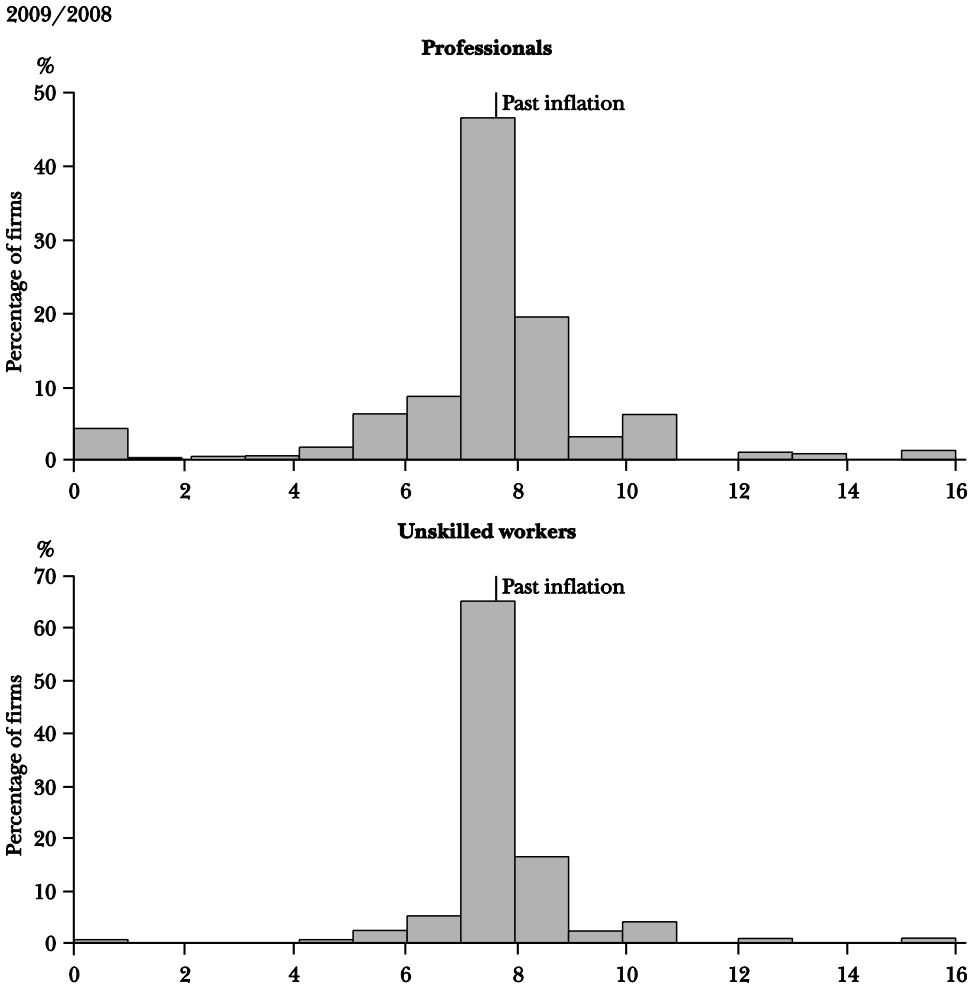
[14] Flexible benefits correspond to a formal plan whereby employees can choose among different employer-paid benefits or take cash. Variable pay corresponds to a form of compensation that links employee payment to some measure of job performance.

FIGURE 2. HISTOGRAMS OF THE DISTRIBUTION OF THE LAST NOMINAL WAGE INCREASE,



SOURCE: Authors' calculations.

Table 2 shows the ordered *logit* estimates for the alternatives *do not increase base wages* and *reduce base wages*. According to the results for all occupational groups, the probability that firms *do not increase base wages* in an economic slowdown increases with the share of labor costs as a portion of total costs, as expected. Moreover, this strategy in firms operating in the construction, manufacturing and financial services is less likely than for firms in the commercial sector (the reference category), where the high share of temporary workers could affect the bargaining power of employees. Regarding the composition of the labor force, in the case of managers



and professionals the probability that firms *do not increase base wages* decreases as the share of skilled workers increases. This could be explained by the difficulty in recruiting employees of this type, as our survey indicates. The presence of flexible benefits is statistically significant only in the case of managers, where such benefits account for approximately 15% of their remuneration. Finally, in the case of technicians, assistants and unskilled workers, as firm size and the share of minimum wage earners increase, the likelihood of not increasing base wages declines; this is also true for firms operating in agriculture, forestry and fishing sectors.

TABLE 2. HOW LIKELY IT IS FOR A FIRM NOT TO INCREASE BASE WAGES OR TO REDUCE BASE WAGES (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

	Not to increase base wages						*Reduce base wages*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Variables												
Agriculture, forestry, fishing	–0.123	(0.217)	–0.327	(0.238)	–0.594[c]	(0.236)	–0.040	(0.238)	–0.244	(0.254)	–0.279	(0.250)
Construction	–0.805[c]	(0.234)	–0.619[b]	(0.227)	–0.529[c]	(0.211)	–0.369	(0.253)	0.120	(0.236)	0.352[a]	(0.228)
Electricity, gas, water, mining	–0.105	(0.248)	–0.414[a]	(0.253)	–0.188	(0.227)	0.487[a]	(0.290)	0.451[a]	(0.295)	0.372	(0.283)
Manufacturing	–0.396[b]	(0.199)	–0.410[b]	(0.207)	–0.511[c]	(0.188)	0.101	(0.214)	0.370[a]	(0.229)	0.288	(0.221)
Financial services	–0.764[c]	(0.305)	–0.696[c]	(0.298)	–1.316[c]	(0.316)	–0.493	(0.377)	–0.501	(0.364)	–0.643[a]	(0.388)
Transport, storage and communications	–0.031	(0.168)	–0.009	(0.183)	–0.209	(0.180)	–0.122	(0.212)	–0.119	(0.222)	0.023	(0.212)
Education and health	–0.118	(0.263)	–0.064	(0.286)	–0.350	(0.256)	0.181	(0.317)	0.222	(0.318)	–0.098	(0.311)
Other services	0.203	(0.166)	0.109	(0.185)	–0.035	(0.174)	0.467[c]	(0.213)	0.315	(0.219)	0.166	(0.210)
Region	–0.214[a]	(0.128)	–0.050	(0.134)	0.177	(0.122)	–0.311[c]	(0.137)	–0.105	(0.141)	–0.137	(0.137)

Log (No. of employees)	0.010	(0.048)	−0.049	(0.051)	−0.074[a]	(0.045)	−0.063	(0.060)	−0.072	(0.059)	−0.051	(0.056)
Skilled workers (%)	−0.006[b]	(0.003)	−0.007[c]	(0.003)	−0.002	(0.003)	−0.004	(0.003)	−0.002	(0.003)	0.004	(0.003)
Minimum wage earners (%)	0.002	(0.002)	0.003	(0.003)	−0.004[a]	(0.002)	0.002	(0.002)	0.004	(0.003)	0.001	(0.003)
Flexible benefits	0.232[b]	(0.129)	0.128	(0.135)	0.035	(0.135)	0.157	(0.147)	0.193	(0.154)	0.000	(0.151)
Variable pay	0.108	(0.129)	0.018	(0.138)	−0.090	(0.127)	0.026	(0.155)	−0.085	(0.160)	−0.075	(0.152)
Collective agreements	−0.264	(0.243)	−0.245	(0.241)	−0.181	(0.238)	0.226	(0.252)	0.154	(0.256)	0.184	(0.270)
Union members (%)	0.006	(0.005)	0.006	(0.005)	−0.002	(0.005)	−0.005	(0.005)	−0.007	(0.006)	−0.010[a]	(0.007)
Labor costs (%)	0.006[b]	(0.003)	0.007[b]	(0.003)	0.007[b]	(0.004)	0.002	(0.004)	0.006	(0.004)	0.005	(0.004)
Permanent workers (%)	0.001	(0.002)	−0.001	(0.002)	0.000	(0.002)	−0.004[b]	(0.002)	−0.005[c]	(0.002)	−0.003[b]	(0.002)
Number of observations	1,266		1,163		1,283		1,266		1,163		1,283	
Pseudo R^2	0.023		0.020		0.027		0.022		0.023		0.017	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the likelihood, ranging from 1 to 4, where 1=not at all, 2 = not likely, 3 = likely and 4 = very likely.

The results for the alternative of *reducing base wages* are also reported in table 2. For all occupational positions, we found the likelihood of reducing base wages decreases as the share of employees on permanent contract increases, which suggests these workers have more bargaining power. In the particular case of managers, firms located in Bogotá are less likely to reduce wages than in other cities of the country and firms in other services and electricity, gas, water and mining, the probability of reducing wages is higher than in the commercial sector. For technicians, assistants and unskilled workers, the likelihood of reducing wages declines as the percentage of union member's increases, suggesting that collective agreements are one of the main reasons for wage rigidity in this occupational group.

We also examined what kind of firm is more prone to increase wages at a rate less than that of inflation. In general, the results show that the probability of using this alternative decreases as the share of labor costs increases, suggesting the presence of DRWR is more likely in firms that are less labor intensive. At the sector level, firms belonging in the *other services* sector are more likely to increase wages below the inflation rate.

4. REASONS PREVENTING WAGE CUTS

In this section, we analyze the reasons why firms do not reduce base wages in difficult times and test different theories of wage rigidity. In particular, the contract theory states that companies and their employees sign long-term agreements so wages are fixed in advance, the idea being to maintain a stable real wage throughout the business cycle (Baily, 1974; Azariadis, 1975; Taylor, 1979). With the insider-outsider theory, companies are reluctant to fire their employees (insiders) and to hire unemployed workers (outsiders) at lower wages, because of the cost involved in hiring and training new workers. In addition, insiders can refuse to cooperate with new incoming employees. This increases the possibility of reducing the firm's productivity, giving insiders power to negotiate their wages (Lindbeck and Snower, 2001).

According to the efficiency wage theory, workers' productivity is a function of their wages. This theory has several versions, including the shirking model, the adverse selection model, the labor turnover model, the gift exchange model and the fair wage-effort hypothesis. With the shirking model, the cost of losing a job depends positively on the wage

(Shapiro and Stiglitz, 1984); with the adverse selection model, the most productive workers are the most likely to resign in the event of a wage reduction (Weiss, 1990); with the labor turnover model, workers' resignation rates depend negatively on the wage rate (Stiglitz 1974); with the gift exchange model, the loyalty of workers is directly related to their salary, and this loyalty leads to higher productivity (Akerlof 1982, 1984); and with the fair wage-effort hypothesis, workers' effort declines if the salary they receive is below what they perceive as a fair wage (Akerlof and Yellen, 1990).

In simple and nontechnical language, the respondents were presented with a number of reasons associated with the theories mentioned above, which explain why firms do not reduce wages (table 3). We asked the interviewees to indicate the importance of each reason based on a scale of 1 to 4, where 1 is *not important* and 4 is *very important*. The average scores obtained were ordered and *t* statistics were calculated for each option to test whether the mean differences between contiguous alternatives were statistically significant. In all cases, the results show the null hypothesis of equal

TABLE 3. THEORIES ASSOCIATED TO WAGE RIGIDITY

Proposed reasons	*Associated theory*
To prevent the loss of the most productive and more experienced workers	Efficiency wages (adverse selection, Weiss, 1990)
Do not affect employee's motivation	Efficiency wages (fair wage-effort hypothesis, gift exchange, Akerlof, G. A., 1984; Akerlof and Yellen, 1990)
Do not affect workers' efforts and productivity	Efficiency wages (shirking, fair wage-effort hypothesis, gift exchange, Shapiro and Stiglitz, 1984; Akerlof, G. A., 1984; Akerlof and Yellen, 1990)
Previous agreements between employees and employers	Contracts theory (Taylor, 1979; Baily; 1974; Azariadis, 1975)
Minimize costs of labor turnover	Efficiency wages (minimize turnover, Stiglitz, 1974)
Do not affect relative wages in relation to competition (outside the firm)	Keynesian theory
Legal restrictions	Contract theory (Taylor, 1979; Baily; 1974; Azariadis, 1975)
Collective agreements	Insider-outsider (insider-outsider, Lindbeck and Snower, 2001).

SOURCE: Iregui et al. (2009b).

average scores for contiguous actions is rejected, with a confidence level of 99 percent.[15]

Table 4 reports the mean scores for all occupational groups, as well as the response rates *not important / of minor importance* and *moderately important / very important* for the different reasons preventing wage cuts. The alternative with the highest mean score was *to prevent the loss of the most productive and experienced workers*. This reason receives the highest response rate as the most important explanation for not cutting wages paid to managers and professionals. This reason is related to the efficiency wage theory, specifically to the adverse selection model. Similar results were found by Campbell and Kamlani (1997) for the United States, Zoega and Karlsson (2006) for Iceland, Martins (2009) for Portugal and Copaciu et al. (2010) for Romania.

The survey also found that *do not affect worker's effort and productivity* and *do not affect worker's motivation* are *very important* reasons for not reducing base wages. These alternatives also are related to the efficiency wage theory, particularly to the shirking model, the gift exchange model and the fair wage-effort hypothesis. Despite differences in the labor market institutions, our results are similar to those found for developed countries. For instance, Bewley (1995, 1999 and 2004) found, for the United States, that employers do not cut wages because of the effect doing so might have on workers' morale and motivation. Similar evidence was found by Blinder and Choi (1990) and Campbell and Kamlani (1997) for the United States, Kaufman (1984) for the United Kingdom, Agell and Bennmarker (2002, 2007) for Sweden, Franz and Pfeiffer (2003) for Germany, Kawaguchi and Ohtake (2008) for Japan, Martins (2009) for Portugal and the Wage Dynamics Network (European Central Bank, 2009, and Babecký et al., 2009a) for different European countries.

Another *important* reason mentioned by respondents for not cutting base wages is to *prevent the loss of the firm's reputation*. For technicians, assistants and unskilled workers, as opposed to managers and professionals, strong support was found for the existence of collective agreements, which might be associated to the *insider-outsider* theory.[16] Similarly, Franz and Pfeiffer (2003) found that labor union contracts explain wage rigidities for the less skilled workers in German firms. In Sweden, the high rate

[15] These results may be obtained from the authors upon request.

[16] The insider-outsider theory considers union members as insiders who show little concern for non-members (outsiders). These insiders have power when negotiating wages.

TABLE 4. IMPORTANCE OF THE FOLLOWING REASONS IN PREVENTING WAGE CUTS

Reasons	*Managers*			*Professionals*			*Technicians, assistants, and unskilled workers*		
	Mean score[a]	*Responses not important / of minor importance (%)*	*Responses moderately important / very important (%)*	*Mean score*[a]	*Responses not important / of minor importance (%)*	*Responses moderately important / very important (%)*	*Mean score*[a]	*Responses not important / of minor importance (%)*	*Responses moderately important / very important (%)*
Collective agreements	1.90(9)	69.9	30.4	2.22(8)	56.5	43.5	3.00(5)	27.2	72.8
Legal restrictions	2.03(8)	64.4	35.6	2.03(9)	64.8	35.2	2.08(9)	62.6	37.4
Previous agreements between employees and employers	2.51(5)	43.9	56.1	2.67(5)	35.3	64.7	2.70(6)	36.1	63.9
To prevent the loss of the firm's reputation	3.14(2)	22.0	78.0	3.13(4)	21.1	78.9	3.15(4)	21.2	78.8
Do not affect employee's motivation	3.01(3)	26.8	73.2	3.21(3)	16.9	83.1	3.30(3)	14.8	85.2
Do not affect workers' efforts and productivity	2.98(4)	27.2	72.8	3.22(2)	17.1	82.9	3.33(2)	14.4	85.6
Minimize costs of labor turnover	2.48(6)	45.0	55.0	2.60(6)	40.8	59.2	2.61(7)	39.7	60.3
To prevent the loss of the most productive and more experienced workers	3.16(1)	21.5	78.5	3.34(1)	14.0	86.0	3.35(1)	14.9	85.1
Do not affect relative wages in relation to competition (outside the firm)	2.28(7)	53.2	46.8	2.28(7)	51.7	48.3	2.28(8)	54.2	45.8

SOURCE: Authors' calculations.

NOTE: The numbers in parentheses correspond to the order obtained by each action.

[a] Average scores based on the following scale: 1 = not important, 2 = of minor importance, 3 = moderately important, 4 = very important.

of unionization explains the wage rigidity in all positions (Agell and Bennmarker, 2002, 2007).[17] In Colombia, when firms are classified by payroll size, this option receives more support in large firms than in small ones, possibly because of the fact that collective agreements are more prevalent in larger firms.[18] Across sectors, this option obtains the highest response rates in electricity, gas, water and mining and manufacturing, where the number of firms with collective agreements (26.1% and 19.6% respectively) is above average (9.3%).

Other reasons receive less support in explaining why firms do not cut wages. Moderate support was found for *minimize costs of labor turnover,* especially in large firms and in the *other services* sector. However, in the construction sector this option obtains the lowest response rate among all sectors, possibly because of an excess of labor supply in this sector. As mentioned by Campbell and Kamlani (1997) and Agell and Bennmarker (2002), firms do not reduce wages to avoid an increase in the number of resignations. According to our survey, a better wage offer is one of the main reasons why workers resign, which might indicate that firms perceive the risk of voluntary turnover as a wage-policy constraint.

Then, we controlled for factors that might explain wage rigidities in the country by estimating ordered *logit* models. The dependent variable takes values from 1 to 4, where 1 = *not important*, 2 = *of minor importance*, 3 = *moderately important*, and 4 = *very important*. As before, we used the same set of benchmark regressors and kept four categories for the dependent variable in all the models, since the threshold parameters are statistically different from one another.

The results for the reason rated as the most important for not cutting wages, namely to *prevent the loss of the most productive and more experienced workers* are reported in table 5. In the case of managers, the main findings indicate the size of the firm; its geographic location and the sector where it operates affect the probability of rating this reason as important. In particular, greater support for the adverse selection model is found among larger firms and those operating in the *other services* sector. On the contrary, less support is found among firms located outside the nation's capital and those operating in construction, manufacturing, financial services

[17] In Sweden, the union density rate was 75.1% in 2006; in Germany, it was 14.6% (data available at ⟨http://stats.oecd.org/Index.aspx?DatasetCode=U_D_D⟩). In Colombia, this rate was 3.4% in 2007 (Guataquí et al., 2009).

[18] According to the results of our survey, 35% of the large firms have collective agreements as opposed to only 3% of the small firms.

and education and health, compared to the trade sector. For professionals, the probability of rating this reason as important is statistically significant only for firms involved in transport, storage and communications and *other services;* however, for technicians, assistants and unskilled workers, it is significant only for firms involved in transport, storage and communications.

TABLE 5. IMPORTANCE OF THE FOLLOWING REASONS IN PREVENTING WAGE CUTS (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*To prevent the loss of the most productive and more experienced workers*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	0.091	(0.225)	0.307	(0.225)	0.026	(0.218)
Construction	–0.74[c]	(0.210)	–0.065	(0.216)	–0.171	(0.221)
Electricity, gas, water, mining	0.374	(0.282)	0.241	(0.289)	0.195	(0.282)
Manufacturing	–0.491[c]	(0.217)	0.140	(0.226)	0.207	(0.216)
Financial services	–0.829[c]	(0.293)	0.118	(0.347)	–0.043	(0.344)
Transport, storage and communications	–0.333[a]	(0.195)	0.586[c]	(0.213)	0.391[b]	(0.206)
Education and health	–0.458[a]	(0.260)	0.388	(0.283)	–0.060	(0.262)
Other services	0.444[c]	(0.191)	0.452[c]	(0.203)	0.033	(0.184)
Region	–0.729[c]	(0.132)	–0.190	(0.142)	–0.165	(0.138)
Log (No. of employees)	0.218[c]	(0.055)	0.066	(0.059)	–0.015	(0.056)
Skilled workers (%)	0.002	(0.003)	–0.001	(0.003)	–0.004	(0.003)
Minimum wage earners (%)	–0.002	(0.003)	–0.001	(0.003)	–0.003	(0.003)
Flexible benefits	0.069	(0.148)	0.145	(0.154)	0.196	(0.147)
Variable pay	0.175	(0.133)	0.215	(0.148)	0.159	(0.144)
Collective agreements	–0.086	(0.283)	–0.228	(0.299)	–0.380	(0.279)
Union members (%)	0.001	(0.006)	0.001	(0.007)	–0.001	(0.005)
Labor costs (%)	0.001	(0.004)	0.003	(0.004)	0.006	(0.004)
Permanent workers (%)	0.001	(0.002)	0.001	(0.002)	0.000	(0.002)
Number of observations	1,266		1,163		1,283	
Pseudo R^2	0.043		0.011		0.009	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the importance, ranging from 1 to 4, where 1 = not important, 2 = of minor importance, 3 = moderately important and 4 = very important.

For the alternatives *do not affect employee's motivation* and *do not affect worker's effort and productivity*, the results indicate the probability that the firms rate each of these reasons as important increases with the number of employees. Agell and Bennmarker (2007) point out that wage rigidity might be an issue in larger firms because of shirking, since it is more difficult for them to supervise workers' effort. In addition, the importance of these reasons increases for firms in the *other services* sector, which includes highly specialized activities that require a particular expertise.[19] On the contrary, the importance of these alternatives is less for firms located in Bogotá compared to the rest of the country. In the case of managers, the economic sector where the firm operates could significantly increase or decrease the probability of rating these two alternatives as important, compared to the commercial sector. For instance, the probability reduces for firms in construction, manufacturing and financial services, whereas it increases for firms involved in electricity, gas, water and mining (table 6).

Similarly, as can be seen in table 7, for the reasons *minimize costs of labor turnover* and *do not affect relative wages in relation to competition (outside the firm)*, the size of the firm, its location and economic sector are significant in explaining why firms rate these reasons as important in preventing wage cuts. It is worth mentioning that in order to evaluate the explanatory power of collective agreements as a reason for preventing wage cuts, an ordered *logit* model was also estimated (table 8). Only in the case of technicians, assistants and unskilled workers was the share of unionized workers found to be positive and highly significant; this is indicative of the bargaining power these workers might have. In addition, the results show that, for most sectors, the coefficients are negative and significant with respect to the commercial sector where union density is very low (according to our survey, only 2.2% of the firms in this sector have unions).

Regarding the reasons associated with the contract theory, *legal restrictions* and *previous agreements between employees and employers* (tables 8 and 9, respectively), the results show that firms located in Bogotá are more likely to consider these reasons as an explanation for wage rigidity. In the

[19] This sector includes activities such as software consultancy and supply; maintenance and repair of office; accounting and computing machinery; research and experimental development in natural sciences, engineering, social sciences and humanities; legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; and advertising, among other activities.

particular case of previous agreements, the coefficient of the share of employees who have a permanent contract is negative and highly significant. As suggested by Agell and Benmarker (2007), the bargaining power of these workers might increase as the share of employees with more secure jobs increases.

Finally, another reason for avoiding wage reductions was *to prevent the loss of the firm's reputation*. This reason is important for firms in *other services* and transport, storage and communications, because these sectors might employ specialized workers and firms do not want their wage policy to be a deterrent for future employees (table 9).

4. 1. Complementarity among Theories on Wage Rigidities

Summers (1988) and Agell and Benmarker (2007) point out that different sources of wage rigidity can operate at the same time, reinforcing one another. To explore the possible interaction between different theories, we computed Spearman rank correlations between the reasons for preventing wage cuts (table 10).

The results show the reasons associated with the efficiency wage theory are highly correlated for all occupational groups. Specifically, in all cases, the highest observed correlation is between *do not affect employee's motivation* and *do not affect worker's effort and productivity*. The former also is highly correlated with the reasons *prevent the loss of the most productive and more experienced workers* and *minimize costs of labor turnover*, which could indicate that firms prefer to keep their employees motivated, so as to avoid losing their most valuable workers and incurring the cost to train new workers. It is also worth mentioning that the presence of collective agreements is highly correlated with the reasons associated with the contract theory, given the bargaining power unions have to set long term contracts between firms and workers.

5. FIRMS' OTHER RESPONSES TO AN ECONOMIC SLOWDOWN

Besides considering changes in base wages, we examined other alternatives firms could use to adjust labor costs during a period of economic slowdown. According to Babecký et al. (2009b) and Fabiani et al. (2010), the use of alternative strategies has gained importance due to the existence of wage rigidities that make it difficult to cut wages to adjust the labor

TABLE 6. IMPORTANCE OF THE FOLLOWING REASONS IN PREVENTING WAGE CUTS (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Do not affect employee's motivation*						*Do not affect workers' efforts and productivity*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	0.045	(0.228)	0.160	(0.224)	–0.176	(0.209)	–0.175	(0.224)	0.078	(0.223)	–0.068	(0.218)
Construction	–0.717[c]	(0.227)	–0.076	(0.221)	–0.176	(0.218)	–0.818[c]	(0.234)	0.028	(0.214)	–0.127	(0.216)
Electricity, gas, water, mining	0.466[b]	(0.259)	0.149	(0.269)	–0.010	(0.273)	0.447[a]	(0.252)	0.181	(0.266)	0.156	(0.282)
Manufacturing	–0.701[c]	(0.196)	–0.213	(0.221)	–0.235	(0.213)	–0.779[c]	(0.193)	0.048	(0.221)	–0.128	(0.207)
Financial services	–0.906[c]	(0.308)	–0.315	(0.337)	–0.338	(0.334)	–1.088[c]	(0.304)	–0.170	(0.350)	–0.263	(0.360)
Transport, storage and communications	0.090	(0.196)	0.677[c]	(0.209)	0.501[c]	(0.198)	–0.117	(0.193)	0.810[c]	(0.208)	0.595[c]	(0.209)
Education and health	–0.337	(0.271)	–0.082	(0.266)	–0.185	(0.257)	–0.178	(0.287)	0.047	(0.286)	–0.211	(0.264)
Other services	0.981[c]	(0.192)	0.582[c]	(0.197)	0.093	(0.185)	0.889[c]	(0.191)	0.585[c]	(0.192)	0.190	(0.187)
Region	–0.908[c]	(0.136)	–0.399[c]	(0.139)	–0.284[b]	(0.135)	–1.025[c]	(0.135)	–0.379[c]	(0.140)	–0.328[c]	(0.140)

Log (No. of employees)	0.211[c]	(0.056)	0.153[c]	(0.054)	0.084[a]	(0.053)	0.220[c]	(0.055)	0.155[c]	(0.056)	0.091[a]	(0.054)
Skilled workers (%)	0.003	(0.003)	0.004	(0.003)	0.001	(0.003)	0.001	(0.003)	0.003	(0.003)	0.000	(0.003)
Minimum wage earners (%)	0.000	(0.003)	0.000	(0.003)	−0.001	(0.003)	0.001	(0.003)	0.000	(0.003)	−0.001	(0.003)
Flexible benefits	−0.052	(0.143)	0.019	(0.144)	0.055	(0.141)	−0.042	(0.141)	0.187	(0.146)	0.107	(0.144)
Variable pay	0.297[b]	(0.134)	0.180	(0.144)	0.207	(0.137)	0.167	(0.130)	0.089	(0.142)	0.063	(0.138)
Collective agreements	0.190	(0.257)	−0.032	(0.238)	0.057	(0.237)	0.221	(0.276)	−0.091	(0.253)	−0.184	(0.243)
Union members (%)	−0.002	(0.007)	0.002	(0.006)	−0.001	(0.005)	−0.002	(0.006)	−0.003	(0.006)	−0.005	(0.006)
Labor costs (%)	−0.006[a]	(0.003)	−0.001	(0.004)	0.000	(0.004)	−0.007[b]	(0.003)	−0.002	(0.004)	0.002	(0.004)
Permanent workers (%)	0.002	(0.002)	0.003[b]	(0.002)	0.001	(0.002)	0.003[b]	(0.002)	0.004[b]	(0.002)	0.002	(0.002)
Number of observations	1,266		1,163		1,283		1,266		1,163		1,283	
Pseudo R^2	0.062		0.020		0.011		0.068		0.019		0.012	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the importance, ranging from 1 to 4, where 1 = not important, 2 = of minor importance, 3 = moderately important and 4 = very important.

TABLE 7. IMPORTANCE OF THE FOLLOWING REASONS IN PREVENTING WAGE CUTS (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Minimize costs of labor turnover*						*Do not affect relative wages in relation to competition (outside the firm)*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	−0.239	(0.225)	−0.258	(0.245)	−0.455[b]	(0.229)	−0.201	(0.234)	−0.062	(0.250)	−0.202	(0.227)
Construction	−0.820[c]	(0.209)	−0.711[c]	(0.205)	−0.519[c]	(0.199)	−0.415[b]	(0.204)	−0.232	(0.201)	−0.125	(0.191)
Electricity, gas, water, mining	0.194	(0.266)	−0.110	(0.286)	−0.041	(0.276)	0.381	(0.253)	0.244	(0.269)	0.336	(0.243)
Manufacturing	−0.889[c]	(0.193)	−0.598[c]	(0.202)	−0.471[c]	(0.194)	−0.716[c]	(0.189)	−0.558[c]	(0.200)	−0.461[c]	(0.191)
Financial services	−1.009[c]	(0.347)	−0.870[c]	(0.308)	−0.728[c]	(0.282)	−0.983[c]	(0.353)	−1.120[c]	(0.333)	−0.881[c]	(0.341)
Transport, storage and communications	−0.496[c]	(0.184)	−0.144	(0.189)	0.011	(0.179)	−0.516[c]	(0.190)	−0.474[c]	(0.208)	−0.324[a]	(0.193)
Education and health	−0.188	(0.273)	−0.072	(0.270)	−0.052	(0.256)	−0.136	(0.241)	−0.154	(0.234)	0.062	(0.226)
Other services	0.753[c]	(0.184)	0.574[c]	(0.195)	0.442[c]	(0.184)	0.517[c]	(0.192)	0.461[c]	(0.197)	0.616[c]	(0.184)
Region	−0.718[c]	(0.133)	−0.488[c]	(0.141)	−0.321[c]	(0.132)	−0.765[c]	(0.129)	−0.715[c]	(0.135)	−0.676[c]	(0.126)

Log (No. of employees)	0.185[c]	(0.052)	0.159[c]	(0.053)	0.120[c]	(0.047)	0.227[c]	(0.057)	0.237[c]	(0.055)	0.134[c]	(0.050)
Skilled workers (%)	0.001	(0.003)	0.001	(0.003)	0.000	(0.003)	0.003	(0.003)	0.004	(0.003)	–0.001	(0.003)
Minimum wage earners (%)	0.001	(0.002)	0.002	(0.003)	0.001	(0.002)	–0.001	(0.002)	0.000	(0.003)	–0.004	(0.002)
Flexible benefits	0.061	(0.139)	0.158	(0.144)	0.176	(0.138)	–0.105	(0.130)	–0.125	(0.139)	–0.109	(0.130)
Variable pay	0.178	(0.132)	0.132	(0.138)	0.087	(0.130)	0.170	(0.137)	0.141	(0.140)	0.076	(0.131)
Collective agreements	0.189	(0.266)	–0.028	(0.271)	–0.148	(0.260)	0.291	(0.222)	0.218	(0.236)	0.317	(0.223)
Union members (%)	0.002	(0.006)	0.005	(0.006)	0.006	(0.006)	0.001	(0.005)	0.002	(0.005)	0.001	(0.005)
Labor costs (%)	–0.006	(0.004)	–0.003	(0.004)	–0.001	(0.004)	0.003	(0.004)	0.002	(0.004)	0.002	(0.004)
Permanent workers (%)	–0.001	(0.002)	–0.001	(0.002)	–0.001	(0.002)	0.002	(0.002)	0.002	(0.002)	0.001	(0.002)
Number of observations	1,266		1,163		1,283		1,266		1,163		1,283	
Pseudo R^2	0.055		0.036		0.024		0.048		0.043		0.034	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the importance, ranging from 1 to 4, where 1 = not important, 2 = of minor importance, 3 = moderately important and 4 = very important.

TABLE 8. IMPORTANCE OF THE FOLLOWING REASONS IN PREVENTING WAGE CUTS (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Collective agreements*						*Legal restrictions*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	−0.898	(0.784)	−1.800[c]	(0.731)	−1.638[c]	(0.709)	−0.188	(0.222)	−0.191	(0.236)	0.011	(0.220)
Construction	−0.573	(0.952)	−2.302	(0.788)	−2.080	(1.365)	−0.829[c]	(0.221)	−0.817[c]	(0.222)	−0.790[c]	(0.215)
Electricity, gas, water, mining	−1.217	(0.863)	−1.116[c]	(0.788)	−0.008	(0.800)	−0.101	(0.236)	−0.192	(0.245)	−0.162	(0.236)
Manufacturing	−1.065[a]	(0.684)	−1.530[c]	(0.598)	−1.201[b]	(0.586)	−0.931[c]	(0.194)	−0.933[c]	(0.201)	−0.787[c]	(0.189)
Financial services	−0.989	(0.947)	−1.695[b]	(0.799)	−1.539[b]	(0.820)	−0.839[c]	(0.349)	−1.014[c]	(0.353)	−0.951[c]	(0.333)
Transport, storage and communications	−1.325[a]	(0.797)	−1.695[c]	(0.690)	−1.870[c]	(0.753)	−0.522[c]	(0.196)	−0.682[c]	(0.210)	−0.442[c]	(0.191)
Education and health	0.307	(0.999)	−0.142	(0.981)	−1.716[a]	(1.067)	−0.262	(0.283)	−0.366	(0.295)	−0.375	(0.273)
Other services	−0.944	(0.863)	−2.341[c]	(0.756)	−2.180[c]	(0.843)	−0.090	(0.190)	−0.189	(0.205)	−0.292	(0.193)
Region	−0.749[b]	(0.407)	−0.154	(0.386)	−0.605[a]	(0.372)	−0.678[c]	(0.130)	−0.633[c]	(0.134)	−0.652[c]	(0.124)

Log (No. of employees)	−0.393[c]	(0.155)	−0.240	(0.173)	0.410[c]	(0.180)	0.060	(0.055)	0.085	(0.057)	0.043	(0.052)
Skilled workers (%)	−0.021[a]	(0.013)	−0.024[b]	(0.012)	−0.009	(0.012)	0.001	(0.003)	0.000	(0.003)	0.002	(0.003)
Minimum wage earners (%)	0.002	(0.007)	−0.009	(0.006)	−0.005	(0.006)	−0.002	(0.002)	−0.001	(0.003)	−0.001	(0.002)
Flexible benefits	0.310	(0.429)	0.369	(0.399)	−0.398	(0.415)	0.110	(0.138)	0.141	(0.144)	0.139	(0.139)
Variable pay	−0.129	(0.392)	−0.344	(0.479)	−0.109	(0.398)	0.232[a]	(0.140)	0.172	(0.147)	0.183	(0.135)
Collective agreements							0.313	(0.224)	0.350	(0.229)	0.392[a]	(0.231)
Union members (%)	−0.005	(0.006)	0.002	(0.005)	0.014[c]	(0.005)	0.004	(0.004)	0.003	(0.004)	0.003	(0.004)
Labor costs (%)	0.001	(0.008)	−0.001	(0.009)	−0.003	(0.010)	0.000	(0.004)	−0.001	(0.004)	−0.001	(0.004)
Permanent workers (%)	0.003	(0.006)	0.004	(0.006)	0.000	(0.005)	−0.002	(0.002)	−0.002	(0.002)	0.000	(0.002)
Number of observations	182		175		187		1,266		1,163		1,283	
Pseudo R^2	0.079		0.064		0.110		0.035		0.035		0.031	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the importance, ranging from 1 to 4, where 1 = not important, 2 = of minor importance, 3 = moderately important and 4 = very important.

TABLE 9. IMPORTANCE OF THE FOLLOWING REASONS IN PREVENTING WAGE CUTS (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Previous agreements between employees and employers*						*To prevent the loss of the firm's reputation*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	–0.178	(0.233)	–0.238	(0.231)	–0.154	(0.201)	–0.001	(0.237)	0.085	(0.240)	–0.289	(0.222)
Construction	–0.748[c]	(0.208)	–0.327[a]	(0.210)	–0.296	(0.207)	–0.076	(0.230)	0.000	(0.234)	0.058	(0.224)
Electricity, gas, water, mining	–0.073	(0.257)	–0.596[b]	(0.270)	–0.499[b]	(0.264)	0.129	(0.249)	0.026	(0.251)	0.051	(0.231)
Manufacturing	–0.650[c]	(0.189)	–0.218	(0.211)	–0.206	(0.206)	–0.085	(0.203)	–0.141	(0.215)	–0.126	(0.208)
Financial services	–0.298	(0.265)	0.155	(0.274)	0.361	(0.280)	0.204	(0.315)	0.083	(0.340)	–0.051	(0.302)
Transport, storage and communications	–0.241	(0.194)	0.476[c]	(0.213)	0.394[b]	(0.186)	0.503[c]	(0.195)	0.550[c]	(0.209)	0.488[c]	(0.193)
Education and health	–0.057	(0.266)	0.025	(0.257)	–0.071	(0.234)	0.330	(0.264)	0.449[a]	(0.272)	0.284	(0.261)
Other services	0.505[c]	(0.191)	0.186	(0.191)	–0.104	(0.180)	0.578[c]	(0.180)	0.528[c]	(0.186)	0.336[b]	(0.181)
Region	–0.830[c]	(0.133)	–0.299[c]	(0.133)	–0.163	(0.120)	–0.173	(0.133)	–0.133	(0.138)	–0.074	(0.130)

Log (No. of employees)	0.007	(0.052)	−0.064	(0.050)	−0.099[b]	(0.049)	−0.055	(0.050)	−0.037	(0.054)	−0.025	(0.049)
Skilled workers (%)	−0.001	(0.003)	0.000	(0.003)	−0.001	(0.003)	−0.001	(0.003)	0.000	(0.003)	−0.001	(0.003)
Minimum wage earners (%)	0.001	(0.002)	0.001	(0.002)	−0.003	(0.002)	0.000	(0.002)	0.002	(0.003)	0.000	(0.002)
Flexible benefits	0.156	(0.134)	0.227[a]	(0.141)	0.228[a]	(0.138)	0.162	(0.131)	0.223[a]	(0.140)	0.204	(0.136)
Variable pay	0.092	(0.131)	0.040	(0.140)	−0.018	(0.133)	−0.067	(0.136)	−0.053	(0.148)	−0.037	(0.134)
Collective agreements	0.343[a]	(0.212)	0.107	(0.224)	0.304	(0.229)	−0.103	(0.234)	−0.166	(0.239)	−0.017	(0.232)
Union members (%)	0.005	(0.006)	0.009[a]	(0.005)	0.014[c]	(0.005)	−0.001	(0.005)	0.000	(0.005)	−0.002	(0.004)
Labor costs (%)	−0.002	(0.003)	0.005	(0.004)	0.002	(0.003)	0.002	(0.004)	0.001	(0.004)	0.002	(0.004)
Permanent workers (%)	−0.004[c]	(0.002)	−0.004[c]	(0.002)	−0.002	(0.002)	−0.002	(0.002)	−0.003[a]	(0.002)	−0.003[a]	(0.002)
Number of observations	1,266		1,163		1,283		1,266		1,163		1,283	
Pseudo R^2	0.040		0.014		0.015		0.011		0.013		0.009	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the importance, ranging from 1 to 4, where 1 = not important, 2 = of minor importance, 3 = moderately important and 4 = very important.

TABLE 10. SPEARMAN RANK CORRELATIONS BETWEEN REASONS FOR PREVENTING WAGE CUTS

Reasons	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
A. Managers									
Legal restrictions (1)	1.000								
Previous agreements between employees and employers (2)	0.377[a]	1.000							
To prevent the loss of the firm's reputation (3)	0.092[a]	0.298[a]	1.000						
Do not affect employee's motivation (4)	0.239[a]	0.363[a]	0.398[a]	1.000					
Do not affect workers' efforts and productivity (5)	0.265[a]	0.381[a]	0.356[a]	0.818[a]	1.000				
Minimize costs of labor turnover (6)	0.349[a]	0.371[a]	0.222[a]	0.497[a]	0.553[a]	1.000			
To prevent the loss of the most productive and more experienced workers (7)	0.215[a]	0.350[a]	0.327[a]	0.619[a]	0.608[a]	0.473[a]	1.000		
Do not affect relative wages in relation to competition (outside the firm) (8)	0.303[a]	0.365[a]	0.207[a]	0.401[a]	0.420[a]	0.530[a]	0.394[a]	1.000	
Collective agreements (9)	0.255[a]	0.337[a]	0.062	–0.060	0.048	0.018	–0.010	0.057	1.000
B. Professionals									
Legal restrictions (1)	1.000								
Previous agreements between employees and employers (2)	0.229[a]	1.000							
To prevent the loss of the firm's reputation (3)	0.048	0.399[a]	1.000						
Do not affect employee's motivation (4)	0.069	0.256[a]	0.524[a]	1.000					

Do not affect workers' efforts and productivity (5)	0.064	0.323[a]	0.517[a]	0.773[a]	1.000				
Minimize costs of labor turnover (6)	0.299[a]	0.236[a]	0.281[a]	0.360[a]	0.371[a]	1.000			
To prevent the loss of the most productive and more experienced workers (7)	0.023	0.311[a]	0.468[a]	0.563[a]	0.567[a]	0.332[a]	1.000		
Do not affect relative wages in relation to competition (outside the firm) (8)	0.300[a]	0.188[a]	0.197[a]	0.230[a]	0.224[a]	0.454[a]	0.213[a]	1.000	
Collective agreements (9)	0.354[a]	0.337[a]	0.107	–0.013	0.048	0.032	0.097	0.011	1.000
C. Technicians, assistants, and unskilled workers									
Legal restrictions (1)	1.000								
Previous agreements between employees and employers (2)	0.134[a]	1.000							
To prevent the loss of the firm's reputation (3)	–0.028	0.382[a]	1.000						
Do not affect employee's motivation (4)	–0.019	0.266[a]	0.577[a]	1.000					
Do not affect workers' efforts and productivity (5)	0.007	0.303[a]	0.566[a]	0.759[a]	1.000				
Minimize costs of labor turnover (6)	0.152[a]	0.185[a]	0.330[a]	0.316[a]	0.310[a]	1.000			
To prevent the loss of the most productive and more experienced workers (7)	–0.013	0.304[a]	0.484[a]	0.558[a]	0.601[a]	0.329[a]	1.000		
Do not affect relative wages in relation to competition (outside the firm) (8)	0.184[a]	0.114[a]	0.220[a]	0.209[a]	0.192[a]	0.431[a]	0.211[a]	1.000	
Collective agreements (9)	0.364[a]	0.310[a]	–0.087	0.018	0.036	0.040	0.085	0.036	1.000

SOURCE: Authors' calculations.

NOTE: [a] Denotes statistical significance at 1%. In panel a, the number of observations is 1,267, except for action (9), where the number is 183. In panel b, the number of observations is 1,164, except for action (9), where de number is 176. In panel c, the number of observations is 1,284, except for action (9), where the number of observations is 188.

market. In particular, we included options related to remuneration for employees, other than base wages, and the firm's personnel. The former includes the reduction of variable pay and non-statutory benefits,[20] while the latter considers changes in the type of employment contract, laying off employees, hiring of workers at lower wages and not hiring anyone (table 11).

The survey shows that, in all cases, around 30% of the firms consider the option of *reducing non-statutory benefits* and *reducing variable pay* as *likely / very likely*. The option of *laying off employees* is more common in the case of technicians, assistants and unskilled workers than in the case of managers and professionals, which suggests that firms are more reluctant to fire more skilled workers.[21] According to our survey, firms that found it difficult to fill vacancies argued the main reason was the lack of candidates with the required profile, especially in the case of managers.

The alternative of a *change the type of employment contract* is also *likely / very likely* for about 30% of the firms. At the sector level, in agriculture, forestry and fishing the options of *hiring new workers at lower wages* and *laying off employees* have higher response rates for *not at all / not likely* than the other sectors with respect to professionals and technicians, assistants and unskilled workers. In the construction sector, the alternative of *reducing variable pay* has the highest response rates for *not at all / not likely*, in all occupations (83% on average). Lastly, in the case of agriculture, forestry and fishing, the alternative of *hiring new workers at lower wages* has the highest response rate for *not at all / not likely*, in all occupations (80% on average).

The strategies to adjust labor costs in a period of economic slowdown are not mutually exclusive and firms could use more than one option. To evaluate the link between the different alternatives, Spearman rank correlations were calculated for the pairing of the different strategies (table 12). As expected, *laying off employees* and *hiring new workers at lower wages* have one of the highest correlation coefficients for all occupational positions, suggesting that some firms could use turnover to adjust labor costs. Similarly, the strategy of *changing the type of employment contract* is highly correlated with the options of *laying off employees* and *hiring new workers at lower wages*, which might indicate that firms could deal with a difficult economic situation by recruiting workers under a different type of contract and at

[20] Non-statutory benefits are determined either by collective agreements or set at the discretion of the employer.

[21] In fact, the mean score obtained with respect to this strategy is the highest for professionals and technicians, assistants and unskilled workers.

TABLE 11. HOW LIKELY IS YOUR FIRM TO CARRY OUT THE FOLLOWING ACTIONS?

Occupational group	*Change the type of employment contract*	*Do not hire anyone*	*Lay off employees*	*Hire new workers at lower wages*	*Reduce non–statutory benefits*	*Reduce variable pay*	*Do nothing*
Managers							
Mean score[a]	1.64	2.18	1.93	1.83	1.84	1.90	2.00
Responses (%)							
Not at all / not likely	81.2	58.2	70.8	73.6	70.5	68.9	78.6
Likely / very likely	18.8	41.8	29.2	26.4	29.5	31.1	21.4
Professionals							
Mean score[a]	1.86	2.21	2.20	2.14	1.82	1.90	1.76
Responses (%)							
Not at all / not likely	72.2	56.6	59.6	59.3	70.5	71.0	87.7
Likely / very likely	27.8	43.4	40.4	40.7	29.5	29.0	12.3
Technicians, assistants, and unskilled workers							
Mean score[a]	1.93	2.08	2.34	2.14	1.75	1.90	1.77
Responses (%)							
Not at all / not likely	68.8	63.3	53.4	60.9	74.0	73.0	87.0
Likely / very likely	31.2	36.7	46.6	39.1	26.0	27.0	13.0

SOURCE: Authors' calculations.
[a] Average score based on the following scale: 1 = not at all, 2 = not likely, 3 = likely, 4 = very likely.

a lower wage. Another pair with high correlations is *reducing non-statutory benefits* and *reducing variable pay*. Similar results for Europe were obtained by Babecký et al. (2009b), who emphasized the complementary nature of these two strategies.

TABLE 12. SPEARMAN RANK CORRELATIONS BETWEEN STRATEGIES TO FACE A SLOWDOWN IN ECONOMIC ACTIVITY

Actions	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
A. Managers						
Change the type of employment contract (1)	1.000					
Do not hire anyone (2)	0.277[a]	1.000				
Lay off employees (3)	0.418[a]	0.427[a]	1.000[a]			
Hire new workers at lower wages (4)	0.425[a]	0.313[a]	0.491[a]	1.000		
Reduce non-statutory benefits (5)	0.318[a]	0.320[a]	0.317[a]	0.336[a]	1.000	
Reduce variable pay (6)	0.307[a]	0.286[a]	0.292[a]	0.315[a]	0.458[a]	1.000
B. Professionals						
Change the type of employment contract (1)	1.000					
Do not hire anyone (2)	0.094[a]	1.000				
Lay off employees (3)	0.376[a]	0.306[a]	1.000			
Hire new workers at lower wages (4)	0.418[a]	0.104[a]	0.432[a]	1.000		
Reduce non-statutory benefits (5)	0.144[a]	0.303[a]	0.153[a]	0.134[a]	1.000	
Reduce variable pay (6)	0.247[a]	0.214[a]	0.177[a]	0.148[a]	0.456[a]	1.000
C. Technicians, assistants, and unskilled workers						
Change the type of employment contract (1)	1.000					
Do not hire anyone (2)	0.068	1.000				
Lay off employees (3)	0.346[a]	0.221[a]	1.000			
Hire new workers at lower wages (4)	0.423[a]	0.053	0.382[a]	1.000		
Reduce non-statutory benefits (5)	0.125[a]	0.305[a]	0.133[a]	0.146[a]	1.000	
Reduce variable pay (6)	0.179[a]	0.258[a]	0.170[a]	0.177[a]	0.470[a]	1.000

SOURCE: Authors' calculations.

NOTE: [a] All correlations are significant at the 1% level. In panel a, number of observations is 1,267, except for actions (5) and (6), where the number of observations are 947 and 678, respectively. In panel b, number of observations is 1,164, except for actions (5) and (6), where the number of observations are 874 and 622, respectively. In panel c, number of observations is 1,284, except for actions (5) and (6), where the number of observations are 955 and 673, respectively.

To analyze the determinants of the different strategies, ordered *logit* models were estimated using the same set of regressors as in the previous models. With regard to the likelihood of reducing non-statutory benefits, the results indicate that the probability of cutting them increases in firms

with flexible benefits. On the contrary, the likelihood is lower in firms located in Bogotá and in firms operating in construction and financial services. In addition, the probability reduces as the percentage of workers with permanent contracts increases. As mentioned earlier, workers' bargaining power might increase as the share of employees with more protected jobs increases. The strategy of *reducing variable pay* is less likely in firms operating in construction, manufacturing and financial services, where our survey shows that variable pay is more widespread (nearly 75% of the firms use this type of remuneration) (table 13).

The next alternatives are related to the type of labor contract and changes in company personnel. Regarding a *change in the type of employment contracts*, in general, we find the likelihood of using this strategy decreases as the share of permanent workers and the size of the firm increase; this is also the case with the presence of collective agreements. On the contrary, the probability of changing employment contracts increases in firms with flexible benefits. Moreover, the results show the likelihood of *not hiring anyone* increases with the presence of collective agreements and with firm size. Conversely, the probability reduces with higher labor costs and in firms located in Bogotá. At the sector level, firms belonging to construction, manufacturing, financial services, and transport, storage and communications are less likely not to hire anyone (table 14).

The alternative of *laying off workers* is less likely in Bogotá and in firms in agriculture, forestry and fishing and more likely in firms with flexible benefits and those operating in transport, storage and communications. For technicians, assistants and unskilled workers, the presence of collective agreements reduces the probability of *laying off workers* (table 15).

The main determinants of the possibility of *hiring new workers at lower wages* differ among occupational groups. In the case of managers, the most important explanatory variables are labor intensity, the presence of variable pay and firm size. For professionals, the existence of flexible benefits, the location of the firm and the sector where the firm operates are the most significant determinants. Finally, for technicians, assistants and unskilled workers, the share of minimum wages earners and the share of employees on a permanent contract are significant explanatory factors, besides sector and location of the firm (table 15).

TABLE 13. HOW LIKELY IT IS FOR A FIRM TO REDUCE BENEFITS OR TO REDUCE VARIABLE PAY (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Reduce non-statutory benefits*						*Reduce variable pay*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	0.366	(0.277)	0.108	(0.292)	0.063	(0.251)	0.021	(0.336)	–0.197	(0.356)	–0.053	(0.312)
Construction	–0.544[b]	(0.284)	–0.507[a]	(0.292)	–0.701[c]	(0.266)	–0.469[a]	(0.293)	–0.863[c]	(0.315)	–0.779[c]	(0.304)
Electricity, gas, water, mining	0.184	(0.299)	–0.005	(0.296)	–0.011	(0.284)	0.325	(0.380)	0.346	(0.363)	0.324	(0.352)
Manufacturing	–0.122	(0.225)	–0.210	(0.243)	–0.137	(0.230)	–0.540[b]	(0.262)	–0.442[a]	(0.269)	–0.685[c]	(0.261)
Financial services	–1.052[b]	(0.461)	–0.885[b]	(0.428)	–1.128[c]	(0.482)	–0.793[b]	(0.421)	–1.237[c]	(0.438)	–1.140[c]	(0.405)
Transport, storage, communications	–0.147	(0.218)	–0.247	(0.225)	–0.216	(0.217)	–0.127	(0.264)	–0.206	(0.282)	0.061	(0.278)
Education and health	0.103	(0.301)	–0.008	(0.315)	–0.206	(0.308)	0.167	(0.430)	0.226	(0.433)	0.198	(0.436)
Other services	0.183	(0.231)	0.113	(0.243)	0.014	(0.233)	0.188	(0.236)	0.128	(0.252)	0.312	(0.260)
Region	–0.532[c]	(0.157)	–0.350[b]	(0.168)	–0.351[b]	(0.159)	–0.232	(0.179)	0.007	(0.183)	–0.081	(0.177)

Log (No. of employees)	0.058[a]	(0.057)	0.080	(0.062)	0.038	(0.056)	–0.070	(0.073)	–0.030	(0.070)	–0.029	(0.065)
Skilled workers (%)	0.002	(0.003)	0.002	(0.004)	0.001	(0.004)	0.002	(0.004)	0.001	(0.004)	–0.005	(0.004)
Minimum wage earners (%)	–0.002	(0.003)	–0.001	(0.003)	–0.006[b]	(0.003)	0.000	(0.003)	0.001	(0.004)	–0.004	(0.004)
Flexible benefits	0.519[c]	(0.152)	0.417[c]	(0.157)	0.272[b]	(0.150)	0.234	(0.172)	0.365[b]	(0.187)	0.239	(0.182)
Variable pay	0.272[a]	(0.161)	0.241	(0.168)	0.301[b]	(0.160)						
Collective agreements	0.194	(0.239)	0.108	(0.264)	–0.160	(0.263)	1.052[c]	(0.288)	0.566[b]	(0.323)	0.328	(0.323)
Union members (%)	–0.005	(0.005)	0.002	(0.005)	–0.002	(0.005)	–0.006	(0.007)	–0.004	(0.006)	–0.006	(0.007)
Labor costs (%)	–0.001	(0.005)	0.000	(0.005)	–0.002	(0.005)	–0.001	(0.004)	–0.001	(0.005)	–0.001	(0.005)
Permanent workers (%)	–0.003[a]	(0.002)	–0.004[a]	(0.002)	–0.002	(0.002)	–0.001	(0.002)	–0.003	(0.003)	0.001	(0.002)
Number of observations	946		873		954		677		621		672	
Pseudo R^2	0.039		0.028		0.028		0.024		0.028		0.029	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the likelihood, ranging from 1 to 4, where 1 = not at all, 2 = not likely, 3 = likely and 4 = very likely.

TABLE 14. HOW LIKELY IT IS FOR A FIRM TO CHANGE THE TYPE OF EMPLOYMENT CONTRACT OR NOT TO HIRE ANYONE (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Change the type of employment contract*						*Not to hire anyone*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	−0.311	(0.248)	−0.409[a]	(0.251)	−0.334	(0.234)	−0.103	(0.218)	−0.096	(0.223)	−0.454[b]	(0.226)
Construction	−0.570[c]	(0.240)	0.054	(0.215)	−0.035	(0.206)	−0.455[b]	(0.227)	−0.479[b]	(0.230)	−0.559[c]	(0.219)
Electricity, gas, water, mining	−0.001	(0.287)	−0.193	(0.319)	−0.473[a]	(0.289)	0.181	(0.272)	−0.180	(0.280)	−0.048	(0.255)
Manufacturing	−0.374[b]	(0.199)	0.304	(0.200)	0.208	(0.193)	−0.617[c]	(0.193)	−0.729[c]	(0.199)	−0.668[c]	(0.198)
Financial services	−0.503	(0.350)	0.442	(0.309)	0.231	(0.308)	−0.603[b]	(0.299)	−0.603[b]	(0.303)	−0.703[c]	(0.315)
Transport, storage, communications	−0.018	(0.200)	0.428[b]	(0.214)	0.401[b]	(0.195)	−0.516[c]	(0.188)	−0.556[c]	(0.204)	−0.449[c]	(0.191)
Education and health	−0.018	(0.302)	0.327	(0.279)	0.200	(0.257)	−0.195	(0.285)	−0.388	(0.301)	−0.480[a]	(0.276)
Other services	0.215	(0.186)	−0.053	(0.194)	−0.341[b]	(0.188)	0.328[a]	(0.185)	0.228	(0.195)	0.058	(0.178)
Region	−0.289[b]	(0.136)	0.245[a]	(0.136)	0.418[c]	(0.127)	−0.400[c]	(0.130)	−0.370[c]	(0.136)	−0.248[b]	(0.128)

Log (No. of employees)	−0.023	(0.054)	−0.140[c]	(0.051)	−0.109[c]	(0.047)	0.195[c]	(0.047)	0.175[c]	(0.050)	0.173[c]	(0.048)
Skilled workers (%)	0.000	(0.003)	−0.003	(0.003)	−0.002	(0.003)	0.004	(0.003)	0.004	(0.003)	0.006[b]	(0.003)
Minimum wage earners (%)	−0.001	(0.003)	0.000	(0.003)	0.001	(0.002)	0.001	(0.002)	0.002	(0.003)	0.000	(0.002)
Flexible benefits	0.228[a]	(0.140)	0.431[c]	(0.146)	0.297[b]	(0.144)	0.173[a]	(0.134)	0.115	(0.140)	0.083	(0.135)
Variable pay	0.198	(0.142)	−0.035	(0.145)	−0.061	(0.137)	0.202	(0.129)	0.201	(0.136)	−0.021	(0.129)
Collective agreements	−0.177	(0.265)	−0.416[a]	(0.268)	−0.436[a]	(0.255)	0.655[c]	(0.232)	0.636[c]	(0.227)	0.767[c]	(0.221)
Union members (%)	0.002	(0.005)	0.002	(0.004)	0.000	(0.005)	0.002	(0.005)	0.004	(0.005)	−0.003	(0.005)
Labor costs (%)	0.001	(0.005)	0.002	(0.004)	0.005	(0.003)	−0.008[c]	(0.003)	−0.008[c]	(0.003)	−0.007[c]	(0.003)
Permanent workers (%)	−0.006[c]	(0.002)	−0.005[c]	(0.002)	−0.002	(0.002)	0.000	(0.002)	0.000	(0.002)	0.001	(0.002)
Number of observations	1,266		1,163		1,283		1,266		1,163		1,283	
Pseudo R^2	0.021		0.017		0.016		0.036		0.033		0.025	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the likelihood, ranging from 1 to 4, where 1 = not at all, 2 = not likely, 3 = likely and 4 = very likely.

TABLE 15. HOW LIKELY IT IS FOR A FIRM TO LAY OFF EMPLOYEES OR TO HIRE NEW WORKERS AT LOWER WAGES (ORDERED *LOGIT* ESTIMATES, WEIGHTED)

Dependent variable and occupational groups / *Explanatory variables*	*Lay off employees*						*Hire new workers at lower wages*					
	Managers		*Professionals*		*Technicians, assistants and unskilled workers*		*Managers*		*Professionals*		*Technicians, assistants and unskilled workers*	
Agriculture, forestry, fishing	−0.424[b]	(0.234)	−0.625[c]	(0.239)	−0.456[b]	(0.226)	−0.167	(0.236)	−0.508[b]	(0.232)	−0.357[a]	(0.215)
Construction	−0.128	(0.223)	0.288	(0.210)	0.225	(0.201)	−0.259	(0.225)	0.442[b]	(0.216)	0.452[b]	(0.208)
Electricity, gas, water, mining	0.135	(0.251)	−0.423	(0.279)	−0.360	(0.265)	0.292	(0.268)	0.224	(0.263)	−0.093	(0.255)
Manufacturing	−0.342[a]	(0.193)	0.079	(0.192)	0.054	(0.186)	−0.273	(0.187)	0.366[b]	(0.188)	0.518[c]	(0.187)
Financial services	−0.446	(0.323)	0.119	(0.298)	0.095	(0.259)	−0.533[a]	(0.347)	0.524	(0.366)	0.719[b]	(0.335)
Transport, storage, communications	0.084	(0.194)	0.517[c]	(0.205)	0.376[b]	(0.199)	0.266	(0.193)	0.715[c]	(0.202)	0.817[c]	(0.190)
Education and health	−0.128	(0.272)	0.140	(0.270)	0.061	(0.255)	0.308	(0.272)	0.901[c]	(0.273)	0.486[b]	(0.233)
Other services	0.324[b]	(0.173)	0.123	(0.180)	−0.103	(0.179)	0.565[c]	(0.187)	0.312[a]	(0.187)	0.181	(0.181)
Region	−0.635[c]	(0.133)	−0.329[c]	(0.136)	−0.246[b]	(0.122)	−0.177	(0.129)	0.455[c]	(0.136)	0.679[c]	(0.122)

Log (No. of employees)	0.091[b]	(0.048)	−0.008	(0.050)	−0.033	(0.045)	0.146[c]	(0.052)	−0.026	(0.053)	−0.020	(0.044)
Skilled workers (%)	0.003	(0.003)	0.006[a]	(0.003)	0.002	(0.003)	−0.001	(0.003)	−0.003	(0.003)	−0.002	(0.003)
Minimum wage earners (%)	0.001	(0.002)	0.001	(0.003)	0.000	(0.003)	−0.002	(0.002)	−0.002	(0.003)	−0.007[c]	(0.002)
Flexible benefits	0.172	(0.141)	0.502[c]	(0.142)	0.417[c]	(0.136)	0.160	(0.134)	0.269[b]	(0.143)	0.179	(0.139)
Variable pay	0.215[a]	(0.137)	0.066	(0.140)	0.006	(0.128)	0.309[b]	(0.138)	0.238[a]	(0.148)	0.109	(0.137)
Collective agreements	−0.019	(0.226)	−0.176	(0.227)	−0.384[b]	(0.224)	0.377[a]	(0.227)	0.130	(0.244)	−0.081	(0.239)
Union members (%)	0.010[c]	(0.005)	0.008	(0.005)	0.008	(0.005)	−0.007[a]	(0.005)	−0.007	(0.005)	−0.006	(0.005)
Labour costs (%)	−0.001	(0.004)	0.001	(0.004)	−0.001	(0.003)	−0.009[b]	(0.004)	−0.004	(0.004)	−0.006[a]	(0.003)
Permanent workers (%)	−0.002	(0.002)	−0.003[a]	(0.002)	−0.002	(0.002)	−0.003[a]	(0.002)	−0.002	(0.002)	−0.003[b]	(0.002)
Number of observations	1,266		1,163		1,283		1,266		1,163		1,283	
Pseudo R^2	0.026		0.017		0.011		0.028		0.021		0.034	

SOURCE: Authors' calculations.

NOTES: Robust standard errors in parentheses. [a], [b] and [c] denote statistical significance at 10, 5 and 1 percent, respectively. The dependent variable increases with the likelihood, ranging from 1 to 4, where 1 = not at all, 2 = not likely, 3 = likely and 4 = very likely.

6. CONCLUSIONS

This paper uses data from a wage setting survey of 1,305 Colombian firms to explore the nature and source of wage rigidities. Our sample is fully representative of the population under study and includes nine economic sectors, three firm sizes and three occupational groups.

The survey provides evidence of nominal and real downward wage rigidities in Colombia. The results show that during difficult times firms would be more willing to freeze wages and to increase them below the inflation rate as opposed to cutting wages. The most important reasons why Colombian firms do not reduce wages during difficult times are to prevent the loss of the most productive and experienced workers, to not affect the worker's effort and productivity and to not affect the worker's motivation, all of which are associated with the efficiency wage theory. In summary, these results suggest downward wage rigidity in Colombia could be explained by the efficiency wage theory. It is worth mentioning that the reasons associated with the different versions of the efficiency wage theory are highly correlated.

Ordered *logit* regressions were used to determine what factors are related to wage rigidities. The findings indicate that permanent contracts impose more wage rigidity than other types of contracts, since workers are more protected by labor legislation. In addition, workforce composition and labor intensity play an important role in explaining of wage rigidities. For less skilled workers, the presence of collective agreements increases wage rigidity. Regarding the reasons preventing wage cuts, we found the sources of wage rigidity differ according to economic sector, firm location and firm size. For example, greater support for the adverse selection model and the shirking model is found among large firms and in those operating in the *other services* sector, which is comprised of specialized workers.

Survey evidence also suggests firms could use other alternatives to adjust costs in difficult times, since wage cuts are not usual. These alternatives include reducing non-statutory benefits and variable pay, laying off employees, changing the type of employment contract and hiring new workers at lower wages. The use of these strategies varies across economic sectors and occupational groups.

Finally, this paper contributes to a better understanding of wage rigidities and their sources at the firm level in Colombia. This is important for the monetary policy transmission process in a context of low inflation and

high unemployment. In addition, the results help to improve the microfoundation of macroeconomic models used in monetary policy decisions.

References

Agell, J., and H. Bennmarker (2002), *Wage Policy and Endogenous Wage Rigidity: A representative View from Inside*, Institute for Labor Market Policy Evaluation, Uppsala, Sweden, August (Working Paper, No. 2002:12).

Agell, J., and H. Bennmarker (2007), "Wage Incentives and Wage Rigidity: A Representative View from Within", *Labour Economics*, Vol. 14, No. 3, pp. 347-369.

Agell, J., and P. Lundborg (1995), "Theories of Pay and Unemployment: Survey Evidence from Swedish Manufacturing Firms", *Scandinavian Journal of Economics*, Vol. 97, No. 2, pp. 295-307.

Agell, J., and P. Lundborg (2003), "Survey Evidence on Wage Rigidity and Unemployment: Sweden in the 1990s", *Scandinavian Journal of Economics*, Vol. 105, No. 1, pp. 15-29.

Akerlof, G. A. (1982), "Labor Contracts as Partial Gift Exchange", *The Quarterly Journal of Economics*, Vol. 97, No. 4, pp. 543-569.

Akerlof, G. A. (1984), "Gift Exchange and Efficiency-wage Theory: Four Views", *The American Economic Review*, Vol. 74, No. 2, pp. 79-83.

Akerlof, G. A., and J. L. Yellen (1990), "The Fair Wage-effort Hypothesis and Unemployment", *The Quarterly Journal of Economics*, Vol. 105, No. 2, pp. 255-283.

Akerlof, G., W. Dickens, and G. L. Perry (1996), "The Macroeconomics of Low Inflation", *Brookings Papers on Economic Activity*, Vol. 1996, No. 1, pp. 1-76.

Amirault, D., P. Fenton, and T. Laflèche (2009), *Asking about Wages: Results from the Bank of Canada's Wage Setting Survey*, paper presented at the XIV meeting of the Central Bank Researchers Network of the Americas, Salvador, Bahía, Brazil, 11-13 November.

Azariadis, C. (1975), "Implicit Contracts and Underemployment Equilibria", *Journal of Political Economy*, Vol. 83, No. 6, pp. 1183-1202.

Babecký, J., P. Du Caju, D. Kosma, M. Lawless, J. Messina, and T. Rõõm (2009a), *Downward Nominal and Real Wage Rigidity: Survey Evidence from European Firms*, European Central Bank, Frankfurt am Main, Germany, November (Working Paper Series, No. 1105).

Babecký, J., P. Du Caju, D. Kosma, M. Lawless, J. Messina, and T. Rõõm (2009b), *The Margins of Labour Cost Adjustment: Survey Evidence from European Firms,* European Central Bank, Frankfurt am Main, Germany, November (Working Paper Series, No. 1106).

Baily, M. (1974), "Wage and Employment under Uncertain Demand", *Review of Economic Studies,* Vol. 41, No. 1, pp. 37-50.

Bewley, T. (1999), *Why Wages Don't Fall During a Recession,* Harvard University Press, Cambridge, Ma.

Bewley, T. (2004), *Fairness, Reciprocity, and Wage Rigidity,* IZA, Bonn, Germany, May (Discussion Paper Series, No. 1137).

Bewley, T. F. (1995), "A Depressed Labor Market as Explained by Participants", *The American Economic Review,* Papers and Proceedings, Vol. 85, No. 2, pp. 250-254.

Bewley, T. F. (1998), "Why Not Cut Pay? Alfred Marshall Lecture", *European Economic Review,* Vol. 42, No. 3-5, pp. 459-490.

Blanchflower, D. G., and A. J. Oswald (1988), "Internal and External Influences upon Pay Settlements", *British Journal of Industrial Relations*, Vol. 26, No. 3, pp. 363-370.

Blinder, A. (1991), "Why are Prices Sticky? Preliminary Results from an Interview Study", *The American Economic Review*, Vol. 81, No. 2, pp. 89-96.

Blinder, A., and D. Choi (1990), "A Shred of Evidence on Theories of Wage Stickiness", *Quarterly Journal of Economics*, Vol. 105, No. 4, pp. 1003-1015.

Brzoza-Brzezina, M., and J. Socha (2007), *Downward Nominal Wage Rigidity in Poland and Its Implications for Monetary Policy,* National Bank of Poland, Warsaw (Working Paper, No. 41).

Campbell, C. M., and K. S. Kamlani (1997), "The Reasons for Wage Rigidity: Evidence from a Survey of Firms", *Quarterly Journal of Economics*, Vol. 112, No. 3, pp. 759-789.

Castellanos, S. G., R. García-Verdú, and D. S. Kaplan (2004), "Nominal Wage Rigidities in Mexico: Evidence from Social Security Records", *Journal of Development Economics*, Vol. 75, pp. 507-533.

Cobb, M., and L. Opazo (2010), "Evidencia microeconómica de rigideces nominales de salarios en Chile", *Economía Chilena*, Vol. 13, No. 1, pp. 23-37.

Copaciu, M., F. Neagu, and H. Braun-Erdei (2010), "Survey Evidence on Price Setting Patterns of Romanian Firms", *Managerial and Decision Economics,* Vol. 31, No. 2-3, pp. 235-247.

Dickens, W. T., L. Goette, E. L. Groshen, S. Holden, J. Messina, M. E. Schweitzer, J. Turunen, and M. E. Ward (2007), "How Wages Change: Micro Evidence from the International Wage Flexibility Project", *The Journal of Economic Perspectives*, Vol. 21, pp. 195-214.

European Central Bank (2009), *Wage Dynamics in Europe: Final Report of the Wage Dynamics Network (WDN)*, December, Accessed May 24; Available at: ⟨http://www.ecb.europa.eu/home/pdf/wdn_finalreport_dec2009.pdf⟩.

Fabiani, S., K. Galuscak, C. Kwapil, A. Lamo, and T. Rõõm (2010), "Wage Rigidities and Labor Market Adjustment in Europe", *Journal of the European Economic Association*, Vol. 8. No. 2-3, pp. 497-505.

Franz, W., and F. Pfeiffer (2003), *The Rationale for Wage Rigidity: Survey Evidence from German and US Firms*, ZEW, Mannheim, Germany (Discussion Paper, No. 02-60).

Franz, W., and F. Pfeiffer (2006), "Reasons for Wage Rigidity in Germany", *Labour* (Review of Labor Economics and Industrial Relations), Vol. 20, No. 2, pp. 255-284.

Gómez, J., J. D. Uribe, and H. Vargas (2002), *The Implementation of Inflation Targeting in Colombia*, Banco de la República, Bogotá, March (Borradores de Economía, No. 202).

Guataquí, J., M. Rodríguez, and A. García (2009), *Determinantes estructurales de la sindicalización en Colombia*, Universidad del Rosario, Facultad de Economía, Bogotá, May (Documentos de Trabajo, No. 58).

Holzer, H. J. (1990), "Wages, Employer Costs, and Employee Performance in the Firm", *Industrial and Labor Relations Review*, Special Issue, Vol. 43, No. 3, pp. 147S-164S.

Iregui, A. M., L. A., Melo, and M. T. Ramírez (2009a), *Are Wages Rigid in Colombia?: Empirical Evidence Based on a Sample of Wages at the Firm Level*, Banco de la República, Colombia, August (Borradores de Economía, No. 571I).

Iregui, A. M., L. A. Melo, and M. T. Ramírez (2009b), *Formación e incrementos de salarios en Colombia: un estudio microeconómico a partir de una encuesta a nivel de firma*, Banco de la República, Bogotá, December (Borradores de Economía, No. 582).

Iregui, A. M., L. A. Melo, and M. T. Ramírez (2010), "Incrementos y rigideces de los salarios en Colombia: un estudio a partir de una encuesta a nivel de firma", *Revista de Economía del Rosario*, Vol. 13, No. 2, pp. 279-311.

Kahn, S. (1997), "Evidence of Nominal Wage Stickiness from Microdata", *The American Economic Review*, Vol. 87, No. 5, pp. 993-1008.

Kaufman, R. T. (1984), "On Wage Stickiness in Britain's Competitive Sector", *British Journal of Industrial Relations*, Vol. 22, No. 1, pp. 101-112.

Kawaguchi, D., and F. Ohtake (2008), "Testing the Morale Theory of Nominal Wage Rigidity", *Industrial & Labor Relations Review*, Vol. 61, No. 1, art. 3.

Knoppik, C., and T. Beissinger (2009), "Downward Nominal Wage Rigidity in Europe: an Analysis of European Micro Data from the ECHP 1994-2001", *Empirical Economics*, Vol. 36, pp. 321-338.

Lebow, D., S. Raven, and A. W. Beth (2003), "Downward Nominal Wage Rigidity: Evidence from the Employment Cost Index", *Advances in Macroeconomics*, Vol. 3, art. 2.

Lindbeck, A., and D. Snower (2001), "Insiders versus Outsiders", *Journal of Economic Perspectives*, Vol. 15, No. 1, pp. 165-188.

Martins, F. (2009), "Wage and Price Dynamics in Portugal. An Integrated Approach Using Qualitative Data", *Economic Bulletin*, Banco de Portugal, Summer, pp. 79-99.

McLaughlin, K. (1994), "Rigid Wages?", *Journal of Monetary Economics*, Vol. 34, pp. 383-414.

Messina, J., P. Du Caju, C. F. Duarte, M. Izquierdo, and N. L. Hansen (2008), *The Causes and Consequences of Nominal and Real Wage Rigidity: a Sectoral Approach*. Available at: <http://www.ecb.int/events/pdf/conferences/wage_dynamics_europe/messina_et_al.pdf?7a98b045f4a02c7924a2e4d4e15177fd> (accessed 17 July 2009).

Sánchez, F., V. Duque, and M. Ruiz (2009), *Costos laborales y no laborales y su impacto sobre el desempleo, la duración del desempleo y la informalidad en Colombia, 1980-2007*, Universidad de los Andes, Bogotá (Documentos CEDE, No. 2009-11).

Schweitzer, M. (2007), *Wage Flexibility in Britain: Some Micro and Macro Evidence*, Bank of England, London (Working Paper, No. 331).

Shapiro, C., and J. Stiglitz (1984), "Equilibrium Unemployment as a Worker Discipline Device", *The American Economic Review*, Vol. 74, No. 3, pp. 433-444.

Stigbauer, A. (2002), "Identification of Wage Rigidities in Microdata – A Critical Literature Review", *Focus on Austria*, Oesterreichische Nationalbank, Vol. 3, pp. 110-126.

Stiglitz, J. (1974), "Alternative Theories of Wage Determination and Unemployment in L.D.C.'s: The Labor Turnover Model", *Quarterly Journal of Economics*, Vol. 88, No. 2, pp. 194-227.

Summers, L. H. (1988), "Relative Wages, Efficiency Wages, and Keynesian Unemployment", *The American Economic Review*, Papers and Proceedings of the American Economic Association, Vol. 78, No. 2, pp. 383-388.

Taylor, J. (1979), "Staggered Wage Setting in a Macro Model", *The American Economic Review*, Vol. 69, No. 2, pp. 108-118.

Tobin, J. (1972), "Inflation and Unemployment", *The American Economic Review*, Vol. 62, No. 1, pp. 1-18.

Weiss, A. (1990), *Efficiency Wages: Models of Unemployment, Layoffs, and Wage Dispersion*, Princeton University Press, Princeton, NJ.

Zoega, G., and T. Karlsson (2006), "Does Wage Compression Explain Rigid Money Wages?", *Economics Letters*, Vol. 93, No. 1, pp. 111-115.