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# Real Wages and Labour Inequalities in the Río de la Plata's Meatpacking Industry (Uruguay, 1890–1928)

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ABSTRACT
This study offers new evidence regarding industrial wage dynamics in the Río de la Plata region during the First Globalization era (1890-1928). We focus on Uruguay's meat-packing industry, particularly Liebig's Extract of Meat Company (Frigorífico Anglo after 1924), a key supplier of meat extract to European markets, and analyse original wage data extracted from company employment records. The nominal and real wage series we construct reveal two significant patterns: persistent real wage stagnation and widening gender-based pay disparities throughout the period. These findings provide important insights into labour market functioning in settler economies and contribute to comparative studies of industrial wages during the late nineteenth and early twentieth centuries.

KEYWORDS: industrial wages, Uruguay, meat packing industry, First Globalization

JEL CODES: N36, E24, J2, L66

## 1. Introduction

Between the last quarter of the 19th century and the first decades of the 20th century, trade in agricultural goods became highly dynamic on a global scale, driven by increases in international demand, a decrease in the cost of maritime freight, and the incorporation of new production technologies (Delgado, Pinilla and Aparicio 2023). This context encouraged a small group of temperate-climate economies with comparative advantages in pasture and grain production to specialize as food suppliers for overseas industrial centres.[1] In particular, meat products stood out for their importance and became a key export destined primarily for the United Kingdom market (Platt 1972; Perren 1978, 2006; Huttman 1978; Gebhardt 2000; Camou 2010; Woods 2012; Rayes 2015; Lluch 2019).

[1] Temperate-climate economies, or regions of recent settlement, developed sustained growth based on several common factors: large flows of European immigration and capital, and an abundance of natural resources. This category included countries in North America (Canada, United States), as well as in the southern hemisphere (Uruguay, Argentina, South Africa, Australia, and New Zealand). On this topic, see Lloyd, Metzer, and Sutch (2013).

Uruguay, as one of these economies, oriented itself toward external markets and intensified its export-led growth model. This process resulted in a major expansion of cattle raising and its related industries—including traditional *saladeros* (jerked-beef factories), meat extract plants, and, later, meatpacking facilities—which together created a new range of products largely based on livestock exports. These industries dominated the local manufacturing sector during the early phase of industrialization and reshaped employment patterns. The literature has discussed some of these issues, particularly those referring to wage trends and income inequalities; however, there is still a need for more disaggregated wage data from primary sources, as well as further analysis within these industries.

This article examines wage performance in the meat industry, between 1890 and 1928. To offer new perspectives, we focus on an emblematic case: the company Liebig's Extract of Meat Company and its successor, Frigorífico Anglo (hereafter, LEMCO/Anglo). Our empirical evidence draws on the employment records of the company's workers—a heretofore unpublished and highly valuable documentary corpus—which systematically document tasks, skill levels, and remuneration, enabling the reconstruction of detailed industrial wage series.

LEMCO, established in the city of Fray Bentos in the 1860s, transformed the processing of livestock products in the region, which previously had been dominated by traditional jerked-beef factories. The innovative production of meat extract met immediate success in European markets, which drove the factory's rapid expansion and international recognition. In turn, it earned the epithet "The Kitchen of the World" in contemporary advertising (Maeso 1904). The history of the company—from its early years as a pioneering enterprise to its consolidation as the Frigorífico Anglo in 1924—exemplifies the technological and commercial transformations that reshaped the sector as a whole

The company's distinctive features—a British-owned company, export-oriented, with high technological incorporation and a workforce composed of local inhabitants and European immigrants—raise new research questions about the effects of foreign investments on labour markets in settler economies. How much were workers paid in a foreign factory oriented toward exporting livestock-based products to Europe? How did wages evolve over the course of the period under study? What impact did gender, nationality, skill level, or age have on the composition of industrial wages during those decades?

In addressing these questions, we seek not only to offer new insights into the impact of the first wave of globalisation on a recently settled economy, but also to compare the wage dynamics in Uruguay with those occurring at the same time in other, similar countries. To this end, the article's main objectives are: (1) to construct new evidence regarding the performance of nominal and real wages in a Uruguayan meat industry between 1890 and 1928; (2) to analyse wage differentials by skill, age and gender within the sector; and (3) to identify the principal determinants of variations in remuneration.

This methodological approach contributes to the literature in two ways. First, it enriches the local history of the workers of Fray Bentos and the labour market in the interior of Uruguay, offering not only new wage series but also analysing the structures that shaped them. Second, the results will enable us to compare wage trends in Uruguay with those of other countries that have similar characteristics, thus advancing understanding of how the First Globalization shaped labour markets in primary-exporting economies.

The remainder of the article is organised into four sections as follows: (1) a brief review of the literature on the manufacturing sector and wage trends in Uruguay during the period under study; (2) a contextualisation of the case study; (3) a presentation of the methodology and data sources; and (4) an analysis of the results, including wage evolution, differentials and determinants.

## 2. Wages and industrialization in Uruguay: A review of recent contributions

The performance of Uruguay's manufacturing sector—particularly in its early phase before the 1930 crisis—has received sustained historiographical attention.

A central place in the literature has been occupied by studies on the industry, ranging from *saladeros* and meat extract factories to modern meat packing plants, or *frigoríficos* (Barrán and Nahum 1973; Beretta 1978; Jacob 1981; Lamas and Piotti 1981; Buxedas and Jacob 1989; Bértola 1991, 2000, 2024; Finch 1991; Millot and Bertino 1996; Nahum 1997; Bucheli 2000; Tajam and Yaffé 2003; Camou and Maubrigades 2004, 2020, 2021; Camou 2010; Maubrigades 2018, 2024; Travieso, 2020; Rey 2025). Common themes in this literature include the relationship between economic growth and industrialisation, the sector's integration into domestic and international markets, the profitability of foreign-owned firms, the cost of energy, the expansion of female labour, gender-based wage gaps, and the evolution of real wages.

Since the 1990s, scholars from varied disciplines have studied industrial wage trends in the First Globalization era. For example, social historians have examined labour relations, conflicts and institutions (Zubillaga and Balbis 1985-1992; Sienra 2007), while economic historians have made significant quantitative advances in analysing wage dynamics, their links to economic growth, and changes in the cost of living.[2] Particular attention has been paid to the impact of the First Batllismo reforms on real wages through legislation and social policies.[3] Others have described the conditions of workers in the industrial, public, and construction sectors, particularly in Montevideo (Jacob 1981; Calicchio 1996; Camou 2010; Bértola 2000; Bértola et al 1999, 2024; Tajam and Yaffé 2003; Camou and

[2] See, for example, a review in Rodríguez Weber (2011). See also the latest review of work on Uruguayan economic history in Bértola (2024), especially chapters 11, 13, and 18.

[3] The term First Batllismo refers to a political cycle led by José Batlle y Ordóñez, spanning the first three decades of the 20th century and including two presidential terms of Batlle y Ordóñez himself (1903-1907 and 1911-1915). During this period, social, economic, and political reforms were carried out, including extensive labour legislation.

Maubrigades, 2004, 2020). Overall, the First Globalization era has been widely regarded as a period of modest real wage growth (Camou and Maubrigades 2024; Bértola 1991). During these years, industrial wages experienced fluctuations, alternating between phases of expansion—driven by economic growth and public policy—and periods of decline associated with external shocks and the rising cost of living.

With regard to LEMCO/Anglo, no quantitative studies of labour dynamics—particularly of wage performance—have yet been undertaken. The existing literature on the subject is diverse. Early works—largely essays and publicist accounts—focused on the company's historical development and productive trajectory (De Pena 1893; Maeso 1904; Barrios Pintos 2005; Boretto 2006; Boretto and Oliveira 2005; Douredjian 2009), while others academic studies examined the perspective of foreign investment and the latter's technological, economic and social effects (Barrán and Nahum 1973; Winn 1975; Millot and Bertino 1996; Gebhardt 2000; Camou 2010). Some authors have taken a critical view of the company's impact on local economic development, arguing that the firm paid relatively low wages compared with those available in Montevideo, because the company held a dominant position in a labour-abundant region (Barrán and Nahum 1973). According to this argument**,** the company's wage practices were facilitated by its monopolistic position, which would have allowed it to set its own wage parameters (at least in relation to the *saladeros*) (Millot and Bertino 1996).

In his classic study of British investments in Uruguay, Winn (2010) advances a more complex explanation, namely that in the company's early years, its factories had to develop specific industrial skills in a context of skilled labour shortages. On this account**,** the company maintained unstable working conditions for unskilled workers, characterized by seasonal employment (six months a year) and wage levels comparable to those in the jerked-beef industry. He stated that highly skilled workers, who were predominantly of European origin, would have received different treatment: stable employment, higher wages, accommodation, recreational infrastructure, an extensive library, and technologically modern meat processing facility. However, these arguments remain largely qualitative. No study has yet quantified average wage levels or systematically compared them over time and across occupational groups within the firm, underscoring the need for empirical analysis.

## 3. The Case and its Context

Beginning in the late 18th century, the Río de la Plata region—comprising territories that today correspond to parts of Argentina and Uruguay—experienced an expansion of cattle raising that would accelerate sharply over the ensuing century. The process of Atlantic integration that occurred after the collapse of the Spanish colonial regime in the second decade of the 19th century, together with increased European demand for agricultural products driven by the incipient Industrial Revolution, spurred not only the growth of livestock farming but also the rise of manufacturing establishments dedicated to the production of livestock by-products. While the *saladeros* had pioneered the sector since

the 1810s, the founding of Liebig's extract factory in 1864 on the eastern shores of the Uruguay River represented a watershed moment for the region's livestock industry.

LEMCO, built upon a technical innovation by the German chemist Justus Von Liebig, became a production hub for meat extracts and its products quickly gained wide circulation in European markets. The driving force behind this project was the German businessman Georg Giebert who, already residing in Uruguay, proposed to Liebig the industrialization of his formula and began a testing phase in 1864 (Maeso 1904; Seoane 1929; Boretto and Oliveira 2005). The first shipment of 230 kilograms of this product was sent shortly thereafter to the port of Antwerp, with very good results. Building on this success, Giebert established a company in London in 1866 and succeeded in placing shares totalling £500,000, a considerable sum for industrial investment in the Río de la Plata region at the time. The quality of the product was quickly recognized in the markets; for instance, in 1867, the company won two gold medals at the Paris Universal Exposition with its *extractum carnis* and another medal at the Maritime Exposition in Le Havre in 1868. Five years later, it would also win a new award at the Vienna Exposition of 1873.[4] Once the product was patented, it managed to differentiate itself from other similar goods coming from Australian factories (De Pena 1893). The international prestige garnered by LEMCO's extract facilitated the expansion of its products across European markets through an efficient marketing network (Gebhardt 2000).

The performance of LEMCO over this period can be assessed using Figure 1. Drawing on data from the *Statistical Yearbooks*, the figure presents the company's annual slaughter volumes, the total value of slaughtered livestock, and total wages paid between 1871 and 1926.[5] Slaughter volumes increased until the mid-1890s, a trend mirrored in the company's financial results.[6] LEMCO thus followed the trajectory of Uruguayan manufacturing: growth driven by the food sector in the late nineteenth century, followed by accelerated expansion with the emergence of modern meat-packing plants after 1910 (Bértola 1991, 2024; Camou 2010). The rise in cattle prices (and, therefore, of the factory's products) during the First World War (1914-1918) again boosted LEMCO's production, which reached unprecedented levels of activity. It is worth noting that the war stimulated demand for LEMCO products, as broths and canned meats were a fundamental

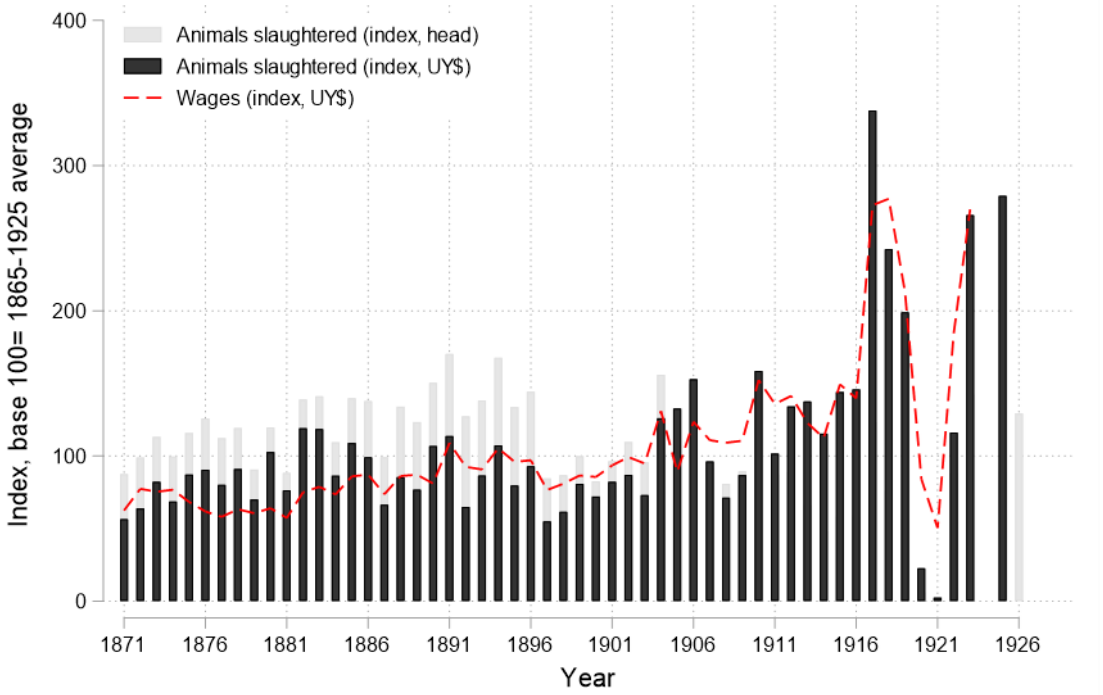
[4] The product gained early acceptance in European markets; Liebig's prestige and the favourable reception it received at international exhibitions likely played an important role in its diffusion. Particularly striking is the reference to Liebig's tablets by Jules Verne in his novel *Autour de la Lune* (Around the Moon), serialized in the *Journal des débats politiques et littéraires* in early 1870: "The lunch began with three cups of excellent broth, prepared by dissolving in hot water several of the precious Liebig's tablets, made from the best meats of the ruminants of the Pampas." Translated by the authors from the original taken from Verne (1875, p. 45). This anecdote related to Verne has been mentioned in several works on Liebig, particularly those by René Boretto.

[5] Unfortunately, the source only indicates the total volume of wages paid per year. This does not allow us to estimate an alternative series to compare with those we have constructed in this work, since it provides no information on the number of workers, nor on the type of tasks performed.

[6] According to data from Finch (1981), the company's annual dividends averaged 18% between 1883 and 1903, and 23% between 1904 and 1923, although a significant part of production during this second period was also carried out abroad.

part of the soldiers' diet. The wartime increase in production value during those years reflects the beneficial effect of the war on the company's financial outcomes (Acevedo 1929). According to official publications (Ministerio de Industrias 1913, p. 34), by 1912 LEMCO was a model establishment, unique in its kind in all of Latin America.

**FIGURE 1** ▪ *Animals slaughtered (volume in head and value in UY$) and wages (in UY$), 1871–1926 (Base 100 = 1865–1925 average)*




*Source*: República Oriental del Uruguay (1929: 115).

After the war ended, by contrast, an abrupt drop in international prices triggered a downturn that deepened in 1920 and 1921, as production fell to historic lows. Facing a situation that exposed the unsustainability of its previous model, the company was acquired by new British investors, resulting in the 1924 sale of its assets and the birth of Frigorífico Anglo. At that time, its share value was 2.5 million pounds sterling (López Campaña 1925, p. 150).

The transition from the LEMCO to Anglo saved the factory from closure and fostered a renewed expansion of industry in Uruguay's inland districts. Although Frigorífico Swift, an American-owned company, maintained a clear predominance during the second half of the 1920s, Anglo retained a significant share—around 20 per cent—of the total number of animals slaughtered (Table 1). This period also coincided with the arrival of new contingents of immigrants, mainly from Eastern Europe, who came to play a crucial role in the workforce of the Frigorífico Anglo.

**TABLE 1** ▪ *Percentage of animals slaughtered in Uruguayan meat-packing plants between 1925 and 1930*

| Year | Artigas | La Uruguaya | Frigorífico Swift | Anglo | Frigorífico Nacional |
|---|---|---|---|---|---|
| 1925 | 27% | 14% | 44% | 16% | 0% |
| 1926 | 26% | 3% | 49% | 22% | 0% |
| 1927 | 29% | 0% | 52% | 18% | 0% |
| 1928 | 25% | 5% | 52% | 18% | 0% |
| 1929 | 23% | 1% | 40% | 20% | 15% |
| 1930 | 18% | 0% | 27% | 15% | 40% |
| Average | **25%** | **4%** | **46%** | **19%** | **6%** |

*Source*: Authors' elaboration based on República Oriental del Uruguay (1929: 112) and (1932: 111). Since the percentages in the table are rounded to whole numbers, the sum may not come to exactly 100.

Furthermore, the territorial impact of LEMCO/Anglo was also significant. At the time of its foundation in the mid-1860s, Fray Bentos was a very small settlement of fewer than 2,000 people. It formed part of Río Negro district, whose economy was predominantly oriented towards extensive livestock production. Along with Montevideo, Río Negro recorded the highest per capita income in the country from the late 19th century until at least the mid-20th century, partly explained by LEMCO-driven industrial development (Martínez-Galarraga, Rodríguez-Miranda and Willebald 2020). The department also stood out for its comparatively low mortality rates relative to the national average (11.5 in 1908 compared with Uruguay's rate of 13.4) (Azar and Román 2025).

Information on the number of employees at the plant during this period is limited and was not always recorded systematically. For 1886, some estimates suggest a workforce of around 600 workers (Winn 2010, p. 79), while records from 1917 indicate an average of between 1,200 and 1,400 labourers during the slaughtering seasons, and approximately 400 engaged in year-round maintenance (Ministerio de Industrias 1917, p. 146). This activity clearly stimulated regional demographic growth. By 1908, Fray Bentos had 7,359 inhabitants while the Department of Río Negro had surpassed 20,000 inhabitants (República Oriental del Uruguay 1929, p. 11). Let us now examine the dynamics of the labour structure between 1890 and 1928.

## 4. Sources and Methodology

The empirical basis of this research rests on a documentary source of unusual depth and detail for the historical study of wages: the individual personnel files of workers from the LEMCO/Anglo company.[7] These records were kept methodically from 1928 in compliance with the 1919 pension law and contain detailed employment histories for each

[7] The archive is available at the Museo de la Revolución Industrial, located in Fray Bentos, Uruguay. This repository houses documentation relating to the operation of LEMCO and the Frigorífico Anglo. The personnel files are also microfilmed by www.familysearch.org.

worker in both firms.[8] Consequently, this source offers a unique window through which to analyse the structure and evolution of industrial wages at the micro level. Each LEMCO/Anglo personnel file was created to provide a retrospective record of the nature and duration of employment and the wages received, which served as the basis for determining pension payments.

The personnel files provide detailed individual information—including name, gender, date of birth, nationality, marital status, family composition, dependents, address, and signature—together with a complete employment history within the company. Each position held is recorded with precise information on the type of task, time served in each category of work, and remuneration received. The database was constructed from 1,484 personnel files of workers active at Frigorífico Anglo in August 1928. Although wage data are available from 1871 onwards, earlier decades lack sufficiently consistent information on wages and skills; therefore, the analysis of wage dynamics is restricted to the period 1890–1928, which captures major economic cycles from the First Globalization to the 1920s. After excluding 26 cases with missing information or piecework wages, the final sample comprises 1,458 workers and 132,635 monthly observations covering the period from January 1890 to August 1928 (see Appendix).

Despite providing exceptionally detailed wage data, this source presents certain methodological limitations for the study of wage dynamics over time. First, because the files were compiled in 1928, they include only individuals who were active at that date, omitting workers who had joined and left the company earlier. This introduces a potential bias that may affect analyses of long-term wage mobility and the trajectories of less skilled sectors, where labour turnover was likely higher. Second, higher-paid employees and managers from the earlier decades are probably under-represented, since many would no longer have been active by 1928. These limitations are taken into account in the processing of the data, the discussion of the results, and the conclusions drawn.

The methodological strategy consists of four stages. First, we estimated the average nominal hourly wage for the period 1890–1928. The recording of wages in the source varies, generally following three formats: monthly, daily and hourly rates. The latter predominates during the Frigorífico Anglo phase (September 1924–August 1928). To ensure consistency, all records were standardised by converting daily and monthly wages to hourly rates, assuming an eight-hour working day and 25 working days per month. Both assumptions are based on information provided in the personnel files, allowing for the construction of a consistent wage series covering the entire 1890–1928 period.

[8] The approval of this law was part of a series of reforms implemented during the First Batllismo aimed at improving the population's living conditions. Among other significant measures were the creation of the Labour Office (1908), the eight-hour workday (1915), and the enactment of pension laws (Camou 2010). In this context, in 1919, the creation of the Pension Fund for Public Service Employees and Workers was approved, which in August 1928 would be extended to employees of corporations and other companies (Sienra 2007).

Second, nominal wages were then deflated using the consumer price index (CPI) for Uruguay constructed by Bértola et al. (1999) to obtain a series of real wages.[9]

Third, wage disparities were analysed across three categories: skill, gender and age. All gaps were quantified by calculating ratios between the respective groups. To this end, and with respect to skill, we constructed three skill categories (low, medium, high) based on the amount of prior knowledge required for each task, inferred from job titles and departmental assignments. This classification covered around 200 distinct jobs.[10]

i. Low skill: This category includes jobs requiring little or no formal qualifications, such as: labourer, worker, machine operator, driver, night watchman, carter, butcher, sawyer, messenger, weigher, steward, assistant, telephone operator, helper, day labourer, among others. It also includes apprentices, those who were registered as such in their personnel files, who were commonly children under 14.

ii. Medium skill: This category encompasses skilled technical services and administrative or middle management employees. It includes electricians, construction workers, carpenters, blacksmiths, laboratory workers, draftsmen, boiler operators, etc., as well as other middle management positions in administration and the manufacturing departments (section heads, foremen).

iii. High skill: This category includes the highest management positions in administration, logistics, technical service, and manufacturing.

Regarding age, age gaps were calculated by comparing wages of workers who entered the factory before and after age 14,[11] while gender differentials were estimated by comparing wages of men and women for the period 1910–1928. Female wage data for the 1890s are unavailable, and observations for 1900–1909 are extremely scarce; therefore, these years are excluded from the analysis.

[9] Unfortunately, there is no consumer price index for Fray Bentos, where the factory was located, nor for Río Negro (the administrative district on which it depended**).** Using data from 1916, the only year for which cost-of-living figures are available for all departments, we calculated that the basic consumption basket in Río Negro cost 15.9% more than in Montevideo (República Oriental del Uruguay 1918, p. 131). This comparison arises from calculating a weighted average for Montevideo and Río Negro based on the prices and quantities of the 10 basic food items (oil, rice, sugar, pasta, wheat flour, bread, meat, yerba mate, potatoes, and beans) that make up the basket used to calculate the Montevideo CPI. However, this single observation cannot be extended over time, so we use the Uruguay index. This suggests real wages in Río Negro would be lower than those estimated with the national CPI, though our aim is not to compare purchasing power across cities.

[10] We followed the criteria proposed by HISCLASS (Van Leeuwen and Maas 2011) as a guideline for grouping tasks according to skill level.

[11] We adopted this age based on the understanding that the 1919 Law prohibits employers from hiring children under 14 years of age.

**(1)**

$$Log(s_i) = \beta_o + \beta_1 \times skills_i + \beta_2 \times tenure_i + \beta_3 \times tenure_i^2 + \beta_4 \times female_i + \beta_5 \times company_i + \beta_6 \times nationality_i + \beta_7 \times minor_i + \varepsilon_i$$

Where:

- $Log(s_i)$: logarithm of the hourly wage for observation *i* by worker
- $skill_i$: skill level for observation *i* by worker, defined by three dummy categorical variables: low, medium, and high. The variables take the value 1 if the skill condition is met and 0 otherwise. In the regression, the low category is omitted and considered as the reference variable.
- $tenure_i$: tenure for observation *i* by worker, measuring work experience acquired in the company (calculated in years).
- $tenure_i^2{}_i$: tenure for observation *i* by worker, squared to capture the diminishing returns to experience on wages (measured in years).
- $female_i$: dummy variable equal to 1 if observation *i* refers to female and 0 if male.
- $company_i$: dummy variable equal to 1 if observation *i* for the worker corresponds to employment at the Anglo company, and 0 if at Liebig.
- $nationality_i$: dummy variable equal to 1 if observation *i* for the worker corresponds to Uruguayan nationality, and 0 if foreign.
- $minor_i$: dummy variable equal to 1 if observation *i* for the worker indicates an age below 14 years, and 0 otherwise.
- $\varepsilon_i$: error term
- $\beta_o \ldots . \beta_{o7}$: coefficients

Finally, in the fourth stage, we estimated a Mincerian wage equation (Equation 1) to examine the determinants of the observed changes in wages. The dependent variable is defined as the average hourly wage (in logarithms) for observation *i* by worker and month. The explanatory variables include: skill (intended to approximate the level of education and/or knowledge required to perform the task), experience (proxied by tenure in the factory), gender (being female relative to male), age (being younger than 14 years relative to older than that threshold), and nationality. We also incorporated a variable indicating whether the employee began working during the Liebig stage (1890-1924) or after 1924 (Anglo stage). This distinction allows us to account for differences potentially attributable to changes in business and/or management strategies. As the change in ownership entailed the transformation of the company into a meat-packing plant (*frigorífico*), it may have altered both its operational organisation and labour structure. Accordingly, this factor was

controlled for in the econometric analysis, either by including a LEMCO/Anglo dummy variable or by restricting the sample exclusively to the Anglo period.

Equation 1 was estimated using Ordinary Least Squares (OLS) with robust standard errors to address potential biases. Several specifications were estimated for this purpose. The baseline specification uses the pooled sample for the period 1924–1928, which provides the largest number of observations. Additional estimations were conducted for alternative time frames, as discussed in the results section. The analysis is based on monthly worker-level observations.

## 5. Results

### *5.1. Working in the Meatpacking Industry: The workforce of LEMCO/Anglo (1890-1928)*

The analysis begins with descriptive statistics summarizing the main characteristics of the workforce, based on a database constructed from 1,458 personnel files (one per worker). Table 2 is divided into two sections: characteristics at the time of hiring (including personal information, initial position, and first wage payment method) and subsequent employment tasks. The results show that 45% of workers began their employment during the LEMCO stage (1890–1924), while 55% started under the management of Frigorífico Anglo (between September 1924 and August 1928). The workforce was predominantly male (86%), and the vast majority—also ~90%—held low-skilled positions at the time of entry.

A total of 132,635 monthly observations of hourly wages is recorded in the personnel files, as shown in the second column of the table. Unlike the previous data, in this case 72% of the wage observations relate to the LEMCO period (1890–1924), and male workers compose 94% of the records. Regarding skill levels, 83% of the records correspond to positions requiring a low level of specialisation. Likewise, the daily wage modality, which is more common in the records from the LEMCO period, accounts for 60% of the total.

The age structure of the workforce and the duration of employment are presented in Figure 2. Workers joined the firm at an average age of 21 years, with a range spanning from 7 to 65 years. The data reveal a broad age distribution, though, the predominant age group is 11–16 years, which accounts for 45% of the observations.

**TABLE 2** ▪ *Characteristics of Workers at First Employment and Monthly Wage Observations, LEMCO/Anglo (1890–1928)*

| | | Workers at the time of entry | | Monthly observations | |
|---|---|---|---|---|---|
| | | **Count** | % | **Count** | % |
| **Company (*)** | Anglo (1924-1928) | 808 | 55% | 37,562 | 28% |
| | Liebig (1890-1924) | 650 | 45% | 95,073 | 72% |
| | **Total** | **1,458** | **100%** | **132,635** | **100%** |
| **Gender** | Male | 1,264 | 87% | 124,428 | 94% |

| | | Workers at the time of entry | | Monthly observations | |
|---|---|---|---|---|---|
| | | **Count** | % | **Count** | % |
| | Female | 194 | 13% | 8,207 | 6% |
| | **Total** | **1,458** | **100%** | **132,635** | **100%** |
| **Skill level** | Apprentices | 20 | 1% | 1,557 | 1% |
| | Low | 1,312 | 90% | 110,479 | 83% |
| | Medium | 118 | 8% | 19,433 | 15% |
| | High | 8 | 1% | 1,166 | 1% |
| | **Total** | **1,458** | **100%** | **132,635** | **100%** |
| **Wage type (*)** | Hourly wages | 734 | 50% | 36,234 | 27% |
| | Daily wages | 611 | 42% | 79,660 | 60% |
| | Monthly wages | 124 | 8% | 17,506 | 13% |
| | **Total** | **1,469** | **100%** | **133,400** | **100%** |

*Note*: All observations correspond to the employment history of workers active in August 1928. (*) Data at the time of joining the firm.

(**) A few files include multiple types of wages for the same worker.

*Source*: Authors' own elaboration based on LEMCO/Anglo personnel files (see Sources and Methodology section).

Meanwhile, the analysis of job tenure at LEMCO/Anglo shows an average duration of 7 years, with exceptional cases of up to 49 years of service.[12] However, underlying this average is a quasi-exponential distribution: more than half of the workers (55%) had a tenure of less than 3 years. This particular pattern is largely due to differences between historical periods. As might be expected, given the bias inherent in the source, shorter spells of employment predominated during the Frigorífico Anglo stage (1924–1928), whereas significantly longer tenures were recorded in the Liebig period (1890–1924).

[12] Even though our analysis begins in 1890, it is interesting to note four workers who, still active in 1928, had accumulated more than half a century at the firm. Those with the longest careers were two workers of Argentine origin whose personnel files indicate they began working at Liebig in 1871 and 1872, respectively. The first started as a *peón* (low-skilled worker) in the canned goods section, and by 1928 was in charge of pulleys in the cold rooms section. The second worked as a *peón* and foreman in the docks section, and continued providing services as a cleaning *peón* in the patio section in August 1928. Their files are available at the Museo de la Revolución Industrial, Fray Bentos, LEMCO/Anglo Collection, nos. 729 and 802.

**FIGURE 2** ▪ *Distribution of workers by age at entry (A) and tenure (B)*

**FIGURE 2a**

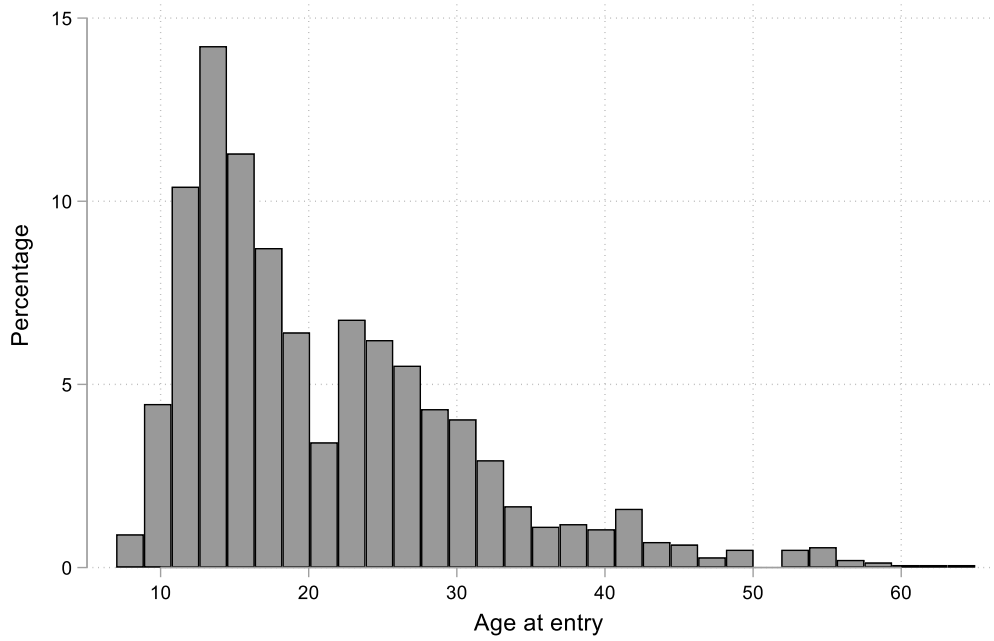
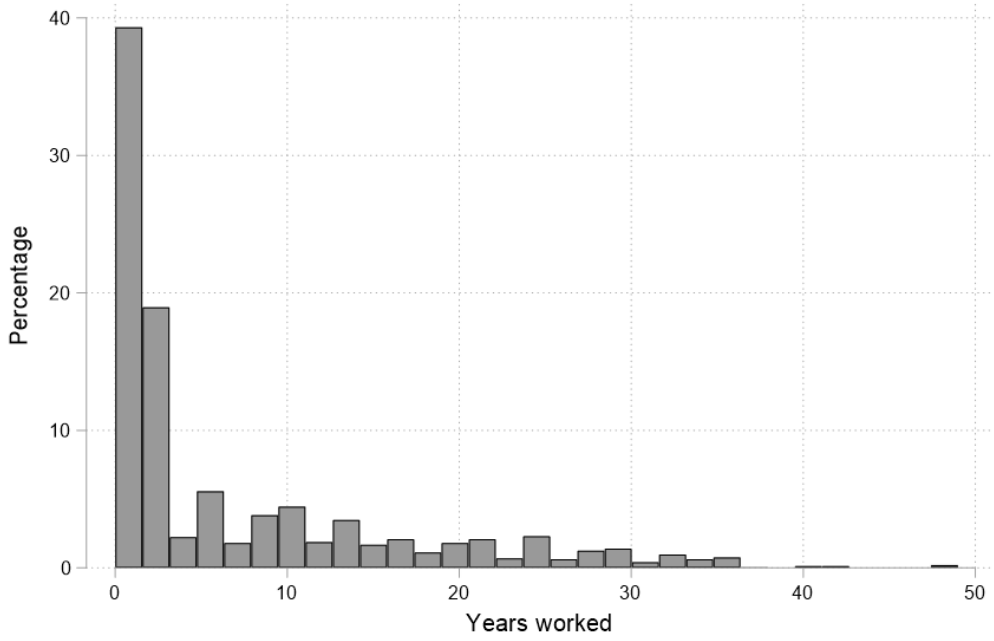



**FIGURE 2b**



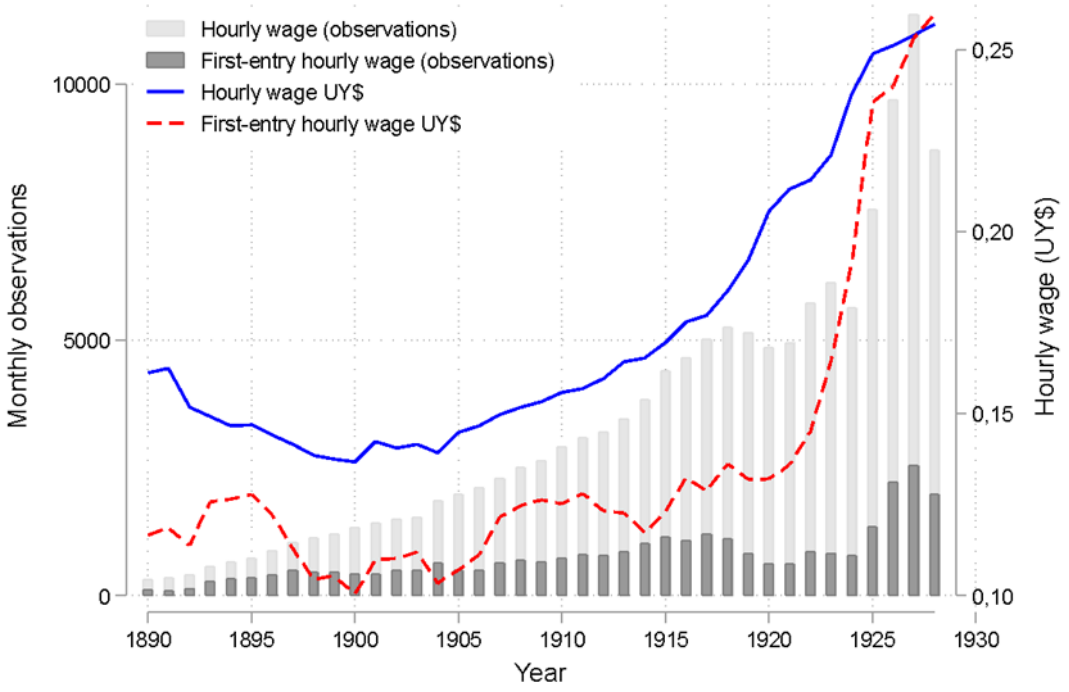

*Source*: Authors' own elaboration based on LEMCO/Anglo personnel files (see Sources and Methodology section).

*5.2. Evolution of Nominal and Real Wages*

The preceding section has described the workforce's main features; we now turn to the results. Figure 3 illustrates the overall evolution of nominal wages paid by LEMCO/Anglo between 1890 and 1928. It presents two series: (a) the average hourly

wage calculated from all observations in the database; and (b) the average hourly wage corresponding to the first job or task performed by each of the 1,429 workers that started in 1890 or after (i.e., at first entry). This distinction allows us to control for potential biases associated with job tenure, thereby enabling a more accurate comparison of initial earnings over time.[13]

**FIGURE 3** ▪ *Nominal wages, 1890–1928, value in Uruguayan pesos per hour (right axis) and number of observations (left axis)*




*Source*: Authors' own elaboration based on LEMCO/Anglo personnel files (see Sources and Methodology section).

The results are consistent with previous calculations for other sectors in Uruguayan historiography (Bértola et al., 1999; Camou, 2010). In nominal terms, a clear upward trend is observed from 1900 onward, with a marked increase during the 1920s associated with the sharp rise in the cost of living resulting from the economic crisis triggered by the First World War. Particularly noteworthy is the trajectory of the series recording remuneration for the first job performed (first entry). Although it exhibits greater volatility at certain points, its evolution closely mirrors that of the general series until 1920. From that year onwards, nevertheless, the growth rate of wages in this series accelerates steadily.

What factors might explain the nominal increase in the general wage level? As an initial approach, it may be suggested that the expansion of the meatpacking sector not only

[13] In fact, both share a similar trend, exhibiting a high correlation coefficient of 0.95. It should be noted that the database is compiled from the employment histories of workers who were still active in August 1928; consequently, accumulated tenure may bias the general wage average upward.

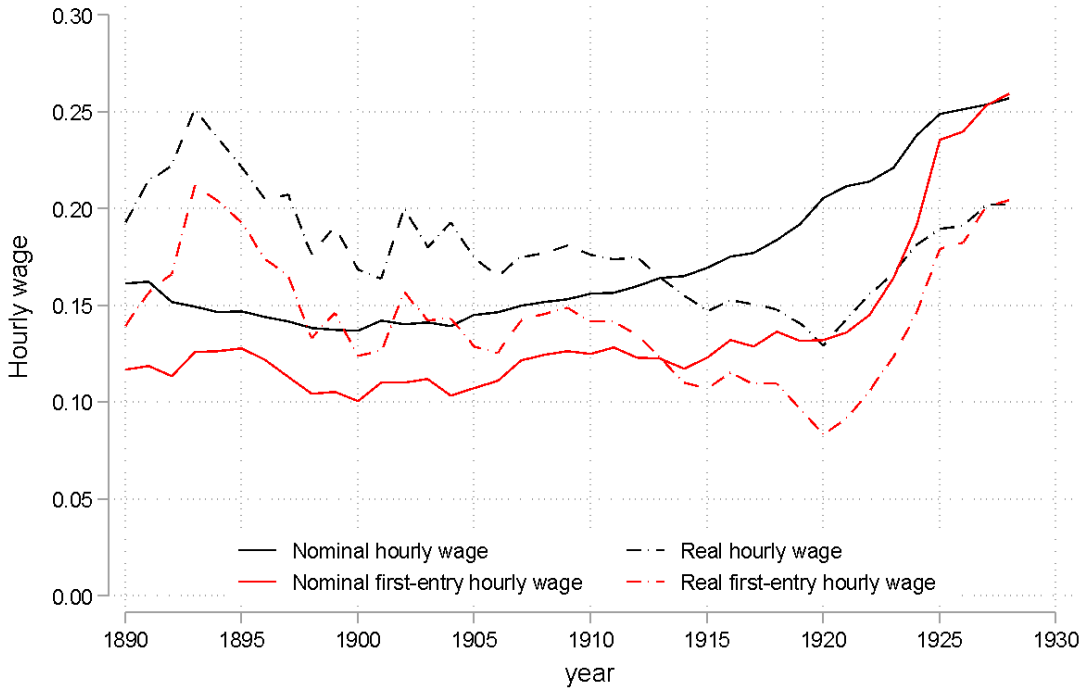
increased demand for labour but also likely offered higher nominal wages, notwithstanding the fluctuations experienced by the firm (as illustrated in Figure 1). These figures are consistent with those reported by María Camou (2010) for the Frigorífico Swift in Montevideo; although her data begin in 1916, the pattern is similar, with a clear increase during the 1920s. In addition, the rise in nominal wages may be linked to the exchange rate disequilibrium that began in 1914 and the consequent increase in the cost of living. This is reflected in the trajectory of the Consumer Price Index, which rose sharply, especially between 1919 and 1921. Another factor that may have contributed to the increase in first-entry nominal wages is labour legislation, specifically the 1919 law prohibiting the employment of minors under 14 years of age. This measure likely reduced the supply of low-skilled labour, leading to a gradual substitution with immigrants from Eastern Europe, whose presence in the company became more pronounced from 1920 onwards.

A somewhat different picture emerges when wages are measured in real terms, as the trajectory is reversed. The results presented in Figure 4 support a more pessimistic interpretation of the evolution of wage purchasing power over the period.

At least three main stages can be identified. During the 1890s, nominal wages tended to decline, however, when measured in real terms the outcome differed due to the fluctuations in the CPI during those years. Thus, in the first half of the decade there was a sharp increase in purchasing power, driven by the fall in the cost of living, whereas in the second half the trend was reversed. Between 1900 and 1920, a second phase emerged: wages experienced a modest recovery in the early years of the twentieth century, but underwent a very pronounced collapse from 1913 onwards, reinforced by the effects of the First World War. Over this period, nominal wage increases were outpaced by inflation. Thus, wage growth failed to keep pace with rising food prices during LEMCO's peak production years. The third phase, beginning in 1920, was characterized by sustained nominal wage growth and a marked recovery in real wages, which nevertheless failed to fully reverse the decline that had begun in the previous stage.

Yet, when the general average wage is examined separately from the first entry series, differentiated patterns emerge. The overall average reveals a clear wage stagnation in the medium term, with values in 1928 very similar to those recorded in 1890. By contrast, the evolution of first-entry wages follows a different trajectory. Despite displaying some volatility, the data show substantial improvement between the beginning and end of the period. This divergence suggests that, while the aggregate wage paid remained broadly stable, the initial earnings of workers improved significantly over these nearly four decades. These results closely correspond to the historical wage series for various sectors in Montevideo reported by Bértola et al. (1999), as the comparison presented in Figure 5 illustrates.

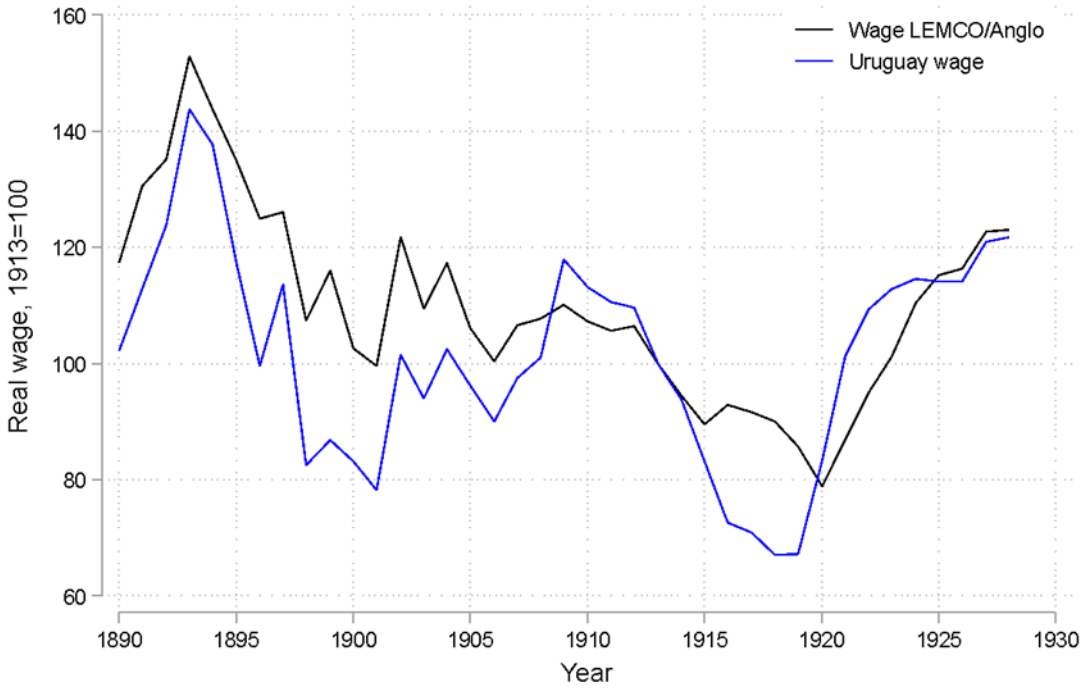
**FIGURE 4** ▪ *Evolution of Nominal and Real Wages, 1890–1928 (in Uruguayan pesos, deflated by CPI)*




*Source*: See Figure 3. The cost of living was calculated based on the CPI constructed by Bértola et al. (1999) (base 100=1913).

The most significant differences occurred at two specific junctures: during the economic crisis arising from the First World War and again in the second half of the 1920s. In the former case, the better performance of wages at Liebig likely reflects the expansion of its business during the war as a result of supplying the belligerent armies. In the latter case, we cannot yet provide an explanation; the findings could be attributable to factors endogenous to the firm itself—such as the change in ownership and the transition to the Frigorífico Anglo model—which may have slowed wage growth—as well as to exogenous factors, including a possible increase in the supply of immigrant labour.

**FIGURE 5** ▪ *LEMCO/Anglo wages versus Uruguay wage series (real wages, 1913=100)*




*Source*: Authors' own elaboration based on the sources cited in the Sources and Methodology section and the wage series published by Bértola et al. (1999).

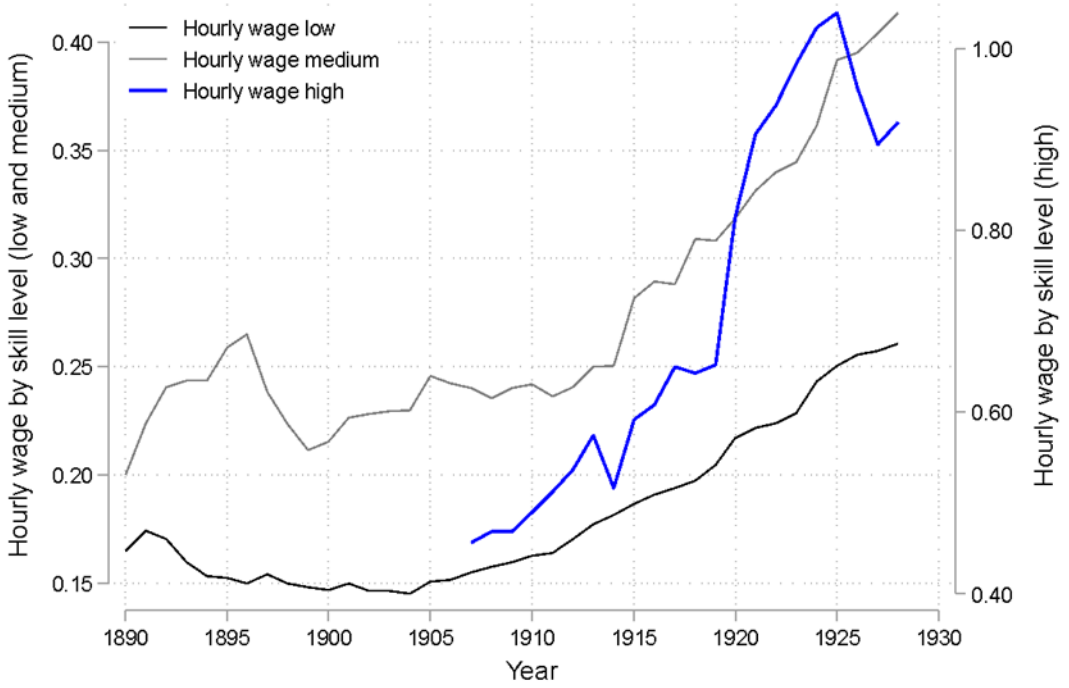
### *5.3. Labour Inequality: An Analysis of Wage Premiums*

#### 5.3.1. Wage Gaps by Skill Level

The study of wage premiums for skilled work enables us to examine the effects that these new industrial investments had on the local labour market. Figures 6 and 7 present wages according to skill level. Their evolution reveals differentiated patterns that merit particular attention. A clear wage stratification is observed across the three skill levels (low, medium, and high), characterized by a persistent gap which, rather than narrowing, shows a tendency to widen from 1920 onwards, particularly in nominal terms. In this regard, although wage growth was sustained for all skill levels from 1900 onwards, it increased considerably more for the higher ones.

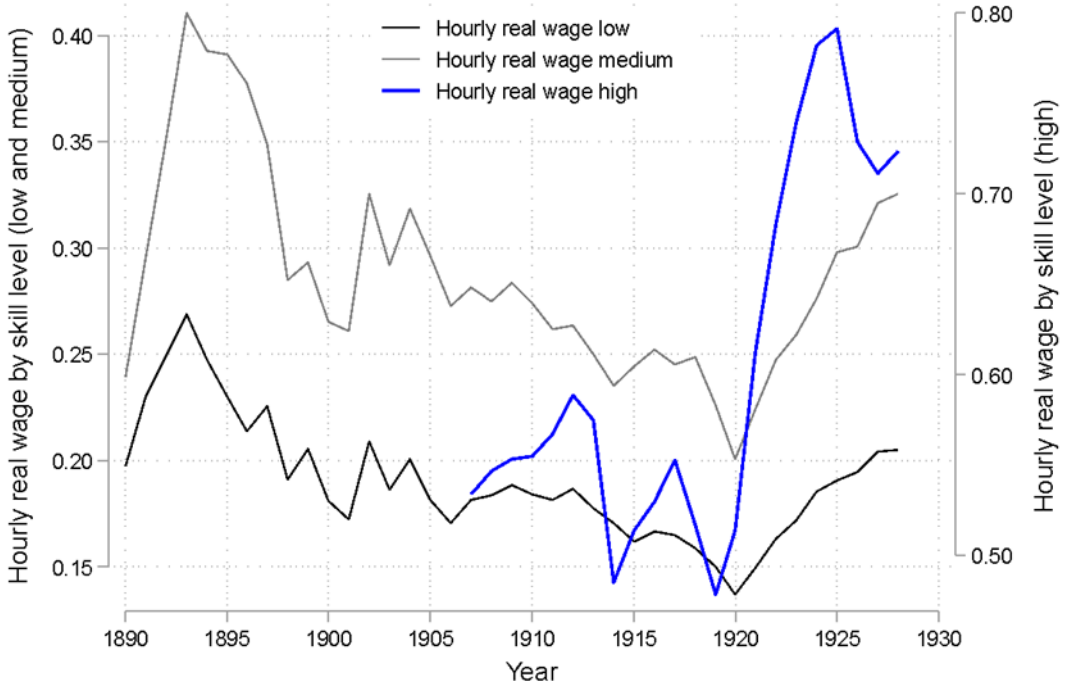
The growing wage disparity suggests that, although the economic expansion of the 1920s benefited all skill levels, higher-income workers captured a larger share of the gains, thereby exacerbating labour inequality within this market. Figure 8, which simplifies the analysis of the gap by grouping skills into two categories (medium and high versus low and apprentices), clearly illustrates this trend. Wage inequality measured by skill level increased steadily from 1900 onwards, reaching particularly pronounced levels after 1915, when the wage premium remained above a ratio of 2.

**FIGURE 6** ▪ *Evolution of nominal wages by skill level 1890-1928 (in Uruguayan pesos)*



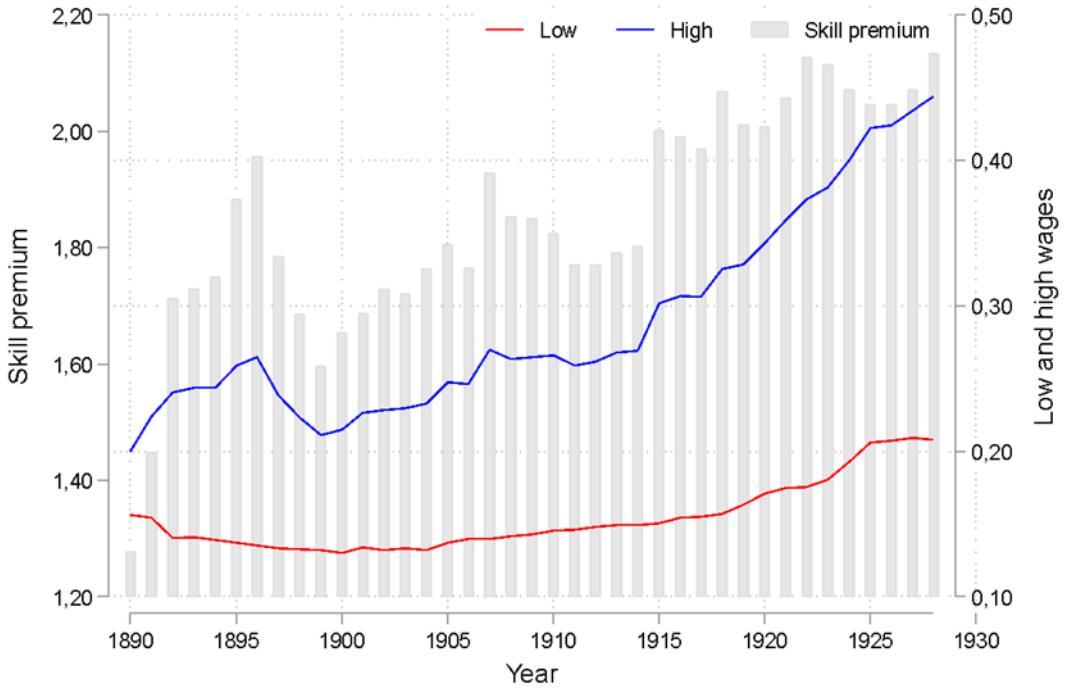

*Source*: See Figure 3.

**FIGURE 7** ▪ *Evolution of real wages by skill level 1890-1928 (in Uruguayan pesos deflated by CPI)*




*Source*: See Figure 3.

**FIGURE 8** ▪ *Evolution of the skill gap in nominal terms*



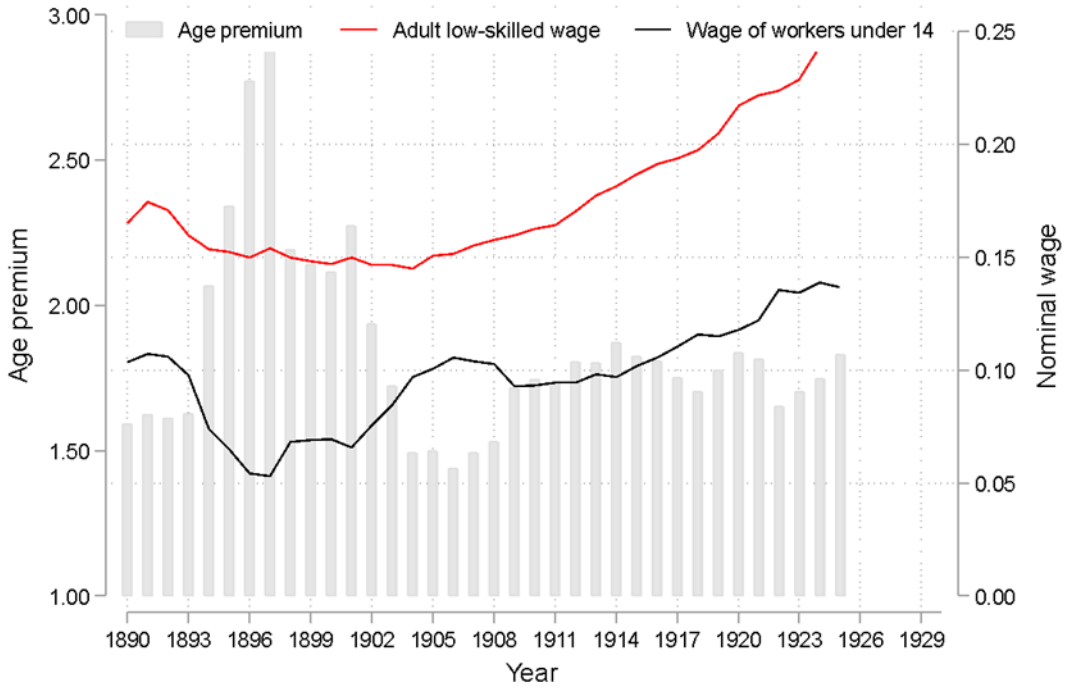

*Source*: See Figure 3.

Several structural factors may account for this situation, including changes in the demand for specific skills, modifications in production methods, or shifts in the labour supply. Unfortunately, we were unable to access the company's accounting records or other information regarding the characteristics of the workforce, making it difficult to determine the relative explanatory weight of these variables. Nevertheless, the evidence shows how certain economic processes may generate asymmetric distributive dynamics, even during periods of sustained economic growth, as in this case.

5.3.2. Women and Children in the Factory: Gender and Age Gaps

The final dimension of wage disparity concerns gaps by gender and age. With regard to the latter, a particularly noteworthy fact is the incorporation of child labour (individuals under 14 years of age) into the formal workforce of the LEMCO/Anglo factory. Archival evidence reveals that minors were typically hired as 'apprentices' and received substantially lower wages than adult workers. While their earnings increased gradually with tenure, they remained well below the average for low-skilled workers. This systematic employment of children may partially explain the remarkable stability of low-wage trajectories up to 1920, as it introduced a pool of workers earning considerably less than the adult population (Figure 9).

**FIGURE 9** ▪ *Evolution of the age premium in nominal terms (adult low-skilled wage/wage of workers under 14)*




*Source*: See Figure 3.

A comparative analysis of remunerations highlights the existence of a persistent, though not constant, wage gap throughout the period under study. The disparity widened most sharply in the late 1890s, when child wages fell abruptly while adult wages remained stable, at times reaching two to three times higher than those of minors. Explaining this pronounced disparity with the present data alone is challenging. One might tentatively hypothesize that wages responded to an increased supply of child labour, possibly associated with economic downturns or a rising cost of living that pushed households to incorporate additional earners.[14] However, the observed pattern may also reflect a bias in the data source for those years. From 1903 onwards, a gradual narrowing of the gap can be observed whereby the adult wage, aside from a slight increase between 1909 and 1914, stabilized at around 1.8 times the youth wage and remained within that level until 1928. It is important to emphasise that during the 1920s, the employment of children became less important. This pattern is corroborated by María Camou's (2010) research on the Swift company, as well as by the evidence compiled in Bértola (1991).[15] Perhaps at this

[14] Some public reports documented the work of women and children in the industrial sector as a measure to cope with the limited ability of wages to cover household expenses (Bértola 1991). Although their analysis is linked to women's work, Camou and Maubrigades (2021) have found greater female labour supply during times of crisis, which could further depress general wages.

[15] Camou (2010) observes a significant decline in child labour from the 1930s onwards, coinciding with the enactment of the Children's Code in 1934, which eliminated the employment of children and established the minimum age of 14 for performing all types of work and a minimum age of 18 for unhealthy or excessively strenuous tasks. In our case, a sharp decline is already noticeable in the 1920s.

point labour legislation, rising real wages, and the restriction on child labour all played a role, as may have changes in recruitment strategies following the firm´s transfer of ownership in 1924. As suggested in the previous section when discussing the strong growth in first entry records, it is plausible that the decline in the supply of child workers was offset by immigrants from Eastern Europe and the Balkans. In sum, the persistence of the age premium reflects structural features of the labour market: institutionalized age-based wage differentiation (until 1919), young workers' greater vulnerability to shocks (with wage volatility double that of adults), and a wage-setting model that sustained significant age disparities, albeit with some narrowing during the 1920s.

Alongside age-based disparities, gender also constituted a significant dimension of wage inequality. Gender disparities have likewise been examined in order to shed additional light on wage inequalities. The findings reveal an increase in female workforce participation at LEMCO/Anglo, especially from the 1920s, consistent with prior research on Uruguayan manufacturing (Maubrigades 2024).[16] Figures 10 and 11 present the evolution of nominal wages by gender between 1910 and 1928, illustrating both the differentiated trajectories and the path of the wage gap.[17]

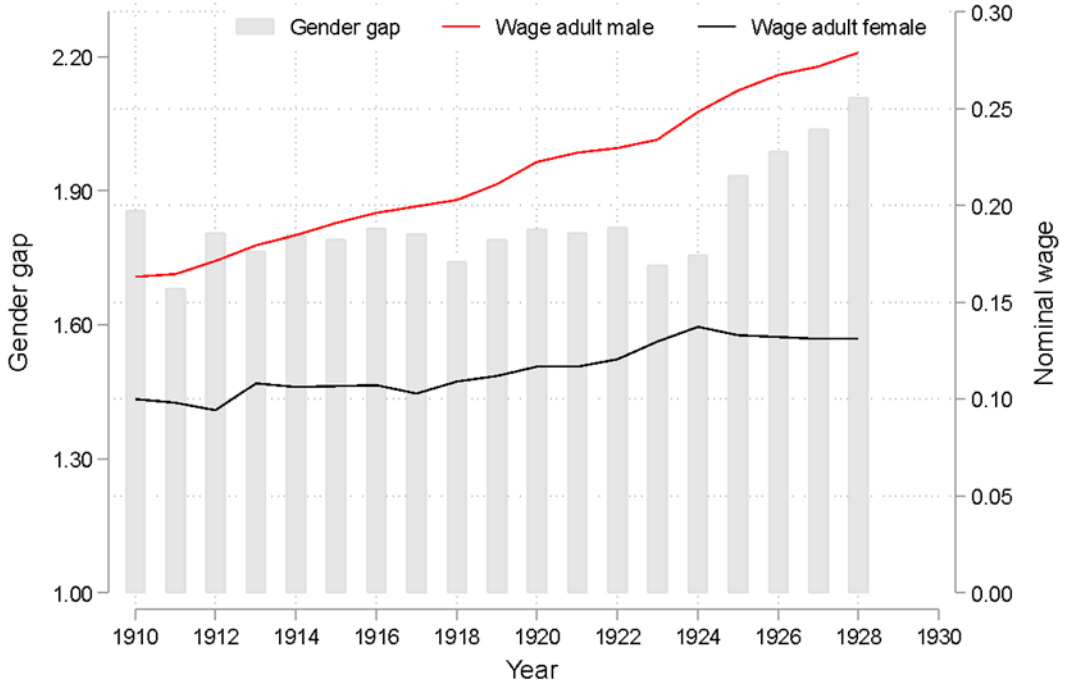
In general terms, the wage gap was relatively stable at the outset and during the LEMCO period, but began to increase from the 1920s onward, with an evident rise after 1924 (Figure 10). While male wages rose steadily, female remuneration grew more slowly and even displayed a nominal downward trend after 1924. This pattern can be attributed to several factors. One may be related to the positions women held within the factories. In general, female employment was concentrated in low-skilled or lower-paid sectors. According to our dataset, the occupations recorded for female workers were primarily associated with administrative tasks (such as "Typist" or "Telephone Operator" in the Personnel or Livestock Office), sewing (in the "Bag Factory" or "Textiles" department), domestic service ("Maids" and "Cooks"), healthcare ("Nursing"), and specific areas of manufacturing ("Tannery", "Frozen Offal", "*Tripería*", "Canned Goods"). This finding differs from Camou's (2010, p. 87) study of the Swift meatpacking plant in Montevideo, which found that women's employment was concentrated in a narrower range of occupations, particularly in the restaurant and canned goods departments. At LEMCO/Anglo, although the range of tasks available to women was more limited than that for men, at least four distinct areas of employment can be identified. Manufacturing-related positions, in particular, offered relatively higher wages and some opportunities for

[16] Argentine historiography has also produced a substantial body of work on this subject. In her research on workers at the Swift and Armour meatpacking plants in Argentina, Lobato finds that, during 1915 and 1930, 15%-25% of the workforce was female. In addition to challenging the myth of women´s absence from factory work, Lobato addresses another critical factor: the double workday of women, involving both household duties and work outside the home (Lobato 2001). A comprehensive historiographical treatment of this topic can be found in Scheinkman (2019).

[17] Due to source limitations, we cannot extend the analysis further back. Nevertheless, the 18-year span covered by the observations provides a clear picture, particularly given the substantial growth of the female workforce during these years.

advancement. However, this relative diversity of employment options did not translate into a substantial reduction in the gender wage gap.

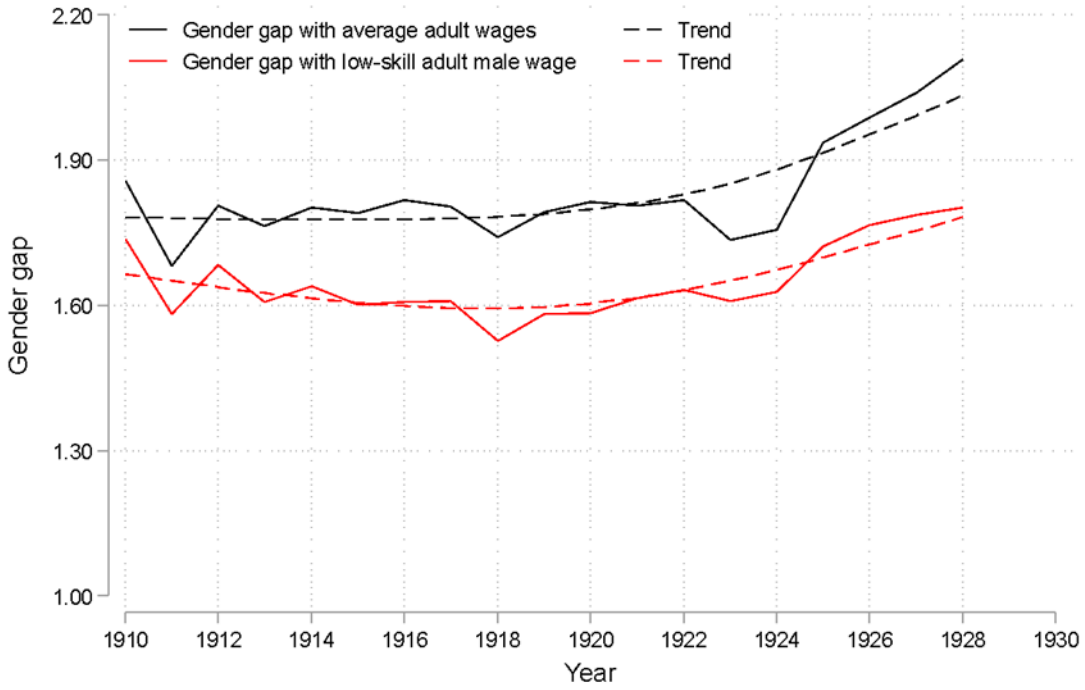
**FIGURE 10** ▪ *Gender wage gap at LEMCO/Anglo (1910–1928): Average adult hourly wages*




*Source*: See Figure 3.

Labour market dynamics may also play a role, as wage policies frequently formalized gender differences through separate pay scales for similar tasks. The database shows that the female hourly wage ranged between 0.09 and 0.13 Uruguayan pesos (for adult women), representing approximately half of male remuneration for equivalent work (see Table A.2 in the Appendix). This disparity is clearly illustrated in Figure 11, which compares 1) the wages paid to females with the wages paid to all male adults, and 2) the wages paid to females with the wages paid to low-skilled males. The comparative analysis reveals a significant pattern: Although the wage gap remained relatively stable for much of the period, it began to widen after 1924. Wage inequality mechanisms thus appear to have operated with varying intensity across labour segments. They were more pronounced among higher-paid positions but also present, albeit to a lesser extent, among lower-skilled ones.

**FIGURE 11** ▪ *Gender wage gap at LEMCO/Anglo (1910–1928): Low-skilled male vs. female wages and average adult wages*




*Note*: The red line represents the wage gap between men in low-skilled occupations and adult women. The black line shows the average wage gap between adult men and women. Trends are estimated using the Hodrick–Prescott filter.

*Source*: See Figure 3.

When these data are compared with Camou (2010) for the Frigorífico Swift, a similar picture of wage differentials emerges. Between 1915 and 1920, the gender-based wage gap at Swift was 1.875, rising slightly to 1.88 for the period 1921-1928. Average wages were comparable across both factories, suggesting a convergence in labour market conditions and gender-based wage gaps within the Uruguayan meat processing industry during these decades, despite the geographical and demographic differences between Montevideo and Fray Bentos.[18]

The increasing gender-based wage difference in the final years of the period may reflect a deepening of wage inequalities or an oversupply of female workforce—particularly in the positions typically occupied by women—within the meat processing sector. Labour market inequalities thus appear not merely as a reflection of market forces, but also as outcomes of modernization processes that could reproduce disparities in the absence of supportive legislation.

[18] Although this table presents nominal wages, when adjusted by the CPI we see a trend toward stagnation in women's wage levels during the 1920s, which converges with Camou's data (2010) for Montevideo.

*5.4. Factors Explaining Wage Dynamics*

The final section of this article seeks to identify the factors that help explain wage dynamics within the company. To this end, we adopt an econometric approach, estimating equations that relate the wages received by workers to skill level, tenure (as a proxy of experience), gender, age, the unit of the company in which they performed tasks, and nationality (see Equation 1). The regressions are estimated using OLS, with the logarithm of the individual hourly wage as the dependent variable.[19]

Our empirical strategy includes four complementary approaches designed to enhance the robustness of the results. First, we estimate a baseline specification using the full sample for the period 1890-1928, thereby maximizing the number of observations. Second, we restrict the timeframe to 1924-1928, corresponding to the period of greatest workforce stability. Third, we estimate the model using wage information exclusively for 1928. Fourth, a specification that exclusively considers the first record of each worker (first entry), thus controlling for potential biases related to tenure and skills acquired after entry. The latter three exercises aim to mitigate sample bias arising from the fact we observe only workers who were still active in 1928, thereby excluding those who left the firm earlier. The findings remain robust across the various specifications and are consistent with the graphical evidence discussed in the preceding sections.[20]

The econometric estimates capture persistent patterns in the wage structure, highlighting the influence of various factors on the determination of labour income. Because the dependent variable (wage) is expressed in logarithms, the estimated coefficients can be interpreted approximately as percentage effects. For a more precise quantification of these impacts, we apply an exponential transformation (Table 4). Nevertheless, the general trends remain consistent with those reported in Table 3.

[19] OLS estimation may be subject to endogeneity bias, primarily because the skill variable (a proxy for human capital) may be correlated with the error term. To reduce potential omitted variable bias, we include controls for sex, age, nationality, work section, and tenure. However, more robust methods to address endogeneity are not feasible given the limitations of the available data.

[20] We repeated the estimations for alternative time periods (1926-1928 and 1927-1928), and the results are consistent with those obtained for the 1924-1928 period.

**TABLE 3** ▪ *OLS estimation results. Dependent variable = hourly wage (in logarithms)*

Dependent variable: logarithm of hourly wage

| VARIABLES | (1) 1890-1928 | (2) 1924-1928 | (3) 1928 | (4) First entry |
|---|---|---|---|---|
| Female | -0.304*** | -0.495*** | -0.511*** | -0.166*** |
| | [0.00372] | [0.00370] | [0.00688] | [0.00753] |
| Skill: Apprentice | -0.280*** | -0.301*** | -0.363*** | -0.297*** |
| | [0.00920] | [0.0161] | [0.0270] | [0.0240] |
| Skill: Medium | 0.510*** | 0.525*** | 0.540*** | 0.679*** |
| | [0.00311] | [0.00469] | [0.00976] | [0.0128] |
| Skill: High | 1.377*** | 1.462*** | 1.388*** | 1.567*** |
| | [0.0110] | [0.00895] | [0.0203] | [0.0137] |
| Company: ANGLO | 0.351*** | | | 0.497*** |
| | [0.00195] | | | [0.00454] |
| Nationality: Uruguayan | -0.0266*** | -0.0772*** | -0.103*** | -0.0811*** |
| | [0.00211] | [0.00312] | [0.00659] | [0.00528] |
| Under 14 years of age | -0.425*** | -0.381*** | -0.419*** | -0.408*** |
| | [0.00446] | [0.00926] | [0.0230] | [0.00628] |
| Tenure (years) | 0.0258*** | 0.00658*** | 0.0115*** | |
| | [0.000287] | [0.000321] | [0.000718] | |
| Tenure (years squared) | -0.000464*** | -0.000174*** | -0.000292*** | |
| | [7.60e-06] | [8.13e-06] | [1.80e-05] | |
| Constant | -2.029*** | -1.512*** | -1.489*** | -2.055*** |
| | [0.00272] | [0.00316] | [0.00580] | [0.00424] |
| Observations | 132,297 | 43,055 | 8,739 | 31,678 |
| R-squared | 0.561 | 0.624 | 0.667 | 0.525 |

*Notes*: Robust standard errors in brackets; *** p<0.01; ** p<0.05; * p<0.1.

The econometric results reveal pronounced gender-based wage discrimination. Over the entire period (1890–1928), women's wages were, on average, 26% lower than those of men, with the gap widening to 39% by 1928. The analysis of first-entry wages (first job) suggests that inequality widens with tenure, as the initial differential stood at 15%. Skill level emerges as the most influential determinant of wage variation. Relative to unskilled workers (the reference category), the most skilled workers earned up to three times as much, while apprentices experienced wage penalties of up to 30%. Workers entering medium-skilled positions earned up to twice as much as those in low-skilled roles, although this gap narrows when other periods are considered, underscoring the importance of tenure in explaining wage differentials. Overall, this stratification appears to have remained stable over time, indicating the persistence of skill-based wage disparities.

**TABLE 4** ▪ *Expected effects of dummy variables on wages (in %)*

| VARIABLES | (1) 1890-1928 | (2) 1924-1928 | (3) 1928 | (4) First entry |
|---|---|---|---|---|
| Female | -26% | -39% | -40% | -15% |
| Skill: Apprentice | -24% | -26% | -30% | -26% |
| Skill: Medium | 67% | 69% | 72% | 97% |
| Skill: High | 296% | 332% | 301% | 379% |
| Company: ANGLO | 42% | | | 64% |
| Nationality: Uruguayan | -3% | -7% | -10% | -8% |
| Under 14 years of age | -35% | -32% | -34% | -34% |
| Tenure | 3% | 1% | 1% | |

*Notes*: To accurately calculate the expected effects, we apply the exponential formula: $\%\Delta y = e^{-1} \times 100$.

Age also contributed significantly to wage disparities: workers under 14 earned between 32% and 35% less than adults. Nationality, although statistically significant, had a more modest effect: foreign-born workers received slightly higher wages than Uruguayans, with premiums of up to 10%. Tenure—intended to capture on-the-job experience—exhibited a positive but small effect (below 3%), with a non-linear relationship consistent with expectations (i.e., a negative coefficient on the quadratic term). The modest impact of tenure can be explained by two factors. First, more than half of the workers had accumulated less than three years of tenure (see Figure 2). Second, wage variation appears to be driven more by the skill level of the task than by experience acquired within the firm. The robustness of these findings is supported by $R^2$ values ranging from 0.53 to 0.67 as well as by their consistency across multiple specifications.[21]

In summary, the econometric analysis identifies the following factors as positively associated with higher wages: skill level (workers in medium- and high-skilled occupations earned more than those in low-skilled roles); gender (being male relative to female); tenure (though with diminishing returns); adult status (relative to being under 14); employment under Anglo management (relative to the Liebig period); and foreign nationality (which confers a modest wage premium relative to Uruguayan-born workers).

## 6. Conclusions

This research seeks to advance historiographical understanding of wage performance and labour inequality in Uruguay during the First Globalization in two ways: first, by providing new empirical evidence that allows for comparison with previous findings; and second, generating new analytical interpretations of wage dynamics in contexts of early industrialization, particularly within an industry of global reach.

[21] It is worth adding that we repeated the exercises of regressions 1, 2, and 4 including real wages as the dependent variable to account for changes in purchasing power, which yielded results consistent with those of our main analysis.

The analysis of wage evolution yields results largely consistent with the existing literature for the Uruguayan case. Although nominal wages exhibited an upward trajectory after 1900, their performance was considerably less favourable when adjusted for inflation. In particular, the results show a sharp decline beginning in 1913 which, despite a rebound in the 1920s, did not exceed the real wage levels recorded in 1890. Real wages at the Frigorífico Anglo plant in 1928 therefore remained comparable to—and did not exceed—those paid by LEMCO four decades earlier.

Wage gaps also indicate a rise in labour inequalities. Skill premiums increased progressively from the late nineteenth century. With regard to age-related wage gaps—an unprecedented phenomenon for Uruguay before 1930—the analysis reveals a volatile pattern, with pronounced peaks in the 1890s and greater stability during the twentieth century. This shift was likely linked initially to labour supply dynamics and subsequently to the impact of child labour legislation. Gender, for its part, emerged as a far more significant determinant of wage inequalities: Although the gender-related wage premium remained stable during the 1910s, it exhibited an upward trend in the following decade, with a marked acceleration from 1924 onward.

Three key observations emerge from these findings. First, they corroborate recent sectoral studies showing that the economic expansion during the First Globalization was uneven, with its benefits unequally distributed across the labour market. The coexistence of pronounced wage inequalities with the firm's technological 'vanguard' status calls into question any straightforward association between foreign investment, economic growth, and rising real wages. Rather, this process of industrial modernization appears to have reinforced labour market segmentation: It generated demand for higher-skilled workers—evidenced by the growing skill premium—while workers in low-skilled positions remained readily replaceable. Second, the findings highlight the uneven effects of early labour legislation intended to mitigate structural labour market gaps. Third, they point to LEMCO/Anglo's role as a key agent of transformation in the local labour market, both through its demand for skilled workforce and through its contribution to the reproduction of gender- and age-based inequalities.

In sum, the study raises new questions for future research, particularly concerning the microeconomic determinants of individual wage trajectories, the impact of immigration flows on the labour market, and the comparative effectiveness of public policies across different industrial contexts.

## Acknowledgments

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## Author contribution statement

Both authors contributed equally to this work.

## References

Acevedo, Eduardo. 1929. 'Historia del Uruguay', *Anales de la Universidad*, 136: 7-676.

Azar, Paola, and Carolina Román. 2025. 'Condiciones de salud en el territorio: una aproximación de largo plazo desde las causas de mortalidad en Uruguay', *Investigaciones de Historia Económica*, 21(2): 49–79.

Barrán, José, and Benjamín Nahum. 1973. *Historia Rural del Uruguay Modemo.* Vol. III. Montevideo: Ediciones de la Banda Oriental.

Barrios Pintos, Aníbal. 2005. *Río Negro, Historia General*. Tomo I. Montevideo: Intendencia de Rio Negro/Tradinco.

Beretta, Alcides. 1978. *La industrialización del Uruguay, 1870-1925*. Montevideo: Fundación de Cultura Universitaria.

Bértola, Luis. 1991. *La Industria Manufacturera Uruguaya 1913-1961. Un enfoque sectorial de su crecimiento, fluctuaciones y crisis*. Montevideo: CIEDUR-Facultad de Ciencias Sociales.

Bértola, Luis. 2000. *Ensayos de Historia Económica: Uruguay en la región y en el mundo*. Montevideo: Trilce.

Bértola, Luis, comp. 2024. *Teleidoscopio. Historia económica del Uruguay*. Montevideo: Fondo de Cultura Universitaria-Universidad de la República.

Bértola, Luis, Leonardo Calicchio, María Camou, and Gabriel Porcile. 1999. 'Southern Cone Real Wages Compared: A Purchasing Power Parity Approach to Convergence and Divergence Trends, 1870-1996'. Unidad Multidisciplinaria. Facultad de Ciencias Sociales, Udelar, Documento de Trabajo. 44.

Boretto, René. 2006. *La Compañía Liebig de Fray Bentos: La otra revolución industrial*. n.p.: n.p.

Boretto, René, and Armando Oliveira. 2005. 'Carne de Cañón. Una visión de la trascendencia de Fray Bentos (Uruguay) en la alimentación del mundo occidental en períodos de conflictos bélicos entre 1865 y 1956'. Gijón: VII Jornadas Internacionales sobre Patrimonio Industrial.

Bucheli, Gabriel. 2000. 'El papel del Estado en la industria temprana uruguaya'. Porto Alegre: Primeras Jornadas de Historia Regional Comparada.

Buxedas, Martín, and Raúl Jacob. 1989. *Industria uruguaya: dos perspectivas.* Montevideo: Fundación de Cultura Universitaria/CIEDUR.

Callicchio, Leonardo. 1996. 'Salarios y costo de vida en el Río de la Plata, 1907-1930'. Documento de Trabajo 33. Montevideo: Unidad Multidisciplinaria. Facultad de Ciencias Sociales, Universidad de la República, Uruguay.

Camou, María. 2010. 'Las instituciones del mercado de trabajo en dos ramas de la industria uruguaya, 1900-1960'. PhD Thesis, Montevideo: Facultad de Ciencias Sociales. Universidad de la República, Uruguay.

Camou, María, and Silvana Maubrigades. 2004. 'Productividad y salario en la industrialización uruguaya: un estudio comparado de una empresa textil y un frigorífico, 1920-1950'. In *Psicología y organización del Trabajo V*, edited by Luis Leopold, 39-60. Montevideo: G. E. Psicolibros / Universidad de la República, Uruguay.

Camou, María, and Silvana Maubrigades. 2020. 'Evolución de salarios por calificación y desigualdad económica en Uruguay, 1918-2009'. Documento de Trabajo 61. Montevideo: Unidad Multidisciplinaria. Facultad de Ciencias Sociales, Universidad de la República, Uruguay.

Camou, María, and Silvana Maubrigades. 2021. '¿Crisis como oportunidad? La participación laboral de las mujeres en la economía uruguaya durante las crisis económicas de 1930, 1980 y 2000', *Revista Uruguaya de Historia Económica*, 11 (20): 57-76.

De Pena, Carlos M. 1893. *The Oriental Republic of Uruguay at the World´s Columbian Exhibition, Chicago, 1893*. Montevideo: n.p.

Delgado, Pablo, Vicente Pinilla, and Gema Aparicio. 2023. 'A different product? The formation and expansion of the international meat and live cattle market (1850-1939)', *Revista de Historia Económica-Journal of Iberian and Latin American Economic History*, 41 (1): 147-182.

Douredjian, Alberto. 2009. *Sobre inmigrantes y frigoríficos. El Anglo y los trabajadores (1924-1954)*. Montevideo: Tradinco.

Finch, Henry. 1981. *A political economy of Uruguay since 1870*. London: Macmillan Press.

Gebhardt, Roberto. 2000. 'The River Plate Meat Industry since ca. 1900: Technology, ownership, international trade regimes and domestic policy'. PhD Thesis, London: London School of Economics and Political Science.

Huttman, John. 1978. 'British Meat Imports in the Free Trade Era', *Agricultural History*, 2 (52): 247–262.

Jacob, Raúl. 1981. *Breve historia de la industria uruguaya*. Montevideo: Fundación de Cultura Universitaria.

Lamas, Mario, and Diosma Piotti. 1981. *Historia de la industria en el Uruguay, 1780-1930*. Montevideo: CIU/Rosgal.

Lloyd, Christopher, Jacob Metzer, and Richard Sutch, eds. 2013. *Settler Economies in World History*. Leiden: Brill.

Lluch, Andrea. 2019. 'Las empresas frigoríficas en Argentina: estrategias empresariales y cambios en el sector industrial (1882-1930)', *América Latina en la Historia Económica*, *26*(2): e985.

Lobato, Mirta. 2001. *La vida en las fábricas. Trabajo, Protesta y Política en una comunidad obrera. Berisso, 1904-1970*. Buenos Aires: Prometeo.

López Campaña, Perfecto, dir. 1925. El Libro del Centenario del Uruguay, 1825-1925. Montevideo: Capurro & Co.

Maeso, Justo. 1904. *Tierra de Promisión. Descripción General de la República Oriental del Uruguay*. Montevideo: Tip. de la Escuela Nacional de Artes y Oficios.

Martínez-Galarraga, Julio, Adrián Rodríguez-Miranda, and Henry Willebald. 2020. 'Patterns of regional income distribution in Uruguay (1872-2012): a story of agglomeration, natural resources and public policies.' In *Time and Space -Latin American Regional Development in Historical Perspective*, edited by Marc Badia-Miró, Daniel Tirado-Fabregat, and Henry Willebald, 271-307. London: Palgrave Macmillan.

Maubrigades, Silvana. 2018. 'Mujeres y desarrollo en América Latina durante el siglo XX. Tasas de actividad, niveles de desarrollo económico y modelos productivos', *Revista Uruguaya de Historia Económica*, 8 (14): 9-33.

Maubrigades, Silvana. 2024. 'Tiempo de crisis, tiempo de mujeres. La participación laboral de las mujeres entre 1908 y 1937 en Uruguay', *Anuario del CEEED*, 21: 137-166.

Millot, Julio, and Magdalena Bertino. 1996. *Historia Económica del Uruguay*. Tomo II, Montevideo: Fundación de Cultura Universitaria.

Ministerio de Industrias, República Oriental del Uruguay. 1913. 'Descripción general de la fábrica de productos animales "Liebig's Extract of Meat Company Limited" establecida en Fray Bentos (Uruguay)´. *Revista del Ministerio de Industria*, 1(7): 124-150.

Ministerio de Industrias, República Oriental del Uruguay. 1917. 'La industria de carnes en la República Oriental del Uruguay´. *Revista del Ministerio de Industria*, 5 (29): 25-72.

Nahum, Benjamín. 1997. *Cuando fuimos ricos. El crédito uruguayo a Inglaterra y Francia en 1918*. Montevideo: Ediciones de la Banda Oriental.

Perren, Richard. 1978. *The Meat Trade in Britain, 1840–1914*. London: Routledge and Kegan Paul.

Perren, Richard. 2006. *Taste, Trade and Technology: The Development of the International Meat Industry since 1840*. England: Ashgate.

Platt, David. 1972. *Latin America and British Trade. 1806 – 1914*. Londres: Adam & Charles Black.

Rayes, Agustina. 2015. 'La estadística de las exportaciones argentinas, 1875-1913. Nuevas evidencias e interpretaciones', *Investigaciones de Historia Económica*, 11 (1): 31-42.

República Oriental del Uruguay. 1918. *Anuario Estadístico de la República Oriental del Uruguay, Año 1916, Libro XXVI*. Montevideo: Imp. Art. de Juan Dornaleche.

República Oriental del Uruguay.1929. *Anuario Estadístico de la República Oriental del Uruguay, Año 1929, Libro XXXVIII*. Montevideo: Imp. Nacional.

República Oriental del Uruguay. 1932. *Anuario Estadístico de la República Oriental del Uruguay, Año 1930, Libro XXXIX*. Montevideo: Imp. Nacional.

Rey, María José. 2025. 'Between International Constraints and State Action: Uruguay's Meat Industry over the Long-Run', *Revista de Historia Industrial—Industrial History Review*, https://doi.org/10.1344/rhi-ihr.46336

Rodríguez Weber, Javier. 2011. 'Nueva luz sobre viejos problemas: incidencia de la cuantificación en la historiografía sobre la industria temprana en Uruguay', *América Latina en la Historia Económica*, 36: 11-36.

Scheinkman, Ludmila. 2019. 'De la historia política a los estudios de género: la historiografía sobre el mundo del trabajo de la primera mitad del siglo XX en Buenos Aires', *Trabajo y sociedad*, 33: 323-347.

Seoane, Pedro. 1929. *La industria de las carnes en el Uruguay*, Montevideo: n.p.

Sienra, Mariana. 2007. 'La evolución del Sistema de Seguridad Social en Uruguay (1829-1986)'. Documentos de Trabajo 07/07. Montevideo: Facultad de Ciencias Económicas y de Administración, Universidad de la República, Uruguay.

Tajam, Héctor, and Jaime Yaffé. 2003. 'Industria manufacturera y sustitución de importaciones (1911-1930)'. Documento de Trabajo 07/03. Montevideo: Instituto de Economía, Facultad de Ciencias Económicas y de Administración, Universidad de la República, Uruguay.

Travieso, Emiliano. 2020. United by Grass, Separated by Coal: Uruguay and New Zealand during the First Globalization. *Journal of Global History,* 15(2): 269-289.

Van Leeuwen, Marco, and Ireke Maas. 2011. *Hisclass: A Historical International Social Class Scheme*. Leuven: Leuven University Press.

Verne, Julio. 1875. *Autour de la Lune*. Paris: Bibliothèque D´Éducation et de Récréation J. Hetzel (11th ed.).

Winn, Peter. 2010. Inglaterra y la tierra purpúrea : Gran Bretaña y Uruguay enel siglo XIX. Boom, quiebra e imperio económico 1880-1903. Montevideo: Ediciones de la Banda. Oriental.

Woods, Rebecca. 2012. 'Breed, Culture, and Economy: The New Zealand Frozen Meat Trade, 1880–1914', *Agricultural History Review*, 60 (2): 288–308

Zubillaga, Carlos, and Jorge Balbis. 1985-1992. *Historia del movimiento sindical uruguayo*. Montevideo: Ed. de la Banda Oriental.

# Appendix

**TABLE A1** ▪ *Number of observations by period: workers and monthly observations*

| | | Monthly observations | | | |
|---|---|---|---|---|---|
| | | **1890-1900** | **1901-1910** | **1911-1920** | **1921-1928** |
| **Gender** | Male | 8,790 | 20,804 | 40,335 | 54,499 |
| | Female | 0 | 119 | 2,698 | 5,390 |
| | **Total** | **8,790** | **20,923** | **43,033** | **59,889** |
| **Age** | Under 14 | 1,254 | 1,972 | 6,525 | 2,885 |
| | 14 or older | 7536 | 18951 | 36,508 | 57,004 |
| | **Total** | **8,790** | **20,923** | **43,033** | **59,889** |
| **Skill level** | Apprentices* | 341 | 419 | 509 | 288 |
| | Low | 7,769 | 18,838 | 36,323 | 47,549 |
| | Medium | 680 | 1534 | 5,842 | 11,377 |
| | High | 0 | 132 | 359 | 675 |
| | **Total** | **8,790** | **20,923** | **43,033** | **59,889** |

*Note*: All observations correspond to the employment history of workers active in August 1928.

*Source*: All observations correspond to the employment history of workers active in August 1928.

**TABLE A2** ▪ *Average hourly wage; adult men and women; number of workers and number of monthly observations (averages; wages in Uruguayan pesos)*

| Year | Average hourly wage | Hourly wage (adult male) | Number of monthly observations (adult male) | Hourly wage (adult female) | Number of monthly observations (adult female) |
|---|---|---|---|---|---|
| 1890 | 0.16 | 0.17 | 282 | | |
| 1891 | 0.16 | 0.17 | 288 | | |
| 1892 | 0.15 | 0.17 | 312 | | |
| 1893 | 0.15 | 0.16 | 478 | | |
| 1894 | 0.15 | 0.15 | 574 | | |
| 1895 | 0.15 | 0.15 | 651 | | |
| 1896 | 0.14 | 0.15 | 789 | | |
| 1897 | 0.14 | 0.15 | 896 | | |
| 1898 | 0.14 | 0.15 | 985 | | |
| 1899 | 0.14 | 0.15 | 1074 | | |
| 1900 | 0.14 | 0.15 | 1,207 | | |
| 1901 | 0.14 | 0.15 | 1,310 | | |
| 1902 | 0.14 | 0.15 | 1,392 | | |
| 1903 | 0.14 | 0.15 | 1,441 | | |
| 1904 | 0.14 | 0.15 | 1,715 | | |
| 1905 | 0.14 | 0.15 | 1,843 | | |
| 1906 | 0.15 | 0.15 | 1,948 | | |
| 1907 | 0.15 | 0.16 | 2,077 | | |
| 1908 | 0.15 | 0.16 | 2,243 | | |
| 1909 | 0.15 | 0.16 | 2,330 | | |
| 1910 | 0.16 | 0.16 | 2,564 | 0.09 | 23 |
| 1911 | 0.16 | 0.17 | 2,694 | 0.10 | 36 |

| Year | Average hourly wage | Hourly wage (adult male) | Number of monthly observations (adult male) | Hourly wage (adult female) | Number of monthly observations (adult female) |
|---|---|---|---|---|---|
| 1912 | 0.16 | 0.17 | 2,739 | 0.09 | 32 |
| 1913 | 0.16 | 0.18 | 2,849 | 0.10 | 73 |
| 1914 | 0.17 | 0.18 | 3,009 | 0.10 | 120 |
| 1915 | 0.17 | 0.19 | 3,406 | 0.11 | 189 |
| 1916 | 0.18 | 0.20 | 3,636 | 0.11 | 228 |
| 1917 | 0.18 | 0.20 | 3,880 | 0.11 | 267 |
| 1918 | 0.18 | 0.20 | 4,223 | 0.12 | 291 |
| 1919 | 0.19 | 0.21 | 4,205 | 0.12 | 290 |
| 1920 | 0.21 | 0.22 | 4,103 | 0.12 | 238 |
| 1921 | 0.21 | 0.23 | 4,239 | 0.13 | 249 |
| 1922 | 0.21 | 0.23 | 4,916 | 0.13 | 304 |
| 1923 | 0.22 | 0.23 | 5,413 | 0.13 | 303 |
| 1924 | 0.24 | 0.25 | 5,108 | 0.14 | 273 |
| 1925 | 0.25 | 0.26 | 6,895 | 0.13 | 513 |
| 1926 | 0.25 | 0.27 | 8,484 | 0.13 | 847 |
| 1927 | 0.25 | 0.27 | 9,867 | 0.13 | 1,150 |
| 1928 | 0.26 | 0.28 | 7,378 | 0.13 | 1,065 |

*Source*: Authors' own elaboration based on LEMCO/Anglo personnel files (see Sources and Methodology section).

## Salaris reals i desigualtats laborals a la indústria càrnia rioplatense (Uruguai, 1890-1928)

RESUM

Aquest estudi aporta nova evidència sobre la dinàmica salarial industrial a la regió del Riu de la Plata durant la Primera Globalització (1890-1928). Centrant-nos en la indústria frigorífica de l'Uruguai, analitzem registres salarials extrets dels expedients laborals de l'empresa *Liebig's Extract of Meat Co.* (que es convertí en Frigorífico Anglo a partir de 1924). Les sèries de salaris nominals i reals construïdes revelen dos patrons significatius: un estancament persistent dels salaris reals i un augment progressiu de les bretxes salarials de gènere al llarg del període. Aquests resultats aporten nous elements per entendre els mercats de treball en economies de nou assentament i ofereixen evidència per a comparacions de salaris industrials entre finals del segle XIX i principis del XX.

PARAULES CLAU: salaris industrials, Uruguai, indústria càrnia, Primera Globalització

CODIS JEL: N36, E24, J2, L66

## Salarios reales y desigualdades laborales en la industria cárnica rioplatense (Uruguay, 1890-1928)

RESUMEN

Este estudio aporta nueva evidencia sobre la dinámica salarial industrial en la región del Río de la Plata durante la Primera Globalización (1890-1928). Centrándonos en la industria frigorífica de Uruguay, analizamos registros salariales extraídos de los legajos laborales de la empresa Liebig´s Extract of Meat Co (convertida en Frigorífico Anglo desde 1924). Las series de salarios nominales y reales construidas revelan dos patrones significativos: un persistente estancamiento de los salarios reales junto con un aumento progresivo de las brechas salariales por género durante el período. Estos resultados aportan nuevos elementos para comprender los mercados laborales en economías de nuevo asentamiento y ofrecen evidencia para comparaciones de salarios industriales entre fines del siglo XIX y comienzos del XX.

PALABRAS CLAVE: salarios industriales, Uruguay, industria cárnica, Primera Globalización

CÓDIGOS JEL: N36, E24, J2, L66