

Tracing Inequality: A Century of Labor Market Dynamics in Historical Job Ads*

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Abstract

This study examines gender inequality in the Austrian labor market between 1850 and 1950 through the lens of job advertisements from 29 Austrian newspapers. Using a dataset of 10.442 manually annotated job ads, which is a subset of a larger dataset containing millions of job ads, we analyze gendered job opportunities, occupational segregation, and wage disparities, using machine-learning approaches and training custom automatic semantic annotation models. Our findings highlight the significant transformation of women's employment over this period. While early job ads predominantly featured women in domestic roles, industrialization and expanding clerical opportunities gradually shifted their labor market presence. However, legal restrictions, societal expectations, and structural barriers limited career advancement, reinforcing wage disparities. Wage data from case studies suggest that female-dominated positions remained largely low-paid, with women often classified as "secondary workers" and expected to leave the workforce upon marriage. The results contribute to ongoing discussions about gender inequality in the workforce and suggest that understanding historical labor market dynamics is crucial to addressing modern labor market challenges.

JEL classification: J16, J21, J62, N33

Keywords: inequality, labor market history, gender economics, occupational segregation

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1 Introduction

Inequality on the labor market is a highly discussed topic nowadays, regarding inequalities in wages like the gender pay gap, inequalities in access to job opportunities, discrimination based on race or ethnicity, disparities in career advancement, and differences in job security and working conditions. But these differences on the labor market have existed ever since and have just recently become of great interest to research.

We analyze a historical angle of labor market inequalities by taking job advertisements published by German-language newspapers in the Austro-Hungarian Monarchy and later in the Republic of Austria as our source. We have chosen 29 daily newspapers (see Appendix) with regional or national reach and long print run of at least 10 years in the period from 1850 to 1950, summing up to more than 6.4 million pages. This large pool of job ads generated from the ANNO newspaper database (Österreichische Nationalbibliothek (2021)) provided by the Austrian National Library is the basis of our analysis. We focus specifically on gender inequality on the labor market, by looking at job ads in newspapers over 100 years and analyzing the content regarding gender roles, their related job opportunities, and salaries. Thanks to our custom models, we can extract job positions from every ad and assign them to a gender. Some advertisements also contain salary information. We are particularly interested in analyzing positions for women and their role in the labor market.

The period studied by us includes several historical events that affect the job market in a discrete manner. With industrialization, starting in Austria between 1820 and 1860, it was the first time in history that population and production were so drastically increasing in such a short period. In addition to the major changes in the labor market, social norms shifted and family structures changed completely, all affecting labor market structures. Therefore, it is necessary to consider not only our job advertisements but also the entire Austrian labor market and the participation of women in the workforce at that time.

In the early 19th century women mainly worked in agriculture or domestic service and were part of the household, meaning they usually lived on their employers' property and home and work activities were performed in the same location. Official statistics like the "*Tafeln zur Statistik der oesterreichischen Monarchie*" do not mention female labor at all, suggesting their labor market participation was relatively low, especially for married women who only rarely offered their labor outside the household. However, not only market production contributes to labor participation but also work for the family. Taking into account household work, female participation was much higher. At the same time, the agricultural sector, where women tra-

ditionally played a significant role, underwent major changes. As economies shifted away from subsistence farming, labor-intensive agricultural practices were gradually replaced by more capital-intensive technologies, which favored male labor due to the physical strength required. This transformation contributed to the decline in female labor market participation.

In the mid-19th century, with industrialization generating a "modern" labor market, a new working class was formed, and labor shifted away from the household to factories and later also to offices. As in many other countries, textile production was also a driving force behind industrial development in Austria. Large factories were built and this industry sector offered great potential for employment, especially for women. However, most factories were located around urban centers, which would require a change of location for many workers. This development was further influencing the female working force, since women had to move to these new industrial centers and at that time, this was only possible (socially accepted) for few women, often only for young and unmarried. Additionally, there were legal restrictions for women in teaching and clerical (in civil service) occupations. These so-called 'marriage bars' required employers to fire women when they got married. This is well documented by Goldin (1988) in America and was also executed in Austria (known as *Zölibatsklausel* or *Lehrerinnenzölibat*) from the mid-19th century until 1949, when it was completely abolished (Nachbaur (2011)).

There are few data on female labor market participation in the 19th century. Starting with the first population and occupational census in 1869, there is information on the different economic sectors and the sectoral change from the agricultural to the industrial sector. There is a clear shift away from agriculture towards the industrial and also to the service sector (see Fig. 1). In 1869, 53.8% of the labor force worked in agriculture, 23.6% in mining, industry, and crafts, and 22.6% in the service sector. In 1910, the economic landscape was very different, with only 39.5% in agriculture, 31% in industry, and 29.5% in the service sector. From 1890 onward, there are estimations on the female employment rate and there is a clear drop from 44.2% in 1890 to 39.5% in 1910 due to the structural changes described above (Butschek (1992), p. 39 ff.).

The labor force changed. There was a huge movement towards urban areas, especially to the industrial centers surrounding Vienna. Around the turn of the century, the working class became increasingly organized and trade unions were gradually established and collective wage agreements were legally introduced. The First World War and the end of the Habsburg empire, followed by economic crises and later the Second World War, were a challenging time for Austria and affected the labor market immensely. Gender roles shifted in war times, with female labor

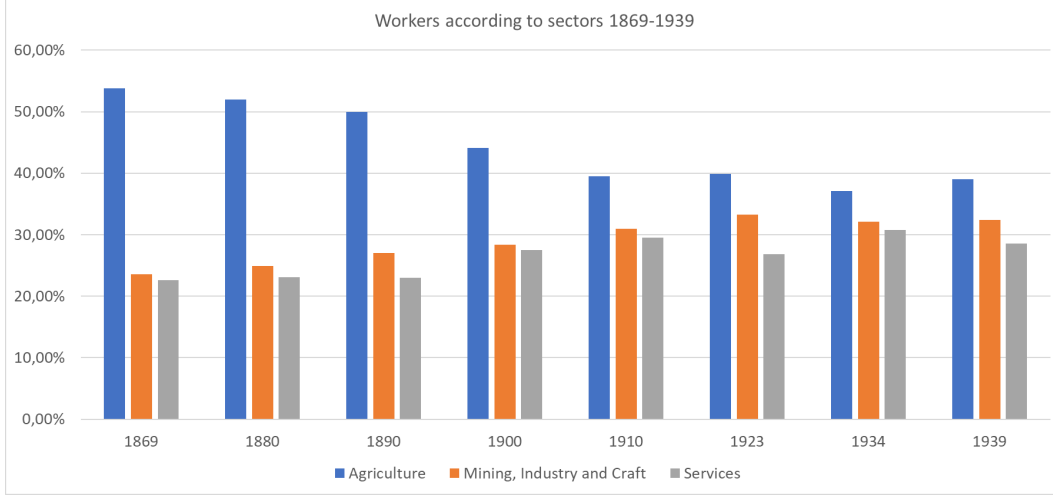


Figure 1: Workers according to economic sectors. Data source: Butschek (1992), p. 42

participation increasing, and in times of crises with high unemployment, women were expected to stay at home and give men the opportunity to find work.

The next section describes our dataset. It consists of manually annotated job advertisements. We also discuss the important features of job ads in newspapers as a research source. In Section 3 we will study gender patterns of the job positions. First, we analyze when particular jobs for women first appear in newspaper ads. Then we compare female and male positions, reflecting their job opportunities over the 100-year period. In Section 4 we focus on salary information extracted from job ads, highlight some methodological challenges. We conduct two case studies where we try to show salary differences with respect to gender at two particular times, in 1870 and around 1900.

2 Dataset

This analysis is based on sample data from ANNO corpus (Österreichische Nationalbibliothek (2021)), a dataset of digitized Austrian historical newspapers. For each of the 29 chosen newspaper titles, we chose the issues that were published between 1850 and 1950, and randomly sampled one issue per year if the issues were available for this year (see list of newspapers in the Appendix). In these issues, image zones with job advertisements were manually annotated using doccano annotation software (Nakayama et al. (2018)). The annotated job advertisements were OCRed (transformed into machine-readable text through an Optical Character Recognition (OCR) process) with the `frak2021` model (MannheimUniversityLibrary (2021)) and manually corrected on the Transkribus platform (Kahle et al. (2017)). The selected issues yield a sample size of 10.442 job ads.

In the annotation process we divided job ads into job offers, job searches, services, and ads from agencies. Job offers announce the vacancies on the labor market, in other words, the employers' demand. Job searches represent the supply by job seekers or employed people who want to change position. The third category includes self-employed people offering a service, like musicians offering piano lessons, or people looking for a service, as for example, searching for native speakers that give language lessons. The fourth group contains job ads posted by private or public agencies that have special features which are often interesting. The differences are for this analysis not relevant. Our random sample that we have manually corrected, consists of almost 6000 job offers, 3400 job searches, 400 service ads, and 700 ads from agencies.

While we took care to construct a sample which is as representative for the Austrian labor market over the 100 years as possible, we are aware of some biases which defy unreflected generalization of our results. Job ads in newspapers do not cover all positions and occupations active in the Austrian labor market. We study this in the next section.

2.1 Newspapers as a Source

The job advertisements corpus comprises a large number of job ads from various newspapers, which differ in their geographical reach, temporal coverage and political orientation. As all of these factors have a direct influence on the type of job ads advertised in the newspapers, as much variability of the labor market as possible should have been covered. However, there is bias in our data resulting from the relationship between our source and the labor market in general: Newspapers were just one of several recruitment channels used in the analyzed time period, when about 30% of matches between employers and employees have been facilitated by job ads (Faust (1986)). Especially job ads for white-collar and household workers dominated the job search in newspapers. Blue-collar workers were underrepresented as they used other channels such as word-of-mouth advertising or calling around.

Employers and job seekers in small towns may rely on local networks rather than paid ads, while specialized positions or jobs requiring workers from distant areas are more likely to appear in newspapers. This results in an overrepresentation of ads involving geographical or social distance and extreme cases, such as high-skilled jobs, poor working conditions, or seasonal demand, while missing those who cannot afford to advertise. The bias of our data source should not be neglected and we are aware that our analysis does not reflect the whole labor market, but a particular segment of it (Venglarová et al. (2024)).

Nevertheless, using job advertisements as a means of labor market analysis has many advantages. Job ads capture direct employer demand and job seeker supply therefore, giving real-time and raw data on skills demanded or offered, on vacancies, and on job market dynamics. In addition, there is no need for retrospective reporting or aggregation of data from different sources, which could introduce new sources of bias through the aggregation process. From our job ads data, we get unfiltered information concerning job titles in which we can identify gender. With these, we can analyze job offers targeted for male or female employees, which enables an analysis of occupational segregation and historical gender inequalities. The next subsection will explain the extraction of these job positions and the relation to gender.

2.2 Job Positions

Within the corrected advertisements, job positions were extracted using a custom automatic semantic annotation model based on an ELECTRA model (Schweter (2024)). The model’s f1 score for identifying the position is 0.956.

From the 10.442 extracted positions we are working with, 3.329 are unique types in the sense of computational linguistics, i.e., they can be unique in their formulation or spelling, not necessarily unique as position themselves. We use morphological features to identify gender. For each position, its gender was established by a rule-based approach, using male (e.g., *boy*, *man*, *lad*) and female (e.g., *girl*, *woman*, *mademoiselle*) lexical indicators and suffixes typical in German for the given gender. Those positions that did not contain any of these, were assigned into a gender non-specific category.

For the gender determination, we tried also different machine-learning based approaches, such as ChatGPT 3.5 or Stanza (Qi et al. (2020)). However, Stanza reflected only the linguistic gender which does not always correspond to the actual gender (e.g., *Mädchen* meaning *girl* is a neutrum in German; *Buchhalterstelle* meaning a *clerk job* becomes feminine), while ChatGPT assigned most of the positions into a non-specific category because of its anti-discrimination policies.

This brings us to a disadvantage of the concept: For the female positions, we can be quite sure that they were targeted specifically women. However, in the male category, we cannot exclude the possibility that the masculine form was used as a generic form and actually anybody, a man or a women, could apply for the job. For this reason, we are not able to do a proper comparison between male and female jobs, but rather between female and male + generic jobs. Considering this, we get 4096 male + generic positions, 4380 female positions and 1966 non-specific positions.

2.3 Salary Information

With another custom automatic semantic annotation model, we identified salaries within the text. As job advertisements contain salary information only rarely, we decided to identify also other categories, such as Qualitative Salary (Tab. 1). Qualitative salary has also been identified in (Ros et al. (2020)) who tackled a similar task and approached it with a rule-based method. In contrast, given the variability in our data of different categories, we preferred a more flexible approach which our model enables.

Entity Type	F1 Score	Description	Examples
Quantitative Salary	69.57	Salary information consisting typically of a number and currency	12 kr., 8-10 fl.
Qualitative Salary	82.22	Information concerning salary without mentioning a specific number	against good salary, against fixed salary and provision
Salary Period	76.92	Reference period for the salary	yearly, weekly
In-kind Transfer	58.82	Board or lodging offered/ requested in the ads in addition to the salary	with board, free apartment

Table 1: Entities identified by the NER model and their description, examples and F1 score.

The process of matching positions with their corresponding salary in job ads with multiple positions was influenced by the not-perfect performance of the identification models (see F1 scores in the Table 1 and F1 score of the position identification model). In the cases where the match between a position and its corresponding salary risked to be false, we excluded the advertisement from the analysis. The resulting number of quantitative salary information is 431 instances, 709 of qualitative salary, 266 of salary period and 276 of in-kind transfer.

The distribution of salaries is not representative either time-wise (see Fig. 2 and 3) or position-wise, as they are result from a random selection process. In the future work, when we work with the whole population of data, the potential of the salary interpretation is much higher. However, for now, they offers material rather for a qualitative analysis. The same applies to the nature of data, as, e.g. the currencies differ across the corpus, the reference salary periods vary and often are entirely missing, and the categories of qualitative salary and in-kind transfers also offer opportunities rather in the qualitative respect.

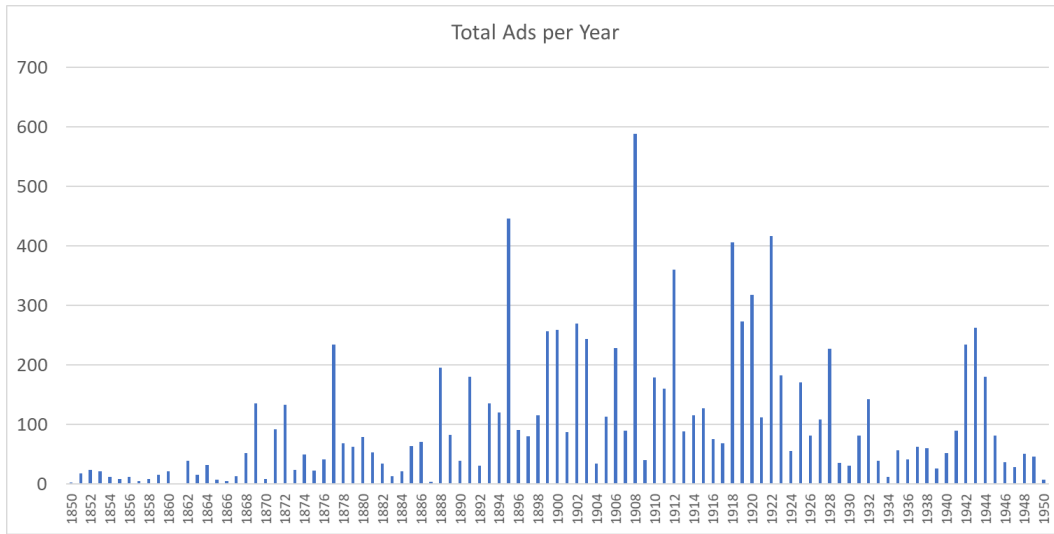


Figure 2: Number of total advertisements per year.

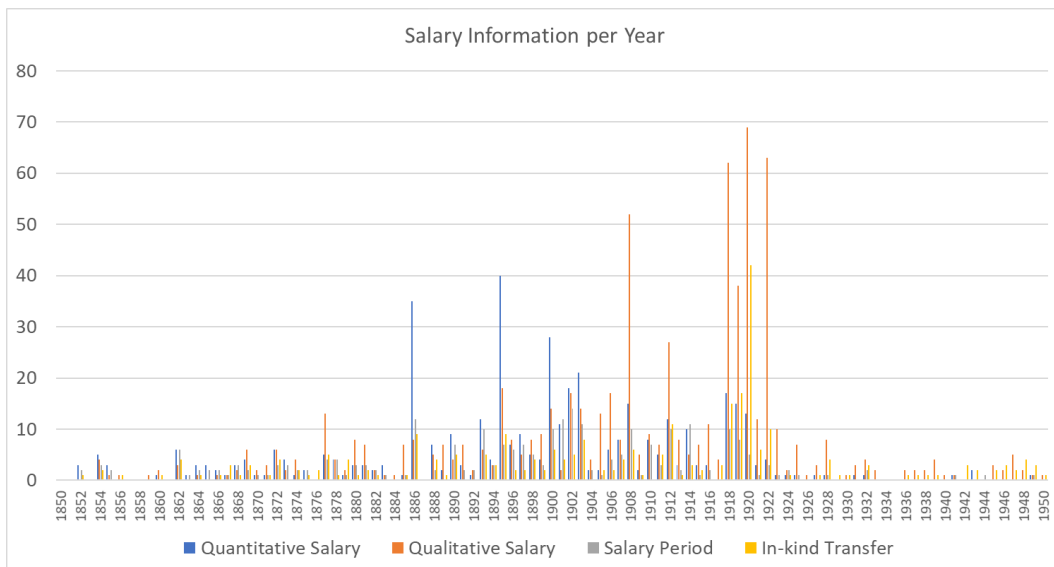


Figure 3: Salary information per year.

3 Gender Inequality on the Austrian Labor Market

As described in the data section above, we extract job positions in the job ads. With them, we get information on job offers and job searches for very specific positions. Moreover, by dividing the job position based on gender, we can analyze the role of women in the labor market and occupational segregation from 1850 to 1950.

In particular, the female labor force underwent drastic changes in the 19th century. One of their traditional working sectors, the agricultural sector, relatively declined in terms of employment and changed structurally, releasing a lot of free female labor. In the mid-19th century, working in the domestic sector was often their only alternative or completely dropping out of the labor force. However, women's access to education and consequently to the labor market improved gradually. Reforms such as the *Mädchenmittelschulgesetz* in 1900 improved access to secondary education for women. Consequently, it became possible for women to take on more skilled positions such as office or teaching jobs, but still at the lowest level, e.g. teaching in elementary schools. However, the marriage bars for female teachers and civil servants were still in effect. At the same time, more and more feminist movements emerged in many European countries and the position and the expectations of women in society and especially in the labor market began to change, slowly expanding roles in white-collar positions next to already traditional textile and factory work.

The First World War introduced a huge negative supply shock on the labor market and the resulting labor shortages temporally led to more female employment. Even the marriage bars were partially repealed in 1919 (Nachbaur (2011)), but with the end of the war and the end of the Austro-Hungarian empire, the country suffered from many major challenges and many women returned to their traditional roles. Nevertheless, like in most European countries, women won the right to vote in 1918 in Austria. The Great Depression hit the young Austrian economy also quite hard and marriage bars were reintroduced and even tightened up in certain places in Austria. And with the territorial merger (*Anschluss*) with Germany in 1938 the role of women in society became very traditional again. However, with the expansion of the service sector, there was a growing participation in white-collar jobs for women. The Second World War disrupted this development and again women temporarily took over jobs as men were drafted into war. After the end of the war and with the Second Republic of Austria, female labor force participation slowly expanded, at the beginning still having a focus on domestic roles, but women became increasingly represented in the service sector and in many white-collar jobs and also the marriage bars were abolished in 1949 in all Austrian regions.

Given our dataset of Austrian newspapers covers job advertisements from 1850 to 1950, we can reflect on the role of women on the labor market and their job possibilities over 100 years.

3.1 First Job Ads for Women

From a preliminary analysis of our sample data, we can look for first occurrences of occupations that were specifically targeted at women (Fig. 4). This is an interesting aspect because, despite the inherent biases of newspaper job ads as a data source, they provide valuable insights into the evolution of labor market opportunities for women over time. Given that white-collar and household jobs were overrepresented in job advertisements, and women increasingly worked and shifted toward these sectors, our dataset is particularly well-suited to trace women’s entry into clerical, administrative, and professional roles. Although job advertisements do not capture the full spectrum of female employment, they offer a unique view on employer demand, occupational segregation, and shifting societal norms of the labor market section that used job ads to form the match between employers and employees.

As expected, the first job ads for women are published for occupations in the household sector - *Haushälterin* (female housekeeper) in 1852 or *Köchin* (female cook) in 1859 - and in the retail sector - *Verkäuferin* (saleswoman, shop assistant) in 1859. Other frequent female jobs like *Mädchen für Alles* (maid-of-all-work) or *Kindermädchen* (nannies) appear a bit later, in 1871, probably because other recruitment channels were used for these kinds of occupations, mostly through personal contacts or recommendations. The first occupations in the textile sector appeared around the same time: *Maschinnäherin* (machine seamstress) in 1869 or *Wäscherin* (laundress) in 1872, but these jobs were often carried out in/for private households. The first female position published from a textile factory was in 1874 for a *Knopflochnäherinnen* (buttonhole seamstresses), but these factory job ads became more frequent for women from the 1890s onward. A job ad for a general female worker (*Arbeiterin*) was first announced in 1902 and a general female factory worker (*Fabriksarbeiterin*) in 1914.

More skilled positions such as teaching jobs were published in our newspaper dataset from the 1880s on - *Unterlehrerin* (low-rank teacher) in 1882 and *Volksschullehrerin* (elementary teacher) in 1889 - but these positions were always related to language or musical lessons. In our one issue each year sample the first official ad that was published from the k.u.k. district school board (*k.u.k. Bezirksschulrat*) explicitly for a male or female teacher was in 1904. Ads for clerical office jobs were mostly targeting women, with *Stenogaphin/-typistin* (stenographer or shorthand typist) appearing first in 1893, but became very frequent from the 1900s onward next

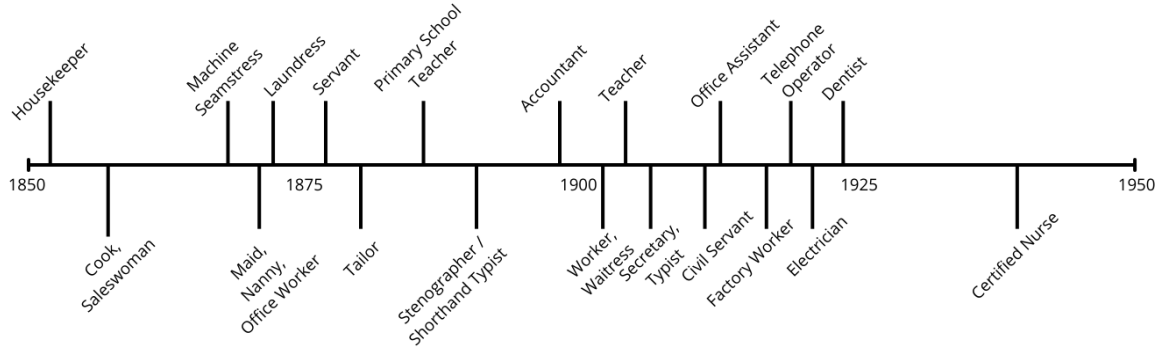


Figure 4: Timeline illustrating first appearance of various female jobs in our job ads corpus.

to positions like *Sekretärin* (secretary) or *Maschin(en)schreiberin* (typist) - both first announced in 1906. Other official occupations announced in newspapers were for civil servants and these positions were very male-dominated in the monarchy. The first *Beamtin* (female civil servant) was announced in 1910 and was supposed to work in an administrative position, which demonstrates that women slowly entered the lower k.u.k. civil servant ranks.

As telephone networks expanded in the early 20th century, the job of telephone operators started appearing and became widespread around the time of the First World War, when demand for telecommunications increased, particularly for military and administrative purposes. Because men were drafted into the military, this led to an increase in women working as telephone operators. This is what we also find in our dataset, with the first job ad for a *Telephonistin* (female telephone operator) published in 1916. The occupation became well-established for female workers, and this trend was similar across Europe and the United States. During the wartime, women needed to fill positions that were typically performed by men. Another example from our job ads collection shows the need for employees, whatever their gender: an electrical engineering company is looking for a man or woman for electrical installation work in 1918.¹ This was not a common sector for female workers and we also did not find other ads for female engineers after the war period, suggesting that this expansion of female employment in some sectors was only temporary.

During the interwar period economic crises reinforced traditional female roles, and therefore we find most job ads for women in the domestic and services sector. However, with better access to education there are some exceptions and in 1924 we find the first *Zahnärztin* (female dentist) looking for a position. Moreover, a statistic on female employment published in the newspaper *Reichspost* on 31 July

¹Arbeiter Zeitung, 16.2.1918, p. 8, <https://anno.onb.ac.at/cgi-content/annoshow?call=aze|19180216|008|33.0|0> [cited 14.03.2025].

1932 reports that there are 559 female physicians practicing in Austria (most of them in Vienna), which is 7% of all physicians. Next to female doctors or teachers, there are about 1500 other women who have an academic degree. They work in about 300 different academic positions. A job that was also a high-skilled position was the *Diplomkrankenschwester* (certified nurse), which first appeared in our job ads dataset in 1942, reflecting the wartime period, when more highly qualified nurses were needed.

This short analysis reflects the development of women’s work through the lens of newspapers but seems to fit with and in the historical context. We see a dominance in domestic work all over the 100-year period but year by year new female positions come up. First, with industrialization, positions in the textile industry appear, which occurred somewhat later for women, due to their lower labor mobility. Later, with educational reforms, more skilled white-collar jobs were open for women. Societal norms shifted throughout this period, with more drastic changes during wars. We observe these shifts affecting the labor market until 1950, when our dataset ends.

3.2 Jobs for Women in Comparison

Looking at the division of our job ads data according to gender, we find some general patterns. First, the number of job ads that specifically target only women is approximately equal to positions targeting men. Although labor market participation was definitely lower for women, our dataset is relatively overrepresenting white-collar and household jobs, which were the sectors women increasingly worked in. The observation of approximately the same amount male and female job ads confirms this overrepresentation.

Second, we look at the positions that were advertised most frequently for women compared to men over the whole 100-year period. We find that women’s roles were heavily concentrated in a few, highly repetitive jobs, like *Köchin* (cook), *Mädchen für Alles* (maid-of-all-work) or *Näherin* (seamstress), which are the three most frequent positions, each with over 300 occurrences in our sample of 10.442 ads and 4380 for women. Thus, these three positions account for more than 20% of total positions for women. The positions for men are distributed more evenly: Men had access to a much broader and diverse range of occupations across various sectors. The most common jobs were *Praktikant* (trainee), *Vertreter* (agent) and *Buchhalter* (accountant), but their frequency was just over 100 mentions in the corpus. This implies that women’s limited access to various jobs constrained their employment potential. The lack of variety likely perpetuated structural gender-based economic disparities. Men had more freedom to choose from a variety of jobs, amplifying gender imbalances.

Future analysis will focus on comparing the variety of job ads for men and women over time to see how the division of labor evolved. For example, a time series analysis can show in more detail in which sectors women searched for positions, reflecting on the shift of their role in particular sectors and ultimately on the shift in social norms and expectations regarding women's work.

Another question that follows the implications from above is whether we see from our data that the jobs advertised for women were generally lower-skilled and lower-paid compared to those for men. Categorizing skills will be part of some future work, but we can analyze salary information, thanks to the models that were described in the dataset section. To the same degree wages and salaries contain also information about specific skills. The following section will discuss the findings on salary.

4 Salary in Job Ads

In our manually corrected data sample of 10.442 job ads we find some information about salary, however, it is often not a quantitative amount that was stated in the ads. Rather, it was common to describe the compensation in different qualitative ways, like job seeker asking or employers promising "good salary" (*gute Bezahlung*) (see also Ros et al. (2020)). Therefore, we divide the salary information taken from job ads into 4 categories: (i) quantitative salary, (ii) qualitative salary, (iii) salary period, and (iv) in-kind transfers. The data section gives a description and explicit examples for each category.

Given the mixture of qualitative and quantitative information that we can extract, we face multiple challenges. For the qualitative salary, we have a general problem with the incomparability of such unspecific information. A "good salary" meant different things to different people, therefore, it is hard to compare positions and their compensation with each other. We expect "good salary" to refer to an industry benchmark, meaning the same things as "at least industry average". Until we can construct "industry wages" or "occupation wages" from the whole population of job ads, we cannot say more about these qualitative assessments.

Even for the quantitative salary information we have several issues: First, some ads announce not only one position but more and the salary information has to be precisely matched to the corresponding position, in order to be meaningful for our analysis. The models do not perform perfectly on this task yet. A minor issue are the inconsistent reference periods for payments and the transition between currencies over the 100-year period (Gulden/Florin (fl.), Krone (K), Schilling (S)). The currency transition can be solved using the official exchange rates. If the reference period is present in the ad, it is easy to calculate a common period like monthly or

annual wage. For salary information without reference period, it would be best to compare them with similar positions that contain that information. Algorithmically this is solvable using a rule-based approach.

However, there are two problems that require more careful consideration. One is that we often find a salary range for a position, for example, '10-14 fl.' which leaves ambiguity about what determines that range. We cannot have the context for every position and observe only the salary mentioned in the job ad and not the real salary that is paid. Education, experience, working hours, employer labor shortage, negotiation power, or many other factors could influence the actual wage paid. The actual wage is negotiated between the two parties when the job seeker has contacted the employer and they agree to form a relationship. But we do not find evidence for the negotiation outcome or for variables affecting it. One could solve this by just including the average of the salary into a quantitative analysis, however, this is a loss of valuable information obtained by the job ad. The range might mean that there is room for negotiation and the ad does not announce a take-it-or-leave-it offer. These problems result in the need for precise evaluation depending on the specific question of the analysis. The next challenge is very specific to the salary categories for k.u.k. civil servants in the Habsburg monarchy. Their salary was tied to fixed amounts by rank, and often job ads only state the rank category for civil servant positions and not the specific salary amount. There were 11-12 ranks and the fixed salary was adjusted over time. Therefore, we additionally need some external information on these civil servants.

Since the models for extracting salary information do not yet work perfectly, we start by looking at some case studies of specific periods. We manually scanned an extra sample of job ads from a whole week in 1870 of all our newspapers and extracted information about positions and salaries. Moreover, Megner (1985) records about the k.u.k. civil servants salary scheme of the year 1898. This gives a first impression on the salaries by rank. Around the same time our dataset peeks with the highest occurrence of information on salary in ads. Therefore, it is worth taking a closer look at these data around 1900 in another case study.

4.1 Case Study for April 1870

For our case study we look at the second week of April in 1870. Out of the 29 daily newspapers (see Appendix), twelve have published job ads in this week. We extracted 195 ads with job offers, 129 ads with searches, and 43 service ads, which we can analyze.

We find job ads that are very different in many dimensions. For job searches, there is, for instance, an English lady willing to teach two hours of English per day to members of a family going to Ischl or Baden in summer in exchange for board and lodging.² She is in a fairly different situation than the poor student who asks, actually more begs, for any private lessons ‘for little money’.³ Whereas, other job seekers offer very confidently their valuable services with salary claims or potential salary details from interested employers.⁴ Concerning employers, very often we read from the job ad that the employer is in a stronger position. However, there are few who know that it would be difficult to find someone who is both able and willing to do the particular job they announce. Therefore, applicants could sometimes propose their terms (including also salary claims).⁵

In the second week in April 1870, jobs or job seekers in 76 different occupations were announced. We split them into ten groups ((i) household services, (ii) tutors, (iii) office, (iv) crafts, (v) unskilled labor, (vi) managers, (vii) teachers, (viii) apprentices, (ix) industry, and (x) artists, with crafts being the group with the largest number of different occupations and household services the group with most job offers or searches. Their job offers are usually short and rarely mention any quantitative salary (*A Reliable Servant who is also capable of driving a carriage, is sought for a noble household starting from April 1.*⁶). Job requests are longer and more subservient. In some service jobs (hair dressers, washerwomen) the hierarchy is very obvious in the job ads, but it is nowhere as pronounced as in servants and housemaid positions.

²Neue Freie Presse, 5.4.1870, p. 16, <https://anno.onb.ac.at/cgi-content/annoshow?call=nfp|18700405|16|100.0|0> [cited 7.3.2025].

³Neue Freie Presse, 9.4.1870, p. 16, <https://anno.onb.ac.at/cgi-content/annoshow?call=nfp|18700409|16|100.0|0> [cited 7.3.2025].

⁴As Housekeeper or Stewardess in the city or countryside, a lady wishes to take a position. She has served for several years as a housekeeper to a noble household in Bohemia. Applicants are requested to provide details regarding potential salary and terms, [...]. Original in German: *Als Wirthschafterin oder Beschließerin in der Stadt oder auf dem Lande wünscht eine Dame einzutreten, die durch mehre Jahre einen Posten als Wirthschafterin bei einer Herrschaft in Böhmen innegehabt. Es wird ersucht, das etwaige Honorar nebst Bedingungen unter [...].* Prager Abendblatt, 4.7.1870, p. 4, <https://anno.onb.ac.at/cgi-content/annoshow?call=pab|18700407|4|100.0|0> [cited 7.3.2025].

⁵Two Skilled Paper Machine Operators as well as a skilled mill preparer, with good references, are sought for a paper factory in Galicia. [...] Applicants for these positions may send their references to: [...] along with their proposed terms. Original in German: *Zwei tüchtig Papiermaschinenführer, wie auch ein tüchtiger Mühlbereiter, mit guten Zeugnissen versehen, werden für eine galizische Papierfabrik gesucht. [...] Die Bewerber um diese Posten können ihre Zeugnisse an [...] übersenden, wie auch ihre Bedingungen angeben.* Die Presse, 7.4.1870, p. 18, <https://anno.onb.ac.at/cgi-content/annoshow?call=apr|18700407|18|100.0|0> [cited 7.3.2025].

⁶German original: *Ein ordentlicher Bedienter, der auch kutschiren kann, wird vom 1. April für eine Herrschaft gesucht.* (Linzer) Tages-Post, 7.4.1870, p. 5, <https://anno.onb.ac.at/cgi-content/annoshow?call=tpt|18700407|5|100.0|0> [cited 7.3.2025].

Every ad in April 1870 mentioned the occupation or field of activity. However, not many include a wage or a range of wages. Activity or industry wages seem to be well understood, as phrases like "*mit entsprechendem Gehalt*" (with corresponding salary) in many ads demonstrate. We observe some job ads for the United States of America: for workers, particularly craftsmen, searched for emigrations a wage range is given. They announce boats leaving from Bremen or Hamburg in spring 1870 in the newspapers. However, the wage dispersion in these ads speaks to the wages in the US and not to Austrian levels. Austrian wages are rather rare. If there is information, then it is not in the same form. There are daily wages, weekly, monthly, and annually, or very special: typesetters that are paid per 1000 characters. It seems from the few observations that the lengths of the announced payment period increase with skill and prestige of a position, probably also reflecting differences in the expected duration of the employment relationship.

Public employees or publicly regulated activities are paid annually. There is a differentiation according to a classification which shows significant differences between the wage categories. An low-rank teacher (*Unterlehrer*) in Semriach, Styria is offered an annual wage of 60 fl.⁷, for instance, a high-rank teacher (*Oberlehrer*) 500 fl. annually.⁸ Both receive not much salary compared to other jobs, but both positions offer housing in addition. Nevertheless, it is likely that the teacher also offers his (seldom her) services as a tutor for some hours in the afternoon or on weekends. For example, there is one offer for such daily afternoon repetition lessons with monthly compensation of 6 fl.⁹ or language lessons from a native speaker for 2 fl. for 3 hours per week.¹⁰ Another public position for a *Kanzleibeamter* (legal clerk) was published with a salary of 40 fl.¹¹ There is no payment period but given this was a public employees' position, it is likely to be annual wage.

Further, there is a position for a *Gärtner* (gardener) with 'very good annual salary'¹², other than that we find only weekly and daily wages. Almost all of these positions require potential applicants to have so-called *Reisegeld* (travel money). There is no further information on a specific amount or how often traveling is re-

⁷Grazer Volksblatt, 5.4.1870, p. 8, <https://anno.onb.ac.at/cgi-content/annoshow?call=gre|18700405|8|100.0|0> [cited 10.3.2025].

⁸Neue Freie Presse, 7.4.1870, p. 16, <https://anno.onb.ac.at/cgi-content/annoshow?call=nfp|18700407|16|100.0|0> [cited 10.3.2025].

⁹Fremden-Blatt, 5.4.1870, p. 15, <https://anno.onb.ac.at/cgi-content/annoshow?call=fdb|18700405|15|100.0|0> [cited 12.3.2025]

¹⁰Fremden-Blatt, 6.4.1870, p. 23, <https://anno.onb.ac.at/cgi-content/annoshow?call=fdb|18700406|23|100.0|0> [cited 12.3.2025].

¹¹Morgen-Post, 6.4.1870, p. 8, <https://anno.onb.ac.at/cgi-content/annoshow?call=mop|18700406|8|100.0|0> [cited 12.3.2025].

¹²Wiener Zeitung, 7.4.1870, p. 11, <https://anno.onb.ac.at/cgi-content/annoshow?call=wrz|18700407|11|100.0|0> [cited 12.3.2025].

quired. It is frequently mentioned, often as the only stated requirement, suggesting that mobility was a fundamental expectation for workers, particularly in trades and service professions. The positions listed — ranging from skilled craftsmen such as *Tischler* (carpenters), *Schuster* (shoemakers), and *Schmiede* (blacksmiths), to industrial and metalworkers like *Dampfkesselarbeiter* (boilermakers) and *Messerschmiede* (knife makers), as well as domestic and service roles including *Kellner* (waiters) and *Hausmädchen* (maids) — were typically short-term or seasonal jobs. The fact that many unrelated positions were grouped in single ads suggests that they were likely announced by job placement agencies rather than individual employers. Unlike direct employers, these agencies had little interest in whether a specific position was filled and therefore placed the responsibility of travel entirely on the workers. This is different to ads from individual employers, where *Reisegeld* is explicitly offered as an incentive — such as for a *Friseurgehilfe* (hairdresser’s assistant)¹³ or *Sesseltischler* (chair carpenter)¹⁴ — indicating that these employers actively sought to attract skilled workers from other regions. The frequent mention of *Reisegeld* in the time around 1870 likely reflects a specific recruitment approach of that time, where agencies tried to facilitate as many connections as possible while not taking responsibility for how applicants reached their work destinations.

For the few salary occurrences in the second week in April 1870 it is hard to compare male and female wages. Most female positions are in the household sector and there we find no quantitative salary information at all. Sometimes in-kind transfers are mentioned for lodging and board. One young woman looks for a position in a family household and states, that for her good treatment is more important than the salary.¹⁵ The female positions that require also *Reisegeld* (cooks, maids, teachers or seamstresses) have a *weekly* wage of 10-16 fl. compared to a position for a male waiter, polisher or barber that offers 6-10 fl. per *day*. This suggests that these female positions were intended to have at least a longer-lasting employment relationship, reflected by weekly wages. Even if the male positions offer a higher wage, given they

¹³A hairdresser’s assistant for independent management of the business with good salary and permanent position wanted. Travel money will be sent on request [...]. Original in German: *Ein Friseurgehilfe zur selbständigen Leitung des Geschäftes bei gutem Lohn und dauernder Stellung gesucht. Reisegeld wird auf Wunsch zugesendet [...]*. Prager Abendblatt, 15.3.1911, p. 9, <https://anno.onb.ac.at/cgi-content/annoshow?call=aze|18960825|008|33.0|0> [cited 10.3.2025] .

¹⁴50 chair carpenters are immediately taken on at the first Krakow chair factory and steam carpentry of Karl Otto in Krakow at the Viennese labor prices. Travel money is sent soon after the work books are sent in [...]. Original in German: *50 Sesseltischler werden sofort in der ersten Krakauer Sesselfabrik und Dampftischlerei von Karl Otto in Krakau zu den Wiener Arbeitspreisen aufgenommen. Reisegeld wird bald nach Einsendung der Arbeitsbücher übersendet [...]*. Arbeiter Zeitung, 25.8.1896, p. 8, <https://anno.onb.ac.at/cgi-content/annoshow?call=aze|18960825|008|33.0|0> [cited 10.3.2025].

¹⁵Neue Freie Presse, 3.4.1870, p. 16, <https://anno.onb.ac.at/cgi-content/annoshow?call=nfp|18700403|16|100.0|0> [cited 13.3.2025].

work more than two days a week, there was more uncertainty, since they were often hired based on work demand. If there was no work, they were not paid.

This hiring model reflects a labor market characterized by high flexibility, where employers required immediate availability without long-term commitments, and job seekers needed to supply both savings for traveling and the willingness to relocate quickly for employment opportunities. The prominence of *Reisegeld* in these ads highlights the economic reality of many workers at the time: employment was available, but only to those who could afford the journey to claim it. This also reinforces the previous argument that female employment fell at the time, as their labor mobility was lower.

4.2 Case Study at the Turn of the 20th Century

Given that our sample of manually corrected job ads has the most salary information in the early 1900s, and there is also information about the salary scheme of the k.u.k. civil servants from 1898 onward, we can compare wages for women and men to get an impression whether jobs advertised for women were generally lower-paid compared to those for men at the time.

The most frequent female job announced in our 100-year sample was a position as a cook (*Köchin*). Around 1900 we find several quantitative salary information for female cooks. On average, a cook earned 19 fl. per month. At that time there were also job offers for *Herrschaftsköchin* (estate cooks), which refer to high-ranking female cooks for wealthy bourgeois or aristocratic households. Their salary was higher with 25 - 30 fl. per month, given they probably had higher skill levels and greater responsibilities with larger kitchens. The second most common occupation in our dataset was a *Mädchen für Alles* (general female servant or maid-of-all-work). This was in general a low-paid and very demanding position because the job title literally describes a female domestic worker who handles multiple household tasks. Around 1900 the average salary for a *Mädchen für Alles* was 10 fl. per month and additionally a small amount of money for a supper allowance (*Nachtmahlgeld*). While this extra money seems positive at first, this just highlights that the working and living conditions of these occupations have changed. Before industrialization, domestic servants worked and lived in households and were provided full board as part of the compensation. *Nachtmahlgeld* suggests that instead of a proper meal, they were paid just a small sum and needed to find food on their own, after their long and demanding working hours.

Comparing these female positions and the related salary with male positions, we find substantial discrepancies. The male counterpart to the profession of a *Mädchen*

für Alles was the profession of a *Diener* (servant). Servant positions that were published in newspapers around 1900 received an average salary of 42 fl. per month, which is more than four times the salary of female jobs that we found in newspapers in this field. We also find one job ad for a *Herrschaftsdiener* (estate servant) with a salary of 110 fl. per month. Compared to the salary of a female cook in an upper-class household, this wage is considerably higher. While this finding comes from our manually corrected random sample, it still provides valuable initial insights, indicating important trends. However, it is also possible that higher-skilled and higher-paid maids relied more on personal contacts or other recruitment channels rather than newspaper ads. Nevertheless, our data suggest a substantial difference in the salaries of women and men in the domestic sector.

Data from the most frequent male position, for a *Buchhalter* (accountant), further reinforce the argument of gender segregation on the labor market. Around 1900 an accountant earned an average wage of 85 fl. per month. Again, this is about four times more than the most frequent female position as a cook. Of course, the qualifications and skills were different for accountants compared to cooks, which is a major explanation for the wage difference. However, looking at the job opportunities that newspapers show us to some extent, this suggests that women had most opportunities or were mostly looking for positions in lower skilled and lower paid jobs, like cooks and maids. Men not only had a broader choice of jobs including access to high-paid jobs, but also for the low-skilled positions, men were likely to be paid better than women.

Next, we look at the salary scheme of the k.u.k. civil servants from 1898 (Megner (1985), p. 130). This Habsburg Monarchy's civil service hierarchy classified officials based on their seniority, authority, and salary. There were 11 rank categories, with the highest positions in the 1st rank earning the most and the 11th rank the least. Public employees received an annual salary, and Table 2 summarizes the different pay scales for each level.

The salary scheme reveals significant disparities in earnings across different ranks. The gap between the highest-paid civil servants (earning 12.000 fl.) and the lowest-paid (earning 800 fl.) is striking. It demonstrates the pronounced income inequality within the state-employed workforce. However, women were excluded from higher-ranked positions, and even within the lower ranks, the salary differences were substantial: A 4th rank civil servant could earn up to 7.000 fl., while someone in the 11th rank made as little as 800 fl., almost ten times less. This highlights significant wage differentiation, even among employees working for the same employer, the state.

rank	salary	rank	salary
1.	12.000 fl.	8.	2.200 fl.
2.	10.000 fl.		2.000 fl.
3.	8.000 fl.		1.800 fl.
4.	7.000 fl.	9.	1.600 fl.
5.	6.000 fl.		1.500 fl.
	5.000 fl.		1.400 fl.
6.	4.000 fl.	10.	1.300 fl.
	3.600 fl.		1.200 fl.
	3.200 fl.		1.100 fl.
7.	3.000 fl.	11.	1.000 fl.
	2.700 fl.		900 fl.
	2.400 fl.		800 fl.

Table 2: Salary scheme k.u.k. civil servants 1898

Data source: RGBI. 172/1898

Normally, civil servants entered lower ranks (9.–11.) and gradually advanced through promotions. The higher ranks (1.–3.) were political or legal positions and often required noble status or university degrees. For women it was prohibited by law to hold political or judicial authority, disqualifying them for these positions. The fourth rank were positions for officials with decision-making power in government or judiciary and the fifth higher supervisory roles, including inspectors and court officials. Consequently, women were also excluded from these ranks. The other ranks covered mid-level and lower-level officials handling administrative matters up to the lowest rank, including e.g. messengers, copyists, and office assistants. Women slowly entered mid-level administrative officers and other mid-level positions, such as teaching, in the beginning, often in elementary schools. With the rise of typewriters and telegraphy, mostly women worked in the lowest ranks from the late 19th century onward. But the marriage bars for female civil servants were still in effect.

Comparing the salary information we found in our dataset with this salary scheme, we do not find many salary information that reach the lowest salary of the 11th rank. This means that even the lowest-ranked civil servants earned considerably more than many other workers, particularly women, reinforcing the structural inequalities of the labor market at that time. Aggregating to annual wages, female cooks earn about 230 fl, rising to 300–360 fl. in wealthy bourgeois households, while annual salary for a *Mädchen für Alles* was only about 120 fl. In contrast, the most frequent male position in our dataset, an accountant, earned an annual wage around

1.020 fl., comparable to the salaries of the lowest two k.u.k. civil servant ranks. Around the same time, an elementary school teacher was offered a yearly salary of 500 fl. with 100 fl. in addition to material and boarding in the school.¹⁶ A teaching position for a commercial secondary school (*Handelsschule*) received 1.400 fl. yearly next to 300 fl. allowance for activities (*Aktivitätszulage*).¹⁷ This is already comparable to the salary of the 9th rank.

It seems that job ads from newspapers do not reflect the upper tale of the earning distribution but rather the mid- and lower part. Given this recruitment channel was highly used for and by white-collar and household workers, this is not surprising. We do see job offers in newspapers for higher ranks, like in 1903 for an inspector with "annual salary of 2.400 fl. (4.800 K), free housing and light."¹⁸ However, these positions are rare, as our analysis is based on a random sample.

5 Conclusion

Our analysis of 10.442 job ads from 29 Austrian newspapers provides a unique perspective on the labor market dynamics between 1850 and 1950. Through the lens of newspaper job ads, we analyze gender inequality in job opportunities and in wages.

Our findings suggest that the participation of women in the workforce changed dramatically over the 100-year period. There was a transformation not only of women's employment but also of their societal and family circumstances, affecting the way women could act on labor markets. The transformation started with structural changes resulting from the agricultural and industrial revolution and continued throughout the analyzed period. Some dynamics were created by the women's movements and by education reforms. We exemplify these changes by pointing to the first appearances of jobs for women: Positions for the domestic sector appeared early and throughout our entire dataset. Women's strong presence in agriculture gradually shifted to the emerging industrial sector, especially the textile sector, as seen in the high frequency of various seamstress positions from 1870 onward. The growing importance of clerical and teaching positions is also reflected in our data. However, we show that the transformation was slow and that a large portion of job advertisements for women remained in low-skilled positions. Compared to men,

¹⁶Prager Abendblatt, 16.9.1896, p. 6, <https://anno.onb.ac.at/cgi-content/annoshow?call=pab|18960916|006|33.0|0> [cited 12.3.2025].

¹⁷Wiener Zeitung, 9.2.1901, p. 25, <https://anno.onb.ac.at/cgi-content/annoshow?call=wrz|19010209|025|33.0|0> [cited 12.3.2025].

¹⁸Neues Wiener Tagblatt, 28.3.1903, p. 26, <https://anno.onb.ac.at/cgi-content/annoshow?call=nwg|19030328|026|33.0|0> [cited 10.3.2025].

women had limited access to many jobs, excluding them from a wide range of job opportunities. Men could choose from a much wider variety of jobs. Marriage bars for women further reinforced their lower career advancement possibilities, amplifying gender inequality on the labor market.

The wage levels of jobs are presented in two case studies, suggesting that most positions for women were not only low-skilled but also low-paid. Given that (i) they were excluded by law from the high rank and high paid positions, (ii) education possibilities did not improve till the early 20th century, and (iii) women were seen as "secondary workers" having to leave the labor market due to family responsibilities, women's career advancement and lifetime earnings were limited. There is even a discussion of whether women really had a "career" at that time, as they often spent little time in the labor force (Goldin (2006)).

Our results contribute to discussions on labor market inequality, demonstrating how gendered job ads reinforced occupational segregation and how economic transformations shaped particular employment opportunities for women over time. Future work with a larger dataset of our whole corpus of millions of job ads, will elaborate on this first findings and provide a more comprehensive, quantitative picture. Especially with the extraction and classifications of skills and qualifications, the analysis will give a better understanding of labor market developments and their consequences for inequalities. In our corpus we find discriminating requirements of all kinds: based on age, marital status, nationality or geographical origin, social status, religious opinion or political party affiliation of applicants. Analyzing the type of these requirements, their temporal distribution, or correlation to specific gender or job categories can provide deeper insights into another form of inequality in job opportunities.

Altogether, understanding historical labor markets and their dynamics is not relevant just for the past — it is key to recognizing the forces that continue to shape economic opportunities and inequalities today. Just like the saying 'Considering our history will permit us to design our future', we analyze historical job advertisements and provide not only a deeper understanding of past inequalities but also offer valuable perspectives for addressing persistent labor market inequities in the present and future.

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A Appendix

A.1 Newspapers included in the research corpus

Newspaper	Link to ANNO corpus
Arbeiterwille	https://anno.onb.ac.at/info/awi_info.html
Arbeiter-Zeitung	https://anno.onb.ac.at/info/aze_info.html
Bregenzener Tagblatt/Vorarlberger Tagblatt	https://anno.onb.ac.at/info/btb_info.html
Das Vaterland	https://anno.onb.ac.at/info/vtl_info.html
Deutsches Volksblatt	https://anno.onb.ac.at/info/dvb_info.html
Die Presse	https://anno.onb.ac.at/info/apr_info.html
Freie Stimmen	https://anno.onb.ac.at/info/fst_info.html
Fremden-Blatt	https://anno.onb.ac.at/info/fdb_info.html
Grazer Tagblatt	https://anno.onb.ac.at/info/gtb_info.html
Grazer Volksblatt	https://anno.onb.ac.at/info/gre_info.html
Illustrierte Kronen Zeitung	https://anno.onb.ac.at/info/krz_info.html
Innsbrucker Nachrichten	https://anno.onb.ac.at/info/ibn_info.html
Linzer Tages-Post	https://anno.onb.ac.at/info/tpt_info.html
Linzer Volksblatt	https://anno.onb.ac.at/info/lvb_info.html
Morgen-Post	https://anno.onb.ac.at/info/mop_info.html
Neue Freie Presse	https://anno.onb.ac.at/info/nfp_info.html
Neues Wiener Journal: unparteiisches Tagblatt	https://anno.onb.ac.at/info/nwj_info.html
Neues Wiener Tagblatt (Tagesausgabe)	https://anno.onb.ac.at/info/nwg_info.html
Neuigkeits-Welt-Blatt	https://anno.onb.ac.at/info/nwb_info.html
Pester Lloyd	https://anno.onb.ac.at/info/pel_info.html
Pilsner Tagblatt	https://anno.onb.ac.at/info/pit_info.html
Prager Abendblatt	https://anno.onb.ac.at/info/pab_info.html
Prager Tagblatt	https://anno.onb.ac.at/info/ptb_info.html
Reichspost	https://anno.onb.ac.at/info/rpt_info.html
Salzburger Chronik für Stadt und Land	https://anno.onb.ac.at/info/sch_info.html
Salzburger Volksblatt: die unabhängige Tageszeitung für Stadt und Land Salzburg	https://anno.onb.ac.at/info/svb_info.html
Vorarlberger Landes-Zeitung	https://anno.onb.ac.at/info/vlz_info.html
Vorarlberger Volks-Blatt	https://anno.onb.ac.at/info/vvb_info.html
Wiener Zeitung	https://anno.onb.ac.at/info/wrz_info.html