

**Wage Compensation for Workplace Disamenities During Industrialization:
The Case of Spain, 1909-1920***

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ABSTRACT

The labor market of nineteenth century Spain was largely unregulated. The first systematic regulation did not in fact take place until 1900, and the measures enacted were aimed at tackling to the most serious inefficiencies: abuses in the employment of women and children, industrial accidents, and hours of work and rest. However, compliance with these early social reform measures was limited. The enforcement of labor market regulations was hampered by limited funding and opposition by a range of different social groups. In fact, factory inspection was based more on actions to raise awareness and persuasion than on penalties. Economic historians have shown that in contexts of limited state intervention, such as the British and American labor markets of the nineteenth and early twentieth centuries, the labor market wage compensated for undesirable urban and workplace features. This article shows that Spanish workers were wage compensated for the inefficiency of early social and labor reforms, a finding which tends to mitigate the pessimistic view of the early twentieth century labor market in Spain.

Between 1889 and 1893 the Social Reform Commission, the precursor of the more ambitious labor institutions created in Spain in the twentieth century, published various studies of working and living conditions. The Commission, which was founded in 1883, gathered reports and accounts by social reformers, workers, trade unionists, employers, and doctors on wages, working hours, the cost of living, savings, accidents, disease, female and child labor, urban environments, restrictions to collective bargaining, etc.¹ A better knowledge of workers' living standards intensified political and academic debate on the issue of social reform. The nineteenth century labor market in Spain was largely unregulated.² In fact, only two acts existed governing female and child labor (1873 and 1878), and even these were rarely enforced.³

The impact of the Social Reform Commission's study helped bring about the enactment of a further two laws in 1900, which addressed two of the most serious labor market inefficiencies of the time, abuses in the employment of women and children, and industrial accidents. The state also introduced regulations limiting the hours of work. First female and then male workers won the right to Sunday rest in 1902 and 1904. Various laws were also enacted to limit the length of the working day for women, children, and workers in certain industries before a general eight-hour day was won in 1919. The *Instituto de Reformas Sociales* (Institute for Social Reforms) was created in 1903 as a specific public institution for labor affairs, and in 1906 the *Servicio de la Inspección del Trabajo* (Labor Inspection Office) was created with the aim of enforcing the whole raft of new labor legislation.

The Spanish economy and society were to change dramatically over the next three decades right up to the Civil War (1936-1939).⁴ The share of the labor force in agriculture, which had previously been stable at around 72 per cent, began to fall, reaching 51 per cent in 1930, as the country became ever more industrialized and urbanized. These shifts were accompanied by intense changes in state regulation of labor markets. Thus, further reforms

¹ Comisión de Reformas Sociales, *Información*.

² Spain lagged behind other countries in the adoption of social reform in the nineteenth century. This is clearly shown in two indexes for seventeen European countries recently prepared by Huberman and Lewchuk, "European economic integration".

³ Social reformers referred to this issue. See Alvarez-Buylla, *Instituto de Trabajo*, 69-70, and García-Ninet, "Elementos", 61-63.

⁴ See, for instance, the recent book by Prados de la Escosura, *Progreso económico de España*, which discusses Spanish economic growth.

were implemented in addition to the initial measures enacted at the turn of the century to protect women and children, provide for post-accident compensation and establish the Sunday rest. The new reforms focused on hours of work and rest, wages, social insurance, and collective bargaining.⁵

However, both labor inspectors and social reformers (independent campaigners and parliamentarians) were quick to draw attention to the shortcomings of these labor market interventions, especially during the first two decades of the twentieth century. Subsequent labor and political historiography has confirmed the pessimistic view of early Spanish labor market reform, drawing on a range of sources.⁶ Such safety standards as were established tended to provoke resistance from both employers and workers, while new post-accident compensations were low and difficult to obtain. Breaches of the law governing female and child labor in areas such as minimum age, working day, rest, and prohibited industries were rife until the early 1920s, in particular in industries employing large numbers of women such as textiles, clothing and paper manufacturing. Sunday working, a common practice during the nineteenth century, was also difficult to eradicate. Underlying this situation was the inefficiency of labor inspection procedures.⁷ Thus, compliance with early state intervention in the labor market was often low. The situation is comparable to that of the least developed countries in the present day, where the main problem is not the lack of labor standards but the inefficiency with which weak bureaucracies with limited resources enforce labor laws.⁸

For the case of Britain and the US during the second half of the nineteenth century and the beginning of the twentieth, economic historians have shown that the labor market wage compensated for undesirable urban and workplace characteristics. In a context in which public health and housing policy was very limited, urban workers received wage compensation for poor sanitary conditions, overcrowding, and the cost of living. Similarly, in largely unregulated labor markets workers received at least partial wage compensation for

⁵ See Section II for regulations of hours of work before 1919 and accident compensation. In 1906 and 1907 were established the prohibition of impounding wages and the prohibition of the truck system respectively; minimum wages were enacted in 1927. Social insurance included old-age (1919), maternity (1931), unemployment (1931), and illness (1936). The regulation of collective bargaining was regulated through two laws in 1908 and 1909.

⁶ The general situation improved in the period from 1922 to the Civil War. However, this was not the case for accidents at work (Silvestre, "Workplace accidents").

⁷ Problems related to the efficiency of inspection in the early twentieth century were not confined to Spain, as shown in the reports on several national inspection offices included in the ILO's *International Labor Review* between 1922 and 1929. For France, also see Dumas, "L'Inspection", and Dhoquois, "Idéologie".

⁸ Elliott and Freeman, *Can Labor Standards Improve*, 11.

negative features of their employment. Although labor markets functioned well enough, they were far from perfect, however, and industrial nations enacted a wide range of legislation and social expenditures. The timing and scope of regulation was influenced by a number of different factors.⁹ Of course, merely enacting ambitious reforms by no means implies that the problems of inefficiency will be resolved. In the case of Spain, where firm government action was conspicuously lacking in the nineteenth century, social reform emerged strongly in the decades preceding the Civil War, but in a context of wrenching social change and political instability defined by budget constraints and opposition.

Following the line of reasoning used by economic historians to explain the circumstances of largely unregulated periods, this article will argue that workers were wage compensated for the inefficiency of early labor market reform in Spain. This article also shows that the process took place independently of the action of unions, whose main priorities in a context of limited power were to increase wages and achieve reductions in working hours rather than obtain improvements in working conditions. The findings also tend to mitigate the traditional pessimistic view of the Spanish labor market during the early twentieth century. The rest of this article is organized as follows. Section I reviews the literature on compensating wage differentials. Section II discusses the main concerns of early social reform and explains the reasons for low compliance. Section III presents the theoretical model on compensating wage differentials and data. Section IV describes the main results, and Section V considers the role played by unions. Finally, the main conclusions are set out in Section VI.

I. COMPENSATING WAGE DIFFERENTIALS: THEORY AND HISTORY

The seminal ideas on the theory of compensating wage differentials go back to the classical economists. Adam Smith is usually credited with being the first to state that “The wages of labor vary with the ease or hardship, the cleanliness or dirtiness, the honorableness or dishonorableness of the employment”, but the Scottish economist was in fact only developing an earlier idea of Richard Cantillon. Thus, “The arts and trades which are accompanied by risks and dangers, such as those of founders, mariners, silver miners, etc.,

⁹ Studies on the emergence of social reform consider potential determining factors such as average income, the rise of democracy, unionization, demographic and occupational distribution of populations, and exposure to international trade (Lindert, “The rise of social spending”, Huberman and Lewchuk, “European economic integration”).

ought to be paid in proportion to the risks”.¹⁰ In any event, early economic thought assumed that workers with worse conditions get higher wages within a labor market in equilibrium.

Later thinkers such as J. S. Mill and A. Marshall refuted these ideas. Thus, Mill warns, “Things have much altered (...) since Adam Smith’s time”, and although Mill admitted that the mechanism of compensating differentials can appear between “employments of about the same grade, and filled by nearly the same description of people”,

(...) it is altogether a false view of the state of facts, to present this as the relation which generally exists between agreeable and disagreeable employments. The really exhausting and the really repulsive labours, instead of being better paid than others, are almost invariably paid the worst of all, because performed by those who have no choice.

Similarly, Alfred Marshall indicated that “the disagreeableness of works seems to have very little effect in raising wages, if it is of such a kind that it can be done by those whose industrial abilities are of a very low order”.

(...) Hence arises the paradoxical result that the dirtiness of some occupations is a cause of the lowness of the wages earned in them. For employers find that this dirtiness adds much to the wages they would have to pay to get the work done by skilled men of high character working with improved appliances; and so they often adhere to old methods which require only unskilled workers of but indifferent character, and who can be hired for low (Time-) wages, because they are not worth much to any employer.¹¹

The substantial empirical literature of the modern era tends to confirm the theory of compensating wage differentials, although there are some exceptions. Apart from regional and urban disamenities, the job disutilities that are usually taken into account are the risk of accident or occupational illness, the unemployment risk, hours worked (duration, timing, etc.), and the existence of bad workplaces (noise, lack of ventilation or space, repetitive work, etc.) or job dissatisfaction in general.¹² A related line of research deals with the impact of labor market institutions on the extent of compensating wage differentials. Thus, the existence of unexpected results according to the theory of compensating differentials - i. e. the absence of any wage compensation for disamenities - can be better understood with the help of recent literature focusing on the role of labor laws, unions and gender issues.

¹⁰ Adam Smith, *Wealth of Nations*, 102; Richard Cantillon, *Nature of Trade*, 26. I am indebted to Cormac Ó Gráda for this remark.

¹¹ J. S. Mill, *Principles*, 381, 383; A. Marshall, *Principles*, 558.

¹² For instance, the bibliographical review included in Viscusi and Aldy, “The Value of a Statistical Life”, shows that the effect of accident risk on the wage is generally positive and statistically significant.

For example, studies show that increases in post-accident compensation may push down wages.¹³ Moreover, the role played by unions in collective bargaining is also relevant. Some studies suggest that an increase in unionization leads to larger compensating differentials if unions focus on providing information about accident risks or representing workers who accept risks in exchange for higher wages. On the other hand, following Fairris' original model, Kim and Fishback, among others, have shown that compensating differentials might be lower if unions seek to level wages for equitable reasons.¹⁴ According to Dorman and Hagstrom and the works cited therein, the existence or the extent of compensating differentials may also be determined by factors related to employer and industry characteristics such as establishment size, capital intensity, profits, the percentage of the workforce that is female, etc.¹⁵

Studies of compensating wage differentials in historical contexts are much less numerous, and almost all of them refer to Britain and the US. The pioneer studies of urban and regional disamenities by Williamson and Lindert and Williamson showed that compensating wage differentials did exist in nineteenth and early twentieth century British cities.¹⁶ Similarly, in Brown's study of nineteenth century English cotton factories, workers received substantial compensation for spatial disamenities such as high rents and poor sanitation in cities, although only the most highly skilled received any compensation for bad working conditions.¹⁷ These findings, which are rooted in the British standard of living debate, have recently been confirmed by Rosenbloom for American cities.¹⁸ Meanwhile, several studies of workplace disamenities in turn-of-the-century America cited by Fishback show that the lack of unemployment insurance generated partial or total wage compensation,

¹³ See Kim and Fishback, "The Impact", and previous works cited therein.

¹⁴ Fairris, "Compensating Wage"; Kim and Fishback, "The Impact".

¹⁵ Dorman and Hagstrom, "Wage Compensation".

¹⁶ For instance, Williamson, "Urban Disamenities", "Some Myths Die Hard", "Was the Industrial Revolution Worth It", "Copying with city growth"; Lindert and Williamson, "English Worker's Living Standards". Historical analysis usually include disamenities like the cost of living, the city size (a proxy for overcrowding or housing costs), and the infant mortality rate (a proxy for inadequate sanitation and environmental quality in general).

¹⁷ Brown, "The Condition of England".

¹⁸ Rosenbloom, "Was there a National Labor Market", finds a statistically significant but, contrary to expectations, negative relationship between earnings and infant mortality. The author attributes this result to a possible reverse causation, with lower income causing higher infant mortality rates. Other potential disamenities like climatic variables have only a small impact in both countries.

accident risk was only partially compensated, and occupational illness went unremunerated.¹⁹ Studies by Fishback and Kantor, and Kim and Fishback have respectively demonstrated the decline in risk premiums provoked by reforms in workers' compensation programs and growing unionization.²⁰ Lewchuk suggests that workers in early twentieth century France received at best partial compensation for occupational risks, since regressions show a positive but not statistically significant relationship between wages and occupational mortality.²¹

Theoretical and empirical studies in modern times show that longer hours of work can be wage compensated. However, empirical studies by Whaples, Sundstrom and Rosenbloom, and Costa on the tradeoff between wages and hours of work in industrialization processes of the late nineteenth and early twentieth centuries show that the *income effect* (i.e. the reduction of hours worked because of the increase in wages) dominates the *substitution effect* (the substitution of leisure for hours worked because of the increase in the price of leisure due to rising wages).²² This is because workers preferred to reduce labor supply in the presence of rising wages in a context where working for ten hours a day or more (six days per week) was common.

II. EARLY SOCIAL REFORM IN SPAIN AND LOW COMPLIANCE

As in other more advanced industrial countries, early state intervention in Spain focused on those workers with the greatest problems in defending their own self-interest. The Women and Children Work Act (1900) was aimed at widening the scope of its two nineteenth-century predecessors, compliance with which was very weak. The law established minimum ages for work, a maximum working day, rest breaks, breast-feeding breaks, provision for pregnant women at work, night work, workplace hygiene conditions, children's vaccination and training requirements, and prohibited occupations.

¹⁹ Fishback, "Operations", 734-740. Some of these studies use individual data. See, for instance, Hatton and Williamson, "Unemployment", or Fishback and Kantor, "'Square Deal' or Raw Deal".

²⁰ Fishback and Kantor, "Did Workers Gain"; Kim and Fishback, "Institutional Change". Also see Fishback and Kantor, *A Prelude to the Welfare State*.

²¹ Lewchuk, "Industrialization".

²² Whaples, "Winning the Eight-Hour Day"; Sundstrom and Rosenbloom, "Occupational Differences"; Costa, "The Wage". In the study of 1939 by Dickens and Katz, "Inter-Industry Wage Differences, 79-81, the correlation between hours and wages is negative and the coefficient of the regressions is positive but not significant.

The question of industrial accidents featured in both parliamentary and general public debate from the late 1880s. However, it was not until 1900 that the first accident-related legislation was enacted. The Labor Accidents Act established safety standards, replaced employer negligence liability theory with employer objective (no-fault) liability theory, and provided for post-accident compensation. Fatal accident compensation varied between seven months' and two years' earnings, depending on the number members in the deceased's family, while compensation for nonfatal accidents, far more common than fatal accidents, depended on the ensuing disability. Permanent disabilities were separated into three categories: total (e.g. full paralysis), professional (incapacity for the victim's usual work), and partial (e.g. loss of a leg), which were remunerated with two, one and a half, and one years' wage respectively. Temporary disability compensation (e.g. payable for a broken arm) was initially established 50 per cent of the wage until the 1922 amendment of the 1900 Act.

Once again, the first regulation on hours were aimed at women and children. After the Women and Children Work Act (1900), limits on age and sex were established in various statutory instruments. For example, from 1902 the maximum working day permitted for women was 11 hours, and for child workers aged under 14 it was 6 hours. This regulation apart, however, working hours were hardly lowered again before the implementation of the eight-hour day in 1919, and such reductions as were implemented affected specific industries.²³ Thus, state employees won an eight-hour day in 1902, while the maximum working day in the mining industry was shortened to 9 hours in 1910, the maximum working week in the textile was limited to 60 hours in 1913, and the maximum working day for shop assistants was set at 10 hours from 1918. The law also regulated night work for women and children. After imposing various limitations, the government finally prohibited night work for women and children in 1913. Finally, women won the right to Sunday rest in 1902 and men in 1904.

One key feature of these early laws governing working conditions was the inefficiency of the labor inspection office during the first two decades of the twentieth century. Labor inspectors made serious complaints about the implementation of labor rules concerning women's and children's work, accidents, and the Sunday rest day in the annual reports.²⁴ Firstly, the inspectorate noted the lack of personnel and the difficulty of attending to the

²³ Domenech, "Reduction".

²⁴ Instituto de Reformas Sociales, *Memoria*; Ministerio de Trabajo, Comercio e Industria, *Memoria*. Other breaches are mentioned after 1917, including failure to observe the eight hour day won in 1919.

whole gamut of new labor laws and covering all firms and industries, which were sometimes located in isolated and remote districts. Secondly, the inspectors voiced the demand for greater coordination between central and local government and warned of the influence that local employers wielded over the local offices of the *Instituto*. Thirdly, the imposition of fines was a slow process, often lasting years, and the instructions given to inspectors put persuasion before sanctions. Moreover, remissions were not unusual, and employers could easily avoid payment by declaring themselves bankrupt.

The celebrated reports by the French sociologist Angel Marvaud which were commissioned by various French economic and political organizations, also emphasized the failure of Spanish state labor regulation in the early years.²⁵ Marvaud ascribed this to lack of funds, and resistance on the part of employers and local authorities. Later labor and political historiography drawing on a range of sources has confirmed, first, the inefficiency of early Spanish labor inspection procedures and the consequences for compliance, and second the employers' unrelenting opposition to social reform and labor market regulation during the period, more for economic reasons than on ideological grounds motives.²⁶

In particular, breaches of the Women's and Children's Work Act were frequent up until the early 1920s. Between 1908 and 1917 in fact, breaches of the Act account for 92 per cent of the total infractions reported in the *Memorias*.²⁷ Female (and child) employment in Spain during the early twentieth century was defined by low labor market participation and high industrial segregation. Though census data are certainly understated (with regard to agricultural and domestic work above all), the evolution of female employment during this period appears as the base of the U-shape described by economic historians and development economists.²⁸ Spain's "second industrial revolution" did not cause significant numbers of women to enter the new industries. During the first decades of the twentieth century, female workers remained highly concentrated in traditional "women's jobs" like clothing, textiles

²⁵ Marvaud, *Cuestión social*.

²⁶ See Martín-Valverde, "Estudio"; Palomeque, *Derecho del trabajo*; Soto, *Trabajo industrial*; Rey-Reguillo, *Proprietarios*; Vázquez-González, "Inspección del trabajo"; Comín, "Modestas realizaciones"; Malo-Guillén, "Real Academia"; Cabrera y Rey-Reguillo, *El poder*.

²⁷ The remaining 8 per cent were breaches of the Accidents and Sunday Rest Acts.

²⁸ The share of women in the labor force fell from around 16 per cent between 1877 and 1900 to around 9.5 per cent between 1910 and 1930 (Soto, *Trabajo industrial*, 193). These figures are remarkably low by international standards. See, for instance, Costa, "From Mill Town to Board Room".

and food, and they were excluded from skilled jobs in certain industries like metal working and transport.²⁹

The Industrial Accidents Act of 1900 was a clear advance in this area, insofar as it removed the negligence-based system and established fixed premiums for each kind of accident. However, before the introduction of life annuities in 1932 (as a result of Spain's adhesion to the ILO Geneva Treaty in 1925), the premiums were insufficient according to social reformers, and independent, legal and medical advisors to government.³⁰ Moreover, the labor inspectorate reported a considerable volume of delayed and unprocessed compensation claims. It also seems that, because the Act was very imprecise in the definition of disabilities, in some cases workers received, at best, the smallest premiums.³¹ At times, the workers themselves refused to claim compensation out of ignorance of the regulations and fear of reprisals, or came to agreements with employers in order to hide partial disabilities.³²

Finally, labor inspection revealed frequent breaches of restrictions on women's and children's working hours and the Sunday rest day for both sexes. The case of the Sunday rest, a common practice in nineteenth-century Spain, is particularly interesting. Despite the considerable pressure exerted by the Catholic Church to enact and enforce the law, its wording was not always precise and a number of exceptions were allowed.³³

III. THEORETICAL MODEL AND DATA

Since compliance with the legislation governing working conditions in Spain was very low in the early years of industrialization, firms and industries may well have used wage compensation to compete for the best workers. Worker mobility would have forced the worst firms and industries either to improve the quality of the working environment or to

²⁹ See Silvestre, "Grado de discriminación", and the numerous references to women's work during this period cited therein.

³⁰ Maeso, *Accidentes*, 5-6; García-Ormaechea, *Jurisprudencia*, 13; Gallart, *Derecho*, 307-308; Martínez-González and Saura, *Nueva Ley*, 5-6. With reference to the extent of workers insurance in general - accident, sickness, and old-age - the US Department of Commerce and Labor, *Twenty-Fourth Annual Report*, 2321-2322, reported that the Spanish system, "not a leader in the field", was taking the first steps.

³¹ García-Ormaechea, *Jurisprudencia*, 13-18; Soto, *Trabajo industrial*, 636-637; Martínez-Pérez, "Salud laboral", 354-356. The implementation of occupational health and safety standards was also fraught with difficulty (Silvestre, "Workplace accidents").

³² Soto, *Trabajo industrial*, 675-677.

³³ Montero, "Polémica", 57-76; Soto, *Trabajo industrial*, 584, 591-592, 623-626.

compensate through higher wages. This section seeks to establish whether workers were in fact wage compensated in the early twentieth century as a result of the failure of early social reform. The empirical analysis refers to the period 1909-1920, and the study focuses on adult workers because of the lack of data on child wages. We estimate the relationship between wages and the main negative job characteristics of that time as reflected in the early labor inspection reports: working conditions for women, accidents and breaches of Sunday rest entitlements. A prior analysis will also consider the working day as a disamenity likely to be compensated. We tried to extend the study over a longer period and to include more indicators of bad working conditions. However, systematic annual wage data only exist for the late 1900s and the 1910s, and there is no information about other potential workplace disamenities such as unemployment risk or occupational illnesses in this period.

We adopted the familiar hedonic regression model, in which the dependent variable is the price of a good (in this case, labor) and the independent variables reflect its characteristics.³⁴ The functional form is the standard semilog. Definitions and sources of all the variables, as well as a brief comment on each source, are reported in Table 1. The dependent variable is based on the annual reports prepared by the labor inspectorate. The *Memorias* report breaches of labor legislation and provide information about average men's and women's wages (without specifying occupation or professional category) in 24 industries between 1908 and 1920. For the purposes of this study, however, we selected 16 of these industries in order to carry out a multivariate regression.³⁵

Micro-data wage series are not available for this period, and we have therefore followed the theoretical and empirical strategy of compensating differentials in the literature on inter-industry wage differentials using wages aggregated at industry level, as applied in various recent studies. Thus, Dickens and Katz consider the layoff rate and the number of hours' work in the week in their analysis of 31 American industries in 1939. Kniesner and Leeth analyze the compensating wage differential for fatal injury risk in 20 Japanese and 44 Australian industries in 1986 and 1984-85, respectively. In their study of Korea in the period between 1984 and 1990, Kim and Fishback run a fixed-effects analysis to estimate the

³⁴ Rosen, "Hedonic prices".

³⁵ The source begins in 1908, but the first year has not been included because the female labor force inspected is too low. The industries excluded are entertainment, glass, government, ornamentation, pottery, public companies, tobacco, and others.

compensating wage differential for both fatal and nonfatal injury risk in 61 industries.³⁶ In line with these studies, the first step given the scarcity of the data was to estimate a panel of average hourly male wages in each industry as a function of disamenities at work and a series of control variables at industry level. Next, two fixed-effects panels of average hourly wages were also estimated for both men and women, as a function of disamenities and industry dummies.

Three indicators of attractiveness or quality of work were designed. First, two variables were created using the two labor rules standing as proxies for work site conditions, as reported in the *Memorias*. These variables are the incidence of breaches of the Sunday Rest Act for men and women, and breaches of the Women's and Children's Work Act (women), and they are similar to the variable constructed by Brown to capture work site conditions, based on fines paid as a result of violations of the reporting and child labor provisions of the English Factory Acts during the mid-nineteenth century.³⁷ Labor law violations are divided by the number of inspections in each industry. With regard to the reliability of these data, as explained in the *Memorias*, although some highly spatially concentrated industries (like Catalan textiles) and bigger establishments could have been visited more often, labor inspection in each industry depended on the size of the worker population. A more formal test is explored in Appendix 1 to test whether the number of inspections or the number of reported labor law violations depended on other factors, such as location or the power of employers. First, employing regional data, the urbanization rate is used as a proxy of the concentration of industries in urban areas. Secondly, using industrial data, the average establishment size is used as a proxy of the power of employers in each industry to influence the legal process.³⁸ Taking into account that the number of observations is very low, panels A and B in Appendix 1 suggest that both the number of inspections and the number of reported violations were not determined by urban concentrations of industries or the existence of

³⁶ Dickens and Katz, "Inter-Industry Wage Differences"; Kniesner and Leeth, "Compensating"; Kim and Fishback, "The impact". Kim and Fishback's, "Institutional Change", dedicated to American railroads follows a similar approach based on occupation wages at the regional level. Previous studies using industry level wages are reviewed by Dickens and Katz, "Inter-Industry Wage Differences".

³⁷ Brown, "The Condition of England".

³⁸ From 1908 to 1920, the labor inspectorate used a spatial division of the country based on ten regions. In 1920, two more regions were added. The urbanization rate is only available for census dates 1910 and 1920. Average establishment size in each industry is only available for 1920. There is no information for agricultural industries.

bigger firms in each industry.³⁹ The results do not vary substantially when other factors are included as controls.⁴⁰

The third disamenity is the accident rate. Unfortunately, the source does not distinguish between fatal and nonfatal accidents at the level of individual industries. However, between 1909 and 1920 fatal accidents represented only 0.50 per cent of the total. This variable is calculated as accidents per thousand workers.⁴¹ The three variables reflecting disamenities are three-year moving averages of the value for the current year, the previous year, and the two previous years.⁴² The amount of hours worked was also considered. However, according to the international literature in historical contexts, the relationship between hours' work and wages (controlled for other factors) should be negative and significant. In the Spanish case, Domenech has also recently found a negative and highly significant relationship between wages and hours, using industrial and regional data from 1910 to 1915, controlling for various factors.⁴³ A comparable though simpler analysis is followed in Table 2, which explains the hours worked by the level of wages using industrial data from 1909 to 1919, the year in which the eight-hour day was won.⁴⁴ The regressions include dummies to control for

³⁹ The coefficient of the urbanization rate is positive in all regressions except for number 1 (panel A), but not significant. In panel A, the coefficient of the average establishment size in each industry is negative but not significant; in panel B, the non-significant coefficient is either positive or negative.

⁴⁰ A time dummy is included at regional level. At both levels, panel A considers if the number of inspections were also determined by the number of breaches. Conversely, panel B considers if the number of breaches were determined by the number of inspections.

⁴¹ The denominator is the worker population for 1914 and 1920 included in Ministerio de Trabajo y Previsión, *Estadística de salarios*, with interpolation of the figures corresponding 1909-1913 and 1915-1919. Since the worker population provided by the *Estadística de salarios* is a sample, the impact of this variable could be biased upward. This strategy is necessary because of divergences between the industry Population Censuses (1910 and 1920) classification and the industries referred to in the accident statistics (Instituto de Reformas Sociales, *Estadística de los Accidentes*). In any case, the samples for 1914 and 1920 number 1,039,086 and 1,293,433 workers respectively, and these values are close to 1,279,800 and 1,868,600 workers reported in the Population Censuses of 1910 and 1920 according to data provided by Nicolau, "Población", 78. As Kim and Fishback, "The Impact", 240, among others point out, however, the estimate of the risk premium may be biased downward, because industry aggregates have been used.

⁴² We follow Kim and Fishback, "The Impact", 247, here in order to account for the ways in which annual variations in disamenities might influence the workers' and employers' attitudes. The results using the evidence for just one year were similar. The main difference was that the impact of the disamenities tended to be lower.

⁴³ Domenech, "Reduction".

⁴⁴ The source does not distinguish between male and female working day. Average working day is 9.48 hours for 1909-1919 and 9.36 hours for 1909-1920.

differences across industries and time. Because both variables are expressed in logarithms, the coefficients refer to elasticities. For men, a 1 per cent increase in wages leads to a 0.16 per cent fall in the hours worked. For women, the fall is 0.07 percent.⁴⁵ In this light, the length of the working day, in isolation, has not been considered as a disamenity in wage regressions.⁴⁶

The first model uses industry level characteristics as controls. Because of the paucity of data on skills, a highly relevant variable, this strategy is only possible for the case of men. The control variables were chosen based on a theoretical framework that takes into account the influence of both *competitive* and *non-competitive* factors on wages and is widely accepted in labor economics.⁴⁷ Dorman and Hagstrom have recently made intensive use of this approach to investigate the relationship between wages and disamenities.⁴⁸ In order to include competitive factors, a proxy for human capital was developed, consisting of the percentage of skilled workers in each industry. A control for average age was then factored in, because this variable may be considered a proxy for experience. The first non-competitive variable refers to the influence of unions. Unions basically have two purposes. Monopoly unions enable workers to drive wages above the market level (and restrict entry). Collective unions negotiate over workplace public goods. In this section, we are interested in the impact of unions on wages. Because continuous and disaggregated union density data is lacking, it has been necessary to use the other conventional proxy for labor pressure, namely strikes. Union variable reflects the level of industrial disputes, measured through different strike *shape* indicators.⁴⁹ Therefore, the interpretation of this variable should be made cautiously.

⁴⁵ As explained by Sundstrom and Rosenbloom, "Occupational Differences", 389, since both wages and hours are endogenous in the market, this relationship should be considered simply as a description of the configuration of wage-hour pairs. Domenech, "Reduction", 28, remarks upon this issue because in Spain, as in other countries, the higher earning workers of the early twentieth century also tended to work shorter hours.

⁴⁶ Breaches of the maximum permitted working day of 11 hours for women are included in the variable capturing work site conditions for women.

⁴⁷ For instance, Dickens and Katz, "Inter-Industry Wage Differences", and Krueger and Summers, "Reflections".

⁴⁸ Dorman and Hagstrom, "Wage Compensation".

⁴⁹ The three usual shape indicators for strike activity as defined by Shorter and Tilly, *Strikes*, 92-101, 435-473, are *frequency* (strikers/active population), *size* (strikers/strikes), and *duration* (lost-work days/strikers). Because sufficient annual data concerning the active population is not available, a variant of strike frequency or the size of strikes as an alternative were finally used (see Table 1). Data on strike duration is unavailable at industry level.

Strikes are costly, and they generally occur when negotiations fail. Thus, for instance, it would be possible that strikes were more common in high-wage industries.⁵⁰ A control for the proportion of female workers in each industry is also included since a high concentration of women may depress the wages earned by unskilled males, as long since observed Slichter.⁵¹ The available industry level variables probably do not capture all of the relevant differences between industries. For instance, potential determining factors for wages such as establishment size, and capital or concentration ratios simply cannot be obtained. Thus industry dummies are used in a second model instead of industry level specific characteristics. This strategy also permits wage regressions for both men and women.⁵² Finally, the year dummies in all specifications capture the impact of differences over time that are common to all industries.

Table 3 shows the descriptive statistics, while Appendixes 2 and 3 provide more information about industry characteristics and intertemporal variations. Among other features, Appendix 2 shows that very feminized industries such as Textiles, Food, Paper, Clothing and Leather tended to present high levels of breaches, whereas less feminized industries, such as Mining, Iron, Electricity and Transport presented great accident risk. Appendix 3 shows the beginning of the decrease in the breaches of the Women's Work Act.⁵³ Table 4 shows the correlations. For the case of men, simple correlations suggests a positive relationship between disamenities and wages. For the case of women, correlations suggest

⁵⁰ In order to test for this potential source of endogeneity, and taking into account the shortage of instruments, regressions 2 and 4 in Table 5 were also carried out using lagged values as instruments for union variables. Hausman test does not reject the null hypothesis of exogeneity.

⁵¹ Slichter, "Notes".

⁵² A potential problem with using industry dummies is the appearance of multicollinearity with disamenities, if industrial differences in disamenities were unchanging over time (see, for instance, Kim and Fishback, "Institutional Change", 808). Regressions of disamenities were run on the set of industrial dummies, and the R² results obtained were relatively high, 0.54, 0.56, and 0.60 for accidents, Sunday rest, and women's and children's work respectively. However, the impact of disamenities on male wages using the industry level variables shown in Table 5 is similar (the impact is similar or higher if the industry level variables are removed in Table 5). A regression was also run with the same variables included in Table 5 for women, with the exception of average skills, because no data is available for women. The results obtained were again similar.

⁵³ With regard to the Accident rate, the number of registered accidents decreased between 1918 and 1921, with the *Estadística de los Accidentes* not making any reference to this fall. Silvestre, "Workplace accidents", offers two complementary explanations.

either a positive or negative relationship. However, remaining controls need to be taken into account.

IV. EMPIRICAL MODEL

The main results are shown in Tables 5 and 6. We took into account the possible bias in estimates arising from the endogenous nature of job disamenities. Thus, if we assume that legality and safety are normal goods, this implies that better paid workers will choose or demand better jobs and industries.⁵⁴ In order to explore this situation we first tried to estimate simultaneous equations in different stages, but were prevented from doing so due to a lack of adequate instruments.⁵⁵ Following Kim and Fishback, we then tried lagged variables in order to endogenize disamenities.⁵⁶ The results were similar. The main difference using lagged variables for one year and the three-year moving average is that the impact of the violations coefficient is not significant in some regressions where the variables refer to women. In our final results in Tables 5 and 6, we present non-lagged three-year moving averages.

Table 5 shows the results of regressing male wages on the two disamenities and competitive and noncompetitive variables. All regressions control for year dummies. The coefficient of the accident rate is positive and significant. The coefficient of the Sunday rest violations variable is also positive in all regressions except for number 2, but not significant. The rest of the variables show the expected sign. Average skills increase average wages per industry. The relationship between our proxy for experience and wages is also positive and significant in the first three estimations. The inclusion of the women density reduces the impact of the remaining significant variables. Thus, an increase in the density of female workers lowered both wage and accident risk compensation for men. Union frequency increased wages. Since the variables considered may not account for all inter-industry differences, the regressions for men and women presented in Table 6 substitute industry-level variables for industry dummies. For men, the results are similar to those obtained in Table 5.⁵⁷ In the case of women, the impact of accident risk on wages is also positive, but not significant. Both violation rates are significant, however.

⁵⁴ See Fairris, “Compensating Payments”, 206, for a review of studies in which the simultaneity bias is eliminated.

⁵⁵ See the problems encountered by Lewchuk, “Industrialization”, which prevented him from applying this technique in a historical context with data limitations.

⁵⁶ Kim and Fishback, “Institutional Change”.

⁵⁷ The results seem to be robust to changes in model specification. In Table 5, the first model uses cross-industry variation. In Table, 6 the second model uses inter-temporal variation within each industry.

In general, our findings suggest that the labor market rewarded the main disamenities endured by male and female workers. Thus, men received wage compensation for accidents, while women received wage compensation for the low level compliance with restrictions on the minimum working age, hours of work and rest (including the Sunday rest), hygiene conditions in the workplace, and prohibited occupations. The negative correlation between the accident rate and women density reported in Table 4 (-0.36) and data for industries included in Appendix 2, reveal that stereotypes of women's work and protective legislation tended to ensure that dangerous industries remained the preserve of men.⁵⁸ On the other hand, the positive correlation between violations of the Women's and Children's Work Act and women density (0.57), and data for specific industries also show that a certain deterioration of the working environment was one outcome of the segregation of women in certain sectors.

V. THE ROLE PLAYED BY UNIONS

Both economists and economic historians assert that collective bargaining may either raise or lower the size of compensating differentials. If unions provide information on workplace conditions and represent infra-marginal workers (who seek higher wage payments for accepting, for instance, accident risk) in situations of employer monopsony, compensating differentials may increase. Moreover, agreements between unions strengthen their hand in collective bargaining situations, leading to the creation of a legal framework covering bad working conditions. By contrast, wage leveling and seniority strategies (not job characteristics), and the existence of multiple unions in the negotiating process, may cause compensating differentials to fall.

Although Spanish union density was comparatively low during the early twentieth century, the level of labor unrest in Spain was similar to or even higher than in other European countries, especially during the period of general labor turbulence that followed WWI.⁵⁹ Spanish workers mainly joined or supported one of two unions, the Socialist *Unión*

⁵⁸ This situation also tended to occur within industries. In this sense, it is possible that the weak correlation between female wages and accident rates may be produced by the fact that not many women did dangerous work.

⁵⁹ The maximum union density, around 12 per cent of the active population, was reached in 1920 (Silvestre, "Determinantes", 77). This is a comparatively low figure in the European context (Bain and Price, *Profiles*; Mikkelsen, "Working-Class Formation"). Average values for strike shape indicators in Spain, as reported in Silvestre, "Determinants", were similar or higher than in any other country included in the large sample examined by Shorter and Tilly, *Strikes*, 306-339.

General de Trabajadores (UGT) and the Anarchist *Confederación Nacional del Trabajo* (CNT). UGT, which was founded in 1879, spread in services and industrial sub-sectors such as mining, metalworking and transport, and was more prone to cooperation with employers and public labor and social reform institutions. CNT was founded in 1910, and its main strength lay in agriculture, textiles and construction, while its general attitude was more revolutionary and anti-capitalist.

The literature on Spanish labor history does not offer conclusive findings regarding union involvement in the struggle for better working conditions. The exhaustive study carried out by Soto on the history of industrial labor includes some local examples of union concern about working conditions.⁶⁰ However, analysis of the motives for strikes and political and labor history studies suggest that the demand for better workplaces was not a priority for Spanish unions during their early years.⁶¹ Rather, Spanish unions seemed to focus on wage demands, and according to strike statistics around 45 per cent of the strikes that took place between 1905 (the first year available) and 1935 were motivated by or included wage claims.⁶² During the period considered, union participation in the design of labor policy in Spain was very limited. This was partly because Anarchist unionism rejected integration into the new labor institutions (not without considerable internal debate), and partly the result of the unwillingness of successive governments to grant opportunities for constructive engagement.⁶³ The increase of wages and hours reduction (before the eight-hour day was won in 1920) were the main union claims in a context of limited power and poverty.⁶⁴

⁶⁰ Soto, *Trabajo industrial*.

⁶¹ This was already suggested by the sociologist Angel Marvaud, *Cuestión social*, cited above, who pointed out that workers were mistrustful of the implementation of implementing labor laws. Also see Silvestre, “Workplace accidents”.

⁶² In a recent study, Vilar, “Ruptura”, compares the evolution of real wages in Spain and four European countries, Britain, France, Germany, and Italy, throughout the twentieth century. Examining the first decades of the twentieth century, the author shows that despite rising wages in the 1920s, the Spanish average before the Civil War was below the other countries considered.

⁶³ Martín-Valverde, “Estudio”; Castillo, “Todos iguales”; Rey-Reguillo, *Proprietarios*; Barrio, “El sueño”; Casanova, *De la calle*; Soto, “Poder”; Silvestre, “Determinantes”.

⁶⁴ In fact, there appears to have been an absence of conscious attention to differences in disamenities between jobs or industries in other European countries too, as was noted by the General Secretary of the Red Cross (Sand, “Health”) and the International Labor Organization (ILO, “Problems”). Indeed, both reported that wage demands were a major priority for European unions, and considered the implications of this strategy for the successful implementation of health and safety programs.

Following the theoretical and empirical strategies employed in previous studies, we are interested in examining the effect of unionization on compensating differentials.⁶⁵ However, as explained in Section III, proxies for the role of unions used here can give rise to some reservations (also see footnote 50). In Table 7 (regressions 1, 2, 5, and 6) we first add union variables to regressions 1 and 3 from Table 6. Second, we interact disamenities with union variables (regressions 3, 4, 7, and 8). In the case of men, the impact of union variables on wages is, as expected, positive and significant (regressions 1 and 2, Table 7). The coefficients of interacting unions with accidents and of the Sunday Rest Act are only significant in one case, while the correlation between accidents and breaches (without interaction) and wages remains similar with the inclusion of union interaction. In the case of women, the impact of unions on wages is not significant and only one interaction variable is significant at 10 per cent. This is no surprise in light of labor gender historiography in Spain.⁶⁶ However, the most striking result is that the inclusion of union interaction substantially increases the impact of accidents (regression 7) and decreases the impact of regulatory breaches on wages. Taken together, these findings seem to confirm that Spanish unions tended to exclude women both from egalitarian demands for wage equalization and from the demand for compensating payments in the case of the most important inefficiencies, particularly those of the application of the Women's Work Act.

VI. CONCLUSIONS

In a Royal Decree issued in 1922 when the labor inspectorate was strengthened, the government affirmed that

“It is of no use for Parliament to enact laws intended to improve the lot of the working man, to humanize relations between capital and labor, channeling social conflict through just and far-sighted legislation, if these laws later turn out to be but a dead letter and the State is unable to enforce them with due effectiveness. It has rightly been said that labor legislation depends upon guaranteed compliance, an impartial and appropriately prepared inspection office, and regulations to ensure that procedures are swift and exemplary”.⁶⁷

In the case of Spain, quantitative and qualitative historical evidence and modern labor and political historiography suggest that the problems associated with the implementation of the labor market inspection institutions meant the new laws governing working conditions

⁶⁵ Fairris, “Compensating Wage”; Kim and Fishback, “The Impact”, “Institutional Change”.

⁶⁶ Several studies cited in Silvestre, “Grado de discriminación”, show that Spanish unions usually presented a gender bias, though with some exceptions.

⁶⁷ Royal Decree of 22 April 1922. Quoted in Palomeque, *Derecho*, 81, and translated into English.

were only very inefficiently enforced. The two main reasons for this situation were the lack of funds and the shortage of inspectors, coupled with the employers' reluctance to comply. In fact, the inspectors themselves recognized the extraordinary economic, and even cultural, costs associated with the implementation of the law in a country where workshops and small enterprises operating on a low capital base were predominant. Thus, inspection was based more on educational actions and persuasion than on penalties, particularly before the reforms enacted from the early 1920s.

As Elliott and Freeman point out with regard to LDCs, the best enforcers of standards are likely to be workers themselves operating through a collective organization, but the unions are also generally weak.⁶⁸ In the case of early Spanish industrialization, unions mainly kept to strategy aimed at raising wages and reducing hours, and the issue of working conditions was not a priority among their main demands. This position was influenced by a political context in which unions had only limited power in the design of labor policies and wages were low. Furthermore, as has been remarked by labor economists, the unions' inability to achieve any significant impact on compensation could have been exacerbated by separate negotiation on the part of the two main unions, which were politically and strategically, and the absence of any common bargaining agreement.

These facts could suggest a badly functioning labor market. However, it has been known since classical economic thought that markets can generate forms of compensation for the negative characteristics of jobs. In spite of better and more disaggregated data, it seems reasonable to affirm that our findings suggest the Spanish labor market rewarded workers for workplace disamenities during early industrialization. Men and women did indeed receive compensation for their respective problems. However, we may wonder, what was the extent of the premiums? The standardized coefficients estimated in Table 8 allow us to compare the size of the impact of compensations with other wage determinants.⁶⁹ In the case of men, controlling for competitive variables and unions (Columns, 1 and 2, corresponding to Table 5), or controlling for industry dummies (Column 1, corresponding to Table 6), a one standard deviation increase in the accident rate increases male wages by around 0.20 standard deviations. In the case of women, controlling for industry dummies (Columns 2 and 3, corresponding to Table 6), the impact of labor law breaches is 0.17 for Sunday Rest and 0.10 for Women and Children Work. In comparison with the impact of other determinants of

⁶⁸ Elliott and Freeman, *Can Labor Standards Improve*.

⁶⁹ See note to Table 8 for a detailed explanation of the meaning of standardized coefficients.

wages, those values do not appear negligible. Thus, a one standard deviation increase in union pressure increases male wages by 0.17 or 0.09 standard deviations (Columns 2 and 4, corresponding to Table 5); whereas in the case of skills, the impact is around 0.22 (Columns 1, 2, and 3, corresponding to Table 5).⁷⁰

In the presence of post-accident compensation, the size of pre-accident (wage) compensation is worth considering in more detail. According to coefficients from male wage regressions (Tables 5 and 6), ex-ante compensation implied a market value between 0.60 and 1.60 of one year's average earnings.⁷¹ If we take the average of these estimations, we can deduce that the compensating differential for accidents covered around one year's average earnings.⁷² Considering that workers were also legally covered by post-accident compensation, the size of the estimated pre-accident compensation appears to be high.⁷³ However, ex-ante and ex-post compensations are not exactly equivalent. Whereas ex-post compensation goes directly to the injured worker, ex-ante compensation is a premium employers have to pay for workers taking risks. Furthermore, it should not be forgotten that, according to Spanish social reformers, ex-post premiums were low and not always received.⁷⁴

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⁷⁰ A relevant feature in Table 8 is also the big impact of women density on lowering male wages (Columns 4 and 5, corresponding to Table 5).

⁷¹ Ex-ante accident compensation (or market value of an accident) is calculated as the following product:

$$\text{Average annual earnings} \times \text{Increase in wages for an increase of one accident} \times 1000.$$

Average annual earning for 1909-1920 is calculated as follows: Average male hourly wage \times Average Working day \times 6 days \times 50 weeks = $0.34 \times 9.36 \times 6 \times 50 = 954.72$ pesetas. For the increase in wages for an increase of one accident we choose the maximum and the minimum coefficients from Tables 5 and 6: 0.0016 (Table 5, Column 2) and 0.0006 (Table 5, Column 5). 1000 is the scale factor. Ex-ante accident compensation for the chosen coefficients are 1527.55 and 572.83 pesetas.

⁷² It should be remembered that our data do not distinguish between fatal and nonfatal accidents.

⁷³ Kim and Fishback, "Institutional Change", and Fishback and Kantor, "Did Workers Gain", show cases in which wages decreased in response to the introduction of workers' compensation.

⁷⁴ Fishback and Kantor, *A Prelude to the Welfare State*, 56-58 and Appendix B, offer a complete and detailed estimation of the size of American ex-post compensation in terms of annual earnings. Spanish data for this period do not allow us to make a similar accurate calculation. Although only roughly approximate, a comparison between the two countries (not included here, but available from the author) suggests that, in general, the generosity of post-accident compensations in Spain during the period under study here was limited.

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TABLES

Table 1. Definitions and Sources for Industry-Level Variables Included in Wage Regressions.

Men. Industry-Level Variables Model (Table 5)	
Wage:	Male hourly wage obtained from Instituto de Reformas Sociales, <i>Memoria</i> , and deflated using the national consumer price index estimated by Ballesteros, “Estimación” (1909 = 100). The <i>Memorias</i> - annual reports of the labor inspectorate - began in 1908. However, as admitted by the <i>Instituto</i> , the first year did not include systematic and reliable information about all industries and regions. The inspectorate was made up of a central office and regional delegations.
Accidents:	Accidents per thousand workers. Three-year moving average. Accidents obtained from Instituto de Reformas Sociales, <i>Estadística de los Accidentes</i> . Worker population obtained from Ministerio de Trabajo y Previsión, <i>Estadística de Salarios</i> . Available for 1914 and 1920. The figures corresponding to 1909-1913 and 1915-1919 have been interpolated. Data on accidents were said - by the <i>Instituto</i> - to be collected on a consistent spatial and industrial basis from 1909 onwards. The <i>Estadística de Salarios</i> , from where the worker population is taken, is the more complete labor statistic available for the pre-Civil War period. It was published by the Ministry of Labor, the main public institution devoted to labor affairs and which substituted for the <i>Instituto</i> from 1924. This source reports several labor market indicators for four dates: 1914, 1920, 1925, and 1930.
Breaches of the Sunday Rest Act:	Breaches per inspection. Three-year moving average. Reported breaches and inspections obtained from the <i>Memorias</i> .
Average Skills:	Percentage of skilled male workers. Obtained from the <i>Estadística de Salarios</i> . Available for 1914 and 1920. The figures corresponding to 1909-1913 and 1915-1919 have been interpolated.
Average Age:	Percentage of men over 16 (which is the cohort given by the source). Obtained from the <i>Memorias</i> .
Unions:	A variant of <i>frequency</i> of strikes comprising the percentage of workers at the establishment that go on strike. Alternatively, <i>size</i> of strikes, i.e., strikers per strike. Obtained from Instituto de Reformas Sociales, <i>Estadística de las Huelgas</i> , and Dirección General del Instituto Geográfico y Estadístico, <i>Anuario Estadístico</i> . The <i>Estadística de las Huelgas</i> began in 1905. The <i>Anuario Estadístico</i> (<i>Statistics Yearbooks</i>) have been used to complete some non-available figures for some industries.
Women Density:	Percentage of female workers. Obtained from the <i>Memorias</i> .
Year Dummies:	1909 is the omitted variable.
Men or Women. Industry-Level Fixed Effects Model (Table 6)	
Wage:	Idem previous model.
Accidents:	Idem previous model.
Breaches of the Sunday Rest Act:	Idem previous model.
Breaches of the Women’s Work Act:	Breaches per inspection. Three-year moving average. Breaches refer to minimum ages, working day, rest breaks, breast-feeding break, pregnant work, night work and prohibited industries. Breaches and inspections obtained from the <i>Memorias</i> .
Industry Dummies:	Mining, Metal Working, Iron, Chemicals, Textiles, Agricultural, Building, Electricity, Food, Printing, Paper, Clothing, Leather, Wood, Transport, and Furniture. Building is the variable omitted.
Year Dummies:	1909 is the omitted variable

Table 2. Impact of Rising Wages on the Reduction in Hours Worked, 1909-1919. Industry-Level

Dependent Variable: Log of Daily Hours		
	Men	Women
Log of Hourly Wage	-0.16** (-3.53)	-0.07** (-2.16)
R ²	0.68	0.66
No. of observations = 176		

Notes: Ordinary least squares estimates. ** Significant for values of $p < 0.05$. White heteroskedasticity-consistent standard errors. *t*-statistics between brackets. Both regressions include an intercept and year and industry dummies. Number of observations = 16 industries x 11 years.

Sources: For wages, see Table 1. Hours obtained from Instituto de Reformas Sociales, *Memoria*.

Table 3. Descriptive Statistics for Variables (not Dummies) Included in Wage Regressions (Tables 5 and 6)

Variable	Mean	S.D.	Min.	Max.	Variable	Mean	S.D.	Min.	Max.
Male Wage	0.34	0.06	0.18	0.56	Wom.Work	6.10	9.13	0.74	72.20
Female Wage	0.16	0.04	0.06	0.28	Skills (Men)	81.7	8.01	59.0	96.1
Log Male Wag.	-1.08	0.17	-1.73	-0.57	Age (Men)	92.5	4.02	83.9	99.0
Log Female Wag.	-1.85	0.22	-2.81	-1.27	Unions (freq.)	69.89	32.26	0.00	100
Accidents	27.54	22.21	0.00	106.37	Unions (size)	264.24	329.21	0.00	2578.78
Sun. Rest	0.28	0.41	0.00	2.69	Women Dens.	23.18	23.17	0.02	77.54

Table 4. Correlation Matrix for Variables (not Dummies) Included in Wage Regressions

Men									
	L.M.W.	Acc.	S.R.	Skills	Age	Freq.	Size	W. D.	
Log Male Wage	1.00								
Accidents	0.15	1.00							
Sunday Rest	0.20	0.45	1.00						
Skills	0.19	-0.08	0.12	1.00					
Age	0.18	0.50	0.40	-0.17	1.00				
Unions-Frequency	0.27	-0.21	0.03	-0.05	-0.16	1.00			
Unions-Size	0.16	-0.05	0.02	-0.25	-0.01	0.33	1.00		
Women Density	-0.46	-0.36	-0.21	-0.15	-0.46	-0.04	0.09	1.00	
Women Work (not included in regressions from Table 5)		-0.17	-0.16			0.06	0.32	0.57	
Women									
	L.W.W.	Acc.	S.R.	W. W.					
Log Female Wage	1.00								
Accidents	-0.01	1.00							
Sunday Rest	0.13	0.45	1.00						
Women Work	-0.05	-0.17	-0.16	1.00					

Table 5. Wage Regressions for Men, 1909-1920. Industry-Level Variables Model

Dependent Variable: Log Real Wage					
	(1)	(2)	(3)	(4)	(5)
Accidents	0.0014** (2.78)	0.0016** (3.38)	0.0014** (2.81)	0.0008* (1.94)	0.0006* (1.62)
Breaches of the Sunday Rest Act	0.0124 (0.56)	-0.0035 (-0.16)	0.0093 (0.42)	0.0201 (0.99)	0.0251 (1.24)
Average Skills	0.0044** (3.21)	0.0048** (3.60)	0.0047** (3.25)	0.0024** (1.99)	0.0025* (1.92)
Average Age	0.0057* (1.94)	0.0069** (2.35)	0.0059** (2.00)	-0.0015 (-0.58)	-0.0023 (0.92)
Unions					
Frequency		0.0009** (3.42)		0.0005* (1.87)	
Size			0.00003 (1.29)		0.00004 (1.56)
Women Density				-0.0031** (-8.29)	-0.0032** (-9.04)
Year Dummies	Included	Included	Included	Included	Included
Intercept	-2.1608** (-6.60)	-2.3570** (-7.12)	-2.2121** (-6.58)	-1.2819** (-4.20)	-1.1936** (-4.00)
Adjusted R ²	0.514	0.537	0.514	0.662	0.661
No. of observations = 192					

Notes: Ordinary least squares estimates. * Significant for values of $p < 0.10$. ** Significant for values of $p < 0.05$. White heteroskedasticity-consistent standard errors. t -statistics between brackets.

Sources: See text and Table 1.

Table 6. Wage Regressions, 1909-1920. Industry-Level Fixed Effects Model

Dependent Variable: Log Real Wage			
	Men (1)	Women (2)	Women (3)
Accidents	0.0015** (2.55)	0.0012 (1.17)	0.0013 (1.30)
Breaches of the Sunday Rest Act	0.0167 (0.48)	0.0902* (1.92)	0.0924** (1.97)
Breaches of Women's Work Act			0.0025** (1.99)
Industry Dummies	Included	Included	Included
Year Dummies	Included	Included	Included
Intercept	-1.2571** (-35.79)	-2.0544** (-33.23)	-2.0563** (-33.62)
Adjusted R ²	0.679	0.525	0.526
No. of observations = 192			

Notes: Ordinary least squares estimations. * Significant for values of $p < 0.10$. ** Significant for values of $p < 0.05$. White heteroskedasticity-consistent standard errors. t -statistics between brackets.

Sources: See text and Table 1.

Table 7. Union and Disamenity Interactions

Dependent Variable: Log Real Wage								
	Men	Men	Men	Men	Women	Women	Women	Women
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unions								
Frequency	0.0005*		0.00001		0.0002		0.0013	
	(1.66)		(0.17)		(0.53)		(1.44)	
Size		0.00001**		0.00001		-0.00002		-0.00001
		(2.27)		(1.35)		(-0.82)		(-1.13)
Accidents	0.0015**	0.0015**	0.0015*	0.0014**	0.0012	0.0013	0.0029*	0.0012
	(2.54)	(2.55)	(1.78)	(2.09)	(1.29)	(1.31)	(1.94)	(1.09)
Breaches of the SRA	0.017	0.016	-0.0557	0.0013	0.0922*	0.0927**	0.0549	0.0211
	(0.48)	(0.47)	(-1.39)	(0.25)	(1.94)	(1.97)	(0.78)	(0.32)
Breaches of WWA					0.0023*	0.0027**	0.0064	0.0025
					(1.85)	(2.14)	(1.02)	(1.29)
Accs. × Unions (freq.)			0.000003				-0.00003	
			(0.30)				(-1.49)	
Accs. × Unions (size)				0.000001				0.0000001
				(0.29)				(0.01)
Breaches of the SRA × Unions (freq.)			0.0012**				0.0006	
			(2.13)				(0.59)	
Breaches the SRA × Unions (size)				0.00001				0.0002*
				(0.05)				(1.89)
Breaches of WWA × Unions (freq.)							-0.00005	
							(-0.72)	
Breaches of WWA × Unions (size)								0.0000004
								(0.28)
Industry Dummies	Included	Included	Included	Included	Included	Included	Included	Included
Year Dummies	Included	Included	Included	Included	Included	Included	Included	Included
Intercept	-1.2935**	-1.2739**	-1.2819**	-1.2713**	-2.0739**	-2.0499**	-2.1326**	-2.0303**
	(-33.89)	(-36.02)	(-31.29)	(-34.16)	(-33.38)	(-33.41)	(-31.64)	(-31.42)
Adjusted R ²	0.682	0.687	0.686	0.683	0.524	0.524	0.521	0.522
No. of obs. = 192								

Notes: Ordinary least squares estimations. * Significant for values of $p < 0.10$. ** Significant for values of $p < 0.05$. White heteroskedasticity-consistent standard errors. t -statistics between brackets. SRA = Sunday Rest Act. WWA = Women's Work Act.

Sources: See text and Table 1.

Table 8. Impact of Changing Exogenous Variables. Standardized Coefficients

Table 5. Men

	(1)	(2)	(3)	(4)	(5)
Accidents	0.18	0.21	0.18	0.10	0.08
Breaches of the Sunday Rest Act	0.02	-0.01	0.02	0.05	0.06
Average Skills	0.21	0.23	0.22	0.11	0.12
Average Age	0.13	0.16	0.14	-0.04	-0.05
Unions- Frequency		0.17		0.09	
Unions- Size			0.06		0.08
Women Density				-0.41	-0.44

Table 6

	Men (1)	Women (2)	Women (3)
Accidents	0.20	0.12	0.13
Breaches of the Sunday Rest Act	0.03	0.17	0.17
Breaches of Women Work Act			0.10

Table 7

	Men (1)	Men (2)	Men (3)	Men (4)	Women (5)	Women (6)	Women (7)	Women (8)
Unions								
Frequency	0.09		0.002		0.03		0.19	
Size		0.02		0.02		-0.03		-0.01
Accidents	0.20	0.20	0.20	0.18	0.12	0.13	0.29	0.12
Breaches of the SRA	0.04	0.04	-0.13	0.03	0.17	0.17	0.10	0.04
Breaches of WWA					0.10	0.11	0.27	0.10
Accs. × Unions (freq.)			0.03				-0.24	
Accs. × Unions (size)				0.06				0.005
Breaches of the SRA × Unions (freq.)			0.22				0.09	
Breaches of the SRA × Unions (size)				0.01				0.16
Breaches of WWA × Unions (freq.)							-0.18	
Breaches of WWA × Unions (size)								0.02

Notes: Standardized coefficients are the original coefficient in regressions (Tables 5, 6 and 7) multiplied by the ratio of the standard deviation of explanatory variables to the standard deviation of the explained variable (see Table 2 for standard deviations). This coefficient measures effects not in terms of the original units of the dependent and the independent variables, but in standard deviation units. This procedure makes the scale of the regressors irrelevant and puts the explanatory variables on an equal footing. In bold letters, significant coefficients at standard levels (see Tables 5, 6, and 7).

APPENDIX

Appendix 1. Reliability of reported inspections and breaches. Regional and industry levels

A. Dependent variable: Inspections							
	Regs. 1910, 1920 (1)	Regs. 1910, 1920 (2)	Regs. 1910, 1920 (3)	Regs. 1910, 1920 (4)	Indus. 1920 (5)	Indus. 1920 (6)	Indus. 1920 (7)
Constant	2060** (2.28)	670 (0.69)	767 (0.82)	670 (0.56)	1906** (4.90)	1409** (4.24)	1053** (1.48)
Urbanization rate	-8.71 (-0.34)	12.46 (0.51)	2.67 (0.11)	7.11 (0.33)			
1920		1251** (2.51)	1321** (2.76)	1391** (3.22)			
Establishment size					-18.31 (-1.52)	-13.65 (-1.47)	-13.98 (-1.44)
Breaches of the SRA			0.55 (1.67)			1.92** (3.25)	
Breaches of the WWA				0.04** (2.75)			0.22** (2.93)
Adjusted R ²	-0.04	0.18	0.25	0.39	0.09	0.47	0.42
No. of observations =	22	22	22	22	15	15	15

B. Dependent variables: Breaches of the SRA and breaches of the WWA										
	SRA Regs. 1910, 1920 (1)	SRA Regs. 1910, 1920 (2)	SRA Regs. 1910, 1920 (3)	WWA Regs. 1910, 1920 (4)	WWA Regs. 1910, 1920 (5)	WWA Regs. 1910, 1920 (6)	SRA Indus. 1920 (7)	SRA Indus. 1920 (8)	WWA Indus. 1920 (9)	WWA Indus. 1920 (10)
Constant	-319 (-0.60)	-177 (-0.27)	-341 (-0.53)	1034 (0.10)	4705 (0.38)	41 (0.00)	259* (1.87)	-206 (-1.16)	3492** (3.40)	265 (0.17)
Urbanization rate	20.06 (1.33)	17.90 (1.08)	14.85 (0.94)	181.77 (0.63)	125.90 (0.40)	39.19 (0.14)				
1920		-128 (-0.38)	-434 (-1.18)		-3302 (-0.52)	-12012* (-1.89)				
Establishment size							-2.43 (-0.57)	2.03 (0.57)	-20.04 (-0.56)	15.29 (0.49)
Inspections			0.25 (1.67)			6.96** (2.75)		0.24** (3.25)		1.93** (2.93)
Adjusted R ²	0.03	-0.01	0.08	-0.03	-0.07	0.21	-0.05	0.39	-0.05	0.34
No. of observations =	22	22	22	22	22	22	15	15	15	15

Notes: Ordinary least squares estimations. * Significant for values of $p < 0.10$. ** Significant for values of $p < 0.05$. SRA = Sunday Rest Act. WWA = Women's Work Act. The urbanization rate is the percentage of the population living in municipalities of 5,000 inhabitants or more. Average establishment size in each industry calculated as the quotient between the total of workers and employers in 1920. The number of observations at regional level is 10 for 1910 plus 12 for 1920. The number of observations at industry level is 15 because there is no information for agricultural industries. Inspections and breaches are three-year moving averages.

Sources: Luna, "Población urbana", for the urbanization rate. Dirección General de Estadística, *Censo*, and Soto, *Trabajo Industrial*, 69, for the establishment size. See text and Table 1 for the rest of the variables.

Appendix 2. Industry-Level Wages, Workplace Disamenities, and Labor Supply Features, 1909-1920

	Wage (Hourly)		Hours (Daily)	Accs. Rate	Sun. Rest	Wom. Work	Uni. (Freq.)	Uni. (Size)	Wom. Dens.	Skills (Men)	Age (Men)
	Men	Wom.									
Mining	0.35	0.14	9.29	44.46	0.41	4.58	73.62	478.08	1.33	83.87	96.94
Metal Work	0.38	0.18	9.50	4.77	0.17	2.44	79.98	326.59	1.26	80.32	97.30
Iron	0.37	0.17	9.19	50.27	0.10	3.60	80.28	278.37	6.00	71.15	92.28
Chemicals	0.36	0.18	8.95	35.49	0.18	3.10	56.49	96.10	20.24	79.36	95.91
Textiles	0.28	0.15	9.78	11.16	0.04	32.24	79.33	705.62	66.27	61.36	87.38
Agricul.	0.32	0.15	9.34	34.21	0.19	6.45	74.16	370.48	48.49	83.57	92.36
Construction	0.36	0.16	9.15	29.79	0.24	2.16	94.51	427.35	2.18	77.58	95.80
Electricity	0.35	0.17	9.83	55.50	0.29	2.74	15.34	47.29	11.75	79.19	97.33
Food	0.32	0.15	9.90	18.88	0.75	2.85	78.09	204.78	33.14	77.41	94.73
Printing	0.37	0.17	9.11	8.40	0.18	4.32	72.12	95.26	10.16	95.60	86.50
Paper	0.31	0.15	9.26	30.15	0.04	10.40	37.99	81.52	51.42	88.08	91.08
Clothing	0.30	0.16	9.62	0.37	0.24	10.61	79.25	265.42	68.95	90.48	88.28
Leather	0.32	0.15	9.20	10.74	0.08	3.33	64.19	65.92	24.53	77.85	91.68
Wood	0.35	0.16	9.18	25.89	0.09	2.28	71.55	151.48	4.21	86.44	89.97
Transport	0.39	0.17	9.29	68.47	1.37	2.61	75.41	346.44	3.19	87.20	97.13
Furniture	0.36	0.15	9.15	14.64	0.04	3.40	82.77	266.84	14.18	88.00	87.04

Notes: Average values for industries, 1909-1920. See Table 1 for definitions and sources.

Appendix 3. Annual Variations of Wages, Workplace Disamenities and Labor Supply Features

	Wage (Hourly)		Hours (Daily)	Accs. Rate	Sun. Rest	Wom. Work	Uni. (Freq.)	Uni. (Size)	Wom. Dens.	Skills (Men)	Age (Men)
	Men	Wom.									
1909	0.29	0.14	9.88	32.28	0.09	3.12	50.91	109.20	20.74	81.30	92.65
1910	0.33	0.16	9.79	32.56	0.39	3.06	57.50	144.02	21.38	81.41	92.86
1911	0.33	0.16	9.38	35.19	0.53	13.62	59.58	141.58	23.00	81.51	92.79
1912	0.35	0.17	9.48	37.27	0.44	11.28	68.49	173.26	21.72	81.60	93.06
1913	0.35	0.17	9.50	36.80	0.32	6.82	61.13	297.57	22.90	81.67	93.06
1914	0.33	0.14	9.96	31.54	0.12	6.32	56.49	205.39	22.82	81.73	92.49
1915	0.32	0.14	9.57	29.57	0.25	6.04	72.23	230.71	23.06	81.79	93.09
1916	0.31	0.14	9.47	26.81	0.22	6.79	69.32	401.68	24.46	81.84	92.84
1917	0.36	0.16	9.44	22.37	0.17	7.20	78.67	307.06	25.35	81.88	92.46
1918	0.33	0.15	8.83	15.64	0.26	3.15	77.09	259.67	23.40	81.92	91.86
1919	0.35	0.16	9.00	17.20	0.19	2.56	91.14	372.98	23.25	81.96	91.86
1920	0.47	0.24	8.00	15.17	0.33	2.86	93.75	512.52	23.39	81.98	92.16

Notes: Average values for each year. See Table 1 for definitions and sources.