DISCUSSION PAPER SERIES

The Times Have Changed: Tracking the Evolution of Gender Norms over Time

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ABSTRACT

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Data on job advertisements from 1950 up to 2020 reveal that there was a significant change among Swiss employers' stated preferences regarding their prospective employees' gender. More specifically, the proportion of gender-neutral job posts increased from 5 to almost 95 percent within the observation period. To further corroborate and contextualize this finding, I complement it with time series on the relative frequency of several specific queries, such as equality between men and women, from Google's German language book corpus. These additional series are broadly consistent with the evolution of the share of gender-neutral job posts. However, it also appears that there are two distinct narratives, one concerned with the personal sphere, identity and intimate relationships, the other with the political and public realm. Interestingly, the narrative on personal relations set off considerably earlier than the change in the proportion of gender-neutral job ads. Overall, the evidence from the different data series shows that gender norms have changed substantively, yet in a complex manner, over the past decades.

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1   Introduction

"The past is a foreign country; they do things differently there."
(L.P. Hartley, quoted in Weinberg, 2015)

Without any doubt, one of the most remarkable changes observed in recent decades has been the large-scale entry of women into the paid labor market (e.g. Costa, 2000; Goldin, 2006; Goldin and Mitchell, 2017) and into the higher educational system (e.g. Goldin *et al.*, 2006). The same broad pattern is observed in many different countries, though obviously with differences in the timing of events. The Swiss labor market provides an interesting case in point. The participation rate among women of working age, i.e. women aged 15 to 64, in the Swiss labor market equaled 76,3% in the year 2019 (BFS, 2020), one of the highest rates among OECD member countries. Moreover, young women in the most recent cohorts, i.e. women aged 25 to 34 in the year 2019, are by now even slightly more likely to have obtained a tertiary-level degree than men of the same age. Specifically, among females (males) in this age group, 54.7% (50.8%) have a tertiary-level degree, and 42.7% (36.1%) have a university-level degree (BFS, 2016).[1] Non-negligible differences in mean wages remain between men and women, both unconditional and conditional on control variables, but these have also decreased considerably over time (BFS, 2021a; Comp-On, 2021). In addition to a large and persistent difference in working hours (BFS, 2020), occupational choices are perhaps the one domain where the largest differences between men and women remain (Aepli *et al.*, 2019; Buser *et al.*, 2017; Kuhn and Wolter, 2022a,b), but empirical studies show the occupational gender segregation in the Swiss labor market has also decreased significantly over the past couple of decades (Deutsch *et al.*, 1994; Flückiger and Silber, 2012).

With regard to these remaining differences in labor-market outcomes between men and women, it is often argued – both by academics and the media – that prevailing gender norms, i.e. the societal prescriptions describing the proper role of women and men in the labor market and in society more generally, are holding women back in their further advancement.[2] Such

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[1] The most recent statistics on gender equality in the Swiss labor market are available from the following website of the Swiss Federal Statistical Office (FSO): https://www.bfs.admin.ch/bfs/en/home/statistics/economic-social-situation-population/gender-equality.gnpdetail.2020-0202.html

[2] This appears to align with the current self-perception among a majority of women in Switzerland who state that they perceive themselves to be disadvantaged compared to men in the labor market and beyond (Sotomo, 2021).

a position seems to assume, at least implicitly, that societal norms concerning women's place in the world of work and the pervasiveness of (negative) gender stereotypes have not changed that much after all over the past couple of decades (because, if they had, it would be much less obvious why they should play such an important role in explaining today's remaining gender differences).[3] For example, these norms are often evoked, either explicitly or implicitly, to explain the residual difference in wages between men and women (i.e. the difference in mean wages that remains after controlling for observable wage determinants such as education or labor market experience). However, the data used for these analyses are usually far from exhaustive, in the sense that they almost always lack various potentially important predictors of individual wages. Thus residual differences in wages may also or instead be due to unobservable factors other than gender norms, such as gender differences in economic preferences (e.g. Croson and Gneezy, 2009; Falk and Hermle, 2018), psychological traits (e.g. Archer, 2019; Kaiser *et al.*, 2020), or work-lifestyle choices (e.g. Hakim, 2000).

Another potential objection to the argument that the remaining gender differences in labor-market outcomes are to a large part due to persistent gender norms is that several recent empirical papers have shown that economic or demographic shocks may set off changes in attitudes and cultural norms (see, for example, Chabé-Ferret, 2019; Schmitz and Weinhardt, 2019; Teso, 2019). Given this evidence on how cultural norms interact with, and are partially driven by the evolution of demographic and economic fundamentals, it appears a priori rather unlikely that gender norms did not change as well in the wake of the profound changes in the economic, technological, and societal spheres over the past couple of decades.[4] A similar issue with using prevailing gender norms as the primary explanation for residual gender differences also shows up, in an even more direct way, in the large differences in the catch-up speed of women across different measures of labor-market performance. For example, in Switzerland,

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[3]To be clear, empirical evidence does show that negative prejudices are relevant in specific contexts (e.g. Alan *et al.*, 2018; Arceo-Gomez and Campos-Vazquez, 2019; Hoffmann and Oreopoulos, 2009). However, these studies typically report (very) small effect sizes and low predictive power, strongly suggesting that other factors are relevant for explaining the remaining differences in economic outcomes. This may be especially true in contexts involving women's deliberate decisions, such as occupational choices (e.g. Kuhn and Wolter, 2022b).

[4]For example, access to oral contraceptives became widespread in the late 1960s and early 1970s, and this presumably had a large effect on female labor market participation by giving women much more control over their own fertility than they ever had before (Ananat and Hungerman, 2012; Bailey, 2006; Goldin and Katz, 2002; Hakim, 2000). Another example are labor-saving household appliances such as washing machines, which also only became affordable for many households in the second half of the 20th century (Greenwood *et al.*, 2005).

as in many other countries, there was a fast and large increase in the proportion of female university level students in the second half of the 20th century while, at the same time, the level of gender segregation in choices in fields of study fell only slowly and remains relatively pronounced to this date.

Of course, the most direct approach to tackle the question about the past and current relevance of gender norms and stereotypes would be to track how gender norms have actually evolved over time. However, the direct evaluation of changes in societal gender norms is difficult from an empirical point of view because the concepts of gender norms and gender stereotypes are hard to measure. They remain, by their very nature, elusive to some extent, especially when looking farther back in time. In other words, it is difficult to find or to compile consistent time series for latent constructs such as gender norms.[5] Not surprisingly, there is relatively little solid empirical evidence on this specific issue, especially concerning the longer-run perspective. Moreover, given the absence of any obvious direct measure of societal gender norms, most of the available studies on the topic rely on survey data, which are often subject to various biases due to their hypothetical nature; in addition, these surveys are often gathered from different sources, further complicating the analysis (see Davis and Greenstein, 2009, for an overview of different survey measures).[6] That being said, however, it nonetheless turns out that the available empirical evidence quite consistently supports the view that these norms have changed over time. Indeed, most of the studies that do report patterns over time quite consistently point to changes towards more liberal and more equal gender roles (e.g. Eagly *et al.*, 2019; Fortin, 2005; Inglehart, 2008; Scarborough *et al.*, 2019; Seguino, 2007). Coincidentally, some of the most compelling descriptive evidence on the subject comes from a study on partnership advertisements (i.e. advertisements placed in the search of a potential marriage partner; a sort of an analogous precursor to the dating apps available today) from the two largest Swiss-German

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[5]Several empirical studies for Switzerland have used voting results on gender-related policy issues to measure regional variation in the prevailing gender norms (e.g. Janssen *et al.*, 2016; Kuhn and Wolter, 2022a; Lalive and Stutzer, 2010). However, note that the subject of each plebiscite is unique – which makes this measure impractical for the study of changes in attitudes over time (i.e. it is unclear how one can disentangle temporal changes in approval rates from changes due to differences in the subject of the plebiscite).

[6]However, several recent papers illustrate how scraping digital data sources can be helpful in measuring latent concepts such as gender norms or gender stereotypes (e.g. Arceo-Gomez and Campos-Vazquez, 2019; Ash *et al.*, 2022; Owen and Wei, 2021). An important downside of most these new data sources is the fact that they usually do not reach far back in time (for an important exception, see section 2 below).

newspapers for the years 1900 to 1992 (Buchmann and Eisner, 1997).[7] This study shows that there was a substantial shift in the way individuals describe both themselves as well as their prospective marriage partners. Specifically, there was a shift from a predominantly utilitarian description (i.e. descriptions such as "industrious", "sincere" or "of good character") to a more expressive and individualistic description (for example, describing oneself or the prospective partner as "tolerant", "joyful" or "independent"). Interestingly, the study also finds that women as well as high-income individuals started shifting earlier from a utilitarian to an expressive description than men and medium-income individuals did, which may give us a hint towards the causal factors driving the change that shows up in the partner ads. A more general trend towards individualism is also found for other countries and using alternative data sources (e.g. Inglehart, 2008; Twenge *et al.*, 2013; Younes and Reips, 2018; Zeng and Greenfield, 2015). Thus, overall, the existing empirical evidence suggests that societal gender roles, as well as expectations of the role of the individual within the larger society, have changed considerably over time and at least since the end of the Second World War, but the change almost certainly started already earlier than that.

In this paper, I will add further evidence on the evolution of gender norms in Switzerland using two independent sources of data. In the first part of the empirical analysis, I use data on actual job advertisements from the Swiss Job Market Monitor in which employers may, or may not, express a preference regarding the gender of the prospective job applicant. Within the observation period from 1950 to 2020, there is a large and swift change in the proportion of gender-neutral job posts from only a few percentage points of gender-neutral job ads in the 1950s to about 95 percent in the most recent year, with no sign of reversal in this trend. To corroborate and contextualize this finding, I also look at several additional series extracted from Google's 2019 publicly accessible German book corpus. These additional data series on the relative frequency of various search terms, such as "discrimination of women", suggest that not only employers' stated gender preferences have substantially changed, but also the wider public narratives about the role of women (as well as men) in society and in the labor market. The data from the two different sources are broadly consistent with each other, in that they

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[7]The two newspapers still exist today (*"Tagesanzeiger"* and *"Neue Zürcher Zeitung"*). The two newspapers presumably still differ in their audiences, but that difference was certainly much more obvious in the last century, with the *"Neue Zürcher Zeitung"* targeting both the more conservative and wealthier readers.

both point to a substantive change in cultural norms, and together they indicate that there has been a massive and relatively swift change in attitudes towards women among both employers and the general population. Moreover, the data also reveal that there are marked differences in the timing of the onset of the various sub-narratives, suggesting that there has been a multi-stage shift in societal attitudes towards women, reflecting that these changes first took place in the private realm before spilling over into the broader society and into the labor market. Consistent with evidence from an earlier empirical study on the subject (Buchmann and Eisner, 1997), I find that the onset of this broader cultural change happened before the 1960s. Taken together, the evidence presented in this paper is inconsistent with the assumption that there has been no or only minor changes in gender norms in the past several decades – a fact that should be taken into account when referring to gender norms as an explanation for residual gender differences in labor market outcomes such as wages or occupational choices.

The remainder of this paper is organized as follows. In section 2, I discuss the two main data sources, along with the key variables extracted from each data source. The empirical analysis is presented and discussed in section 3, which focuses on the change in the proportion of gender-neutral job posts, as well as section 4, which presents additional evidence on the evolution of public narratives about the role of women. Section 5 concludes.

2 Data and key variables

For the empirical analysis, I use data from two independent and distinct data sources. Both data sources provide the opportunity to construct consistent time series of variables that, arguably, reflect changes in the underlying latent attitudes towards the role of women.

2.1 The Swiss Job Market Monitor

The first and primary data source is the Swiss Job Market Monitor (*"Stellenmarktmonitor Schweiz"*), referred to as SJMM below (Buchmann *et al.*, 2020, 2022).[8] The SJMM is an ongoing longitudinal survey consisting of annual samples of job advertisements taken from newspapers,

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[8]See the project's website (www.stellenmarktmonitor.uzh.ch) for additional details. The data are accessible for research purposes via FORS, the Swiss Centre of Expertise in the Social Sciences (https://forscenter.ch/).

online job portals, and employers' websites. The SJMM runs from 1950 to present; the most recent data available are from the year 2020. The main purpose of the SJMM is to track changes in Swiss employers' labor demand over time (e.g. Buchs *et al.*, 2015).

Among many other things, the data contain a variable which indicates whether a particular job post mentioned a preferred gender of the prospective job applicant (i.e. either male or female) or not. For the empirical analysis, I simply construct a binary indicator variable for each job post in the data, indicating that the post did not explicitly mention either gender – in which case the job post is marked as gender-neutral. I then aggregate this indicator variable by year, which corresponds to the proportion of gender-neutral job posts in year t, and which is denoted by n_t in what follows. This is the variable of main interest in the first part of empirical analysis presented below.

The implicit assumption in using this measure as the main target of my empirical analysis is, of course, that employers not only signal their adherence to prevailing societal expectations, but that changes in how job posts are formulated also reflect real changes in employers' actual hiring decisions. There is no possibility to test this assumption directly with the data at hand, but I will come back to this issue in the concluding section, where I will discuss corroborating evidence from other empirical studies that appears to be consistent with this assumption.

2.2 Google's digitized book corpus

To complement and validate the series extracted from the above data source, I also use data from Google's N-gram viewer.[9] The viewer is set up as a website which allows the extraction of the relative frequency of specified strings or any sequence of strings (i.e. n-grams) in a large corpus of digitized books in different languages and in principle as long back as 1500 (Aiden and Michel, 2014; Michel *et al.*, 2011).[10] In practice, the number of books in the corpus is much lower in the years before 1800, and thus empirical analyses based on these data are

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[9]The viewer is accessible at https://books.google.com/ngrams.

[10]To be precise, a n-gram is a series of n alphanumeric sequences of any length, delimited by white space (i.e. a sequence of numbers, or the combination of words and numbers, also classifies as n-grams; "the year 2018" is an example of a 3-gram). The N-gram viewer provides the relative frequency of a given n-gram among all n-grams of the same length in a given year of publication. See Michel *et al.* (2011) for additional details and examples.

often restricted to the period running from 1800 to 2019.[11] With relatively minor effort, these data can provide unique insights into long-run cultural and social change, such as the rise of individualistic values over time (Greenfield, 2013; Younes and Reips, 2018), an increase in causal language over time (Iliev and Axelrod, 2016), the rise of emotions relative to reasoning in language (Scheffer *et al.*, 2021), or the relative disappearance of individual virtue from the public discourse (Kesebir and Kesebir, 2012).[12]

At the same time, however, there are also potential problems to keep in mind when using data from this source. For example, there are issues with the representativeness of the corpus (Pechenick *et al.*, 2015) as well as the fact that the population of books is unknown to researchers, which in turn is due to legal considerations, or with potential time lags between changes in the real world and their appearance in the book corpus (Bentley *et al.*, 2014).[13] Moreover, as Pechenick *et al.* (2015) argue, the relative usage of terms in the book corpus does not necessarily coincide with differences in the actual usage of the terms because it does not take into account how popular a given book is (i.e. how often a given book is read). More generally, one may question the degree to which trends in the Google book corpus represent broader cultural change (Pettit, 2016). Keeping these objections in mind, I would nonetheless argue, along with other researchers, that these data can provide useful quantitative insights into long-term cultural change.

For the purpose of the analysis presented below, I extracted the time series associated with the following five, thematically interwoven queries (i.e. n-grams) from the 2019 German book corpus: (i) "equality between men and women", (ii) "discrimination of women", (iii) "feminism", (iv) "sexuality", and (v) "partnership".[14] As the extracted series will show, all

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[11]This shows up as an often much more disheveled time pattern for a given search term before 1800 than afterwards. Perhaps because of this, the default time period is also set to 1800 to 2019 in the N-gram viewer.

[12]See also Owen and Wei (2021), who use similar data from Google Trends to measure gender stereotypes. These data allow for a more disaggregated analysis at the regional level, but they do not reach as far back in time as the data from the Google's N-gram viewer.

[13]However, this does not appear to be a general problem with the (German) book corpus. I tried to check this by searching for some specific keywords associated with a known and very precise timing of events. For the chosen keywords, e.g. "Mauerfall" (i.e. the fall of the Berlin wall), I find that the temporal patterns in the frequency of the search terms align well with the real evolution of events (see appendix figure A.1). This suggests that the potential time lag may partially reflect how a given narrative evolves over time. Thus, intuitively, it appears that some narratives catch on immediately, while others evolve or persist more slowly over time.

[14]More precisely, I searched for the following German search terms: (i) *"Gleichstellung von Mann und Frau / Gleichstellung von Frau und Mann / Gleichstellung von Männern und Frauen / Gleichstellung von Frauen und Männern / Gleichstellung der Frau / Gleichstellung der Frauen / Gleichstellung der Geschlechter"*; (ii)

five search terms show a broadly similar evolution over time – with an interesting twist in terms of the timing in the onset of the corresponding sub-narratives (this topic is discussed in more detail below; see section 4). Moreover, to better contextualize the evolution of these sub-narratives, I also extracted the relative frequencies for "househusband", "homosexuality" and "marriage". Looking at the evolution "househusband" in the book corpus may shed some light on whether there was also a discussion about the role of men; the evolution of "homosexuality" may indicate whether the change under way was more encompassing than the above keywords may imply, while a search for "marriage" is expected to yield a pattern that should be different from the other keywords (given that the religious and legal institution of marriage has been in place for centuries). A final ancillary search which I performed is for the level of "woman" and ratio of "man" to "woman". The evolution in the ratio of the two terms is again potentially informative about changing gender roles, while a change in the level could be indicative about the prevalence of the discussion.

These keywords also highlight some of the more obvious conceptual and practical issues that pop up when using data from Google's book corpuses (beyond the more fundamental issues already mentioned above; see also Younes and Reips, 2019). First, one has to consider the possible existence of alternative formulations that describe essentially the same keyword (e.g. in the case of "equality between men and women", there are several slightly alternative, yet equivalent formulations in the German language; cf. footnote 14) so as not to confuse linguistic evolution or semantic twists with cultural change (Michel *et al.*, 2011; Pettit, 2016). Consequently, the omission of one or several alternative paraphrases for essentially the same substantive term or circumstance risks the mismeasurement of the evolution in the frequency with which a specific term is used. Second, even quite specific search queries may have different meanings, depending on the broader context in which they are used. For example, *"Partnerschaft"* ("partnership" in German) is a word usually used in the context of personal and intimate relationships, describing a mutual relationship on about equal terms. However, the same term may also be used in the political realm, for example, to describe an alliance between different countries, parties, or associations in a more strategic and political sense. This implies

"Diskriminierung von Frauen / Diskriminierung der Frauen", and (iii) *"Feminismus"*, (iv) *"Sexualität"*, and (v) *"Partnerschaft"*.

that changes over time in specific search terms could also reflect a change in the usage of a term not directly relevant for the question at hand, at least if a term can have a different connotation in alternative contexts. Because of these potential ambiguities in the formulation of the search terms themselves, I decided to extract data series for several related search terms (reassuringly, as the analysis will show, the various series appear to be broadly consistent with each other). For the same reason, I try not to focus on the specifics of any single series; rather, I will try to extract features which are apparent across different search terms.

2.3   Comparability issues

Two main issues must be taken into account when comparing data from these two sources, however. A first issue with the additional data from Google's book corpus is that they are not directly comparable to the data from the SJMM because they use a different metric. Specifically, note that the data from the SJMM provide information about the absolute level of gender-neutral job posts, while the data series extracted from Google's N-gram viewer reflect the intensity of the usage of a given term in a given year, relative to the use of other search terms in the same year. That is, unlike the data from the SJMM, these data are not directly informative about the absolute prevalence of certain attitudes in the broader population. Nonetheless, the timing evident from the different series can be compared across the two different data sources. Moreover, under the assumption that the different narratives as well as employers' attitudes are driven by a common yet latent meta-narrative, one would expect that the peak in the series of a given search term, if there is any, should broadly coincide with the period with the largest change in the proportion of gender-neutral job posts (e.g. Shiller, 2020).

The second and probably more important comparability issue is that the two data sources are drawn from different geographical regions. The data from the SJMM are drawn from the population of job posts by employers located in Switzerland, which not only hosts a majority of German-speaking regions but also includes regions where German is not the dominant language. In contrast, the German book corpus is understood to represent books written in German which were published in a given year. This of course means that the corpus covers books written by Swiss authors, but also by Austrian and presumably predominantly by German authors.

3 The proportion of gender-neutral job posts over time

Turning to the empirical analysis, I will first focus on the evolution of the proportion of gender-neutral job posts in the SJMM. To start with, figure 1 shows the evolution of n_t over the full observation period, from 1950 to 2020. The figure immediately shows that there was a remarkably fast, monotonous, and significant change in employer's stated preferences over a prospective job applicant's gender, from a large majority of job posts with an explicit preference for either female or male applicants to an overwhelming majority of gender-neutral job advertisements.

Figure 1

More precisely, the percentage proportion of gender-neutral job posts was very low in the 1950s, at about 3.7 percent on average, meaning that a majority of job posts stated a preferred gender of the potential job applicant. It appears to have increased steadily over the 1960s and 1970s, but it remained at relatively low levels over these two decades. Then, in the mid-1980s, the proportion of gender-neutral job posts appears to have increased more rapidly, as evident from table 1 as well as from figure 1 (see also section 4 below for a more formal approach to this question).

Table 1

The process further accelerated in the 1990s, and the increase in n_t remained high until the end of the observation period in 2020. In that last year, the proportion of gender-neutral job posts equaled about 95 percent, corresponding to an 19-fold increase from its starting value in 1950 (5 percent). In the more recent years, the increase in the proportion of gender-neutral job posts appeared to have slowed down again, but this mainly reflects the fact that a large majority of job posts had already switched to being gender neutral. In more substantive terms, the evolution of n_t suggests an almost complete reversal in employers' attitudes within the course of about thirty to forty years only (i.e. about one to two generations). Moreover, it is also evident that the evolution of n_t shows no sign of reversibility up until now (see also figure 2 below). The final feature worth noting is the comparatively late onset in the longer-run evolution towards more gender-neutral job posts, evidently starting in the late 1980s to the

early 1990s only (more on this below, see section 4). This is also the feature of the observed evolution of n_t which urges for a comparison with additional series on alternative variables (also discussed in section 4).

3.1 Modelling the evolution of the proportion of gender-neutral job posts

The other obvious characteristic evident from figure 1 is the regular, S-shaped form of the evolution of n_t over time, suggesting that the shift to gender-neutral job ads has spread through a process of social contagion (e.g. Shiller, 2017, 2020).[15] That is, once some employers have started to switch to gender-neutral job posts, more employers follow suit, and so on. In a next step, I therefore estimate the four parameters that describe the following logistic function, using nonlinear least squares (e.g. Wooldridge, 2010):

$$n_t = \beta_0 + \frac{\beta_1}{(1 + \exp(-\beta_2 \times (t - \beta_3)))}, \tag{1}$$

with n_t denoting the percentage proportion of gender-neutral job posts in a given year t. β_0 to β_3 are the four parameters to be estimated from the data. Equation (1) essentially fits a logistic (i.e. symmetric sigmoid) function to the observed time series of n_t.[16] This lets me evaluate how well such a function can fit the observed data.

Table 2

Point estimates and associated standard errors of the four parameters are given in table 2. To start with, $\widehat{\beta_0} = 4.693$ and $(\widehat{\beta_0} + \widehat{\beta_1}) = 4.693 + 94.962 = 99.655$ correspond, respectively, to the left- and right-hand asymptote of the estimated logistic function. These estimates thus predict that only a tiny proportion of gendered job posts will remain in the longer-run

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[15]Pan (2015) finds similarly shaped patterns in her study of the evolution of the share of female workers in specific occupations over time in the US labor market, arguing that it may reflect kind of a tipping behavior (i.e. that male workers start to withdraw from an occupation at an increased rate once the share of female workers has crossed a certain tipping point).

[16]I also estimated an asymmetric sigmoid function (i.e. a Gompertz function), which yielded a slightly lower model fit than the logistic function yet virtually identical predictions for the observation period. Moreover, it yielded implausible forecasts for the years until 2040. I therefore only show results for the simpler logistic function.

future. Next, parameter $\widehat{\beta}_3 = 2001.357$ gives us the midpoint of the estimated sigmoid (i.e. $\widehat{\beta}_3$ corresponds to the inflection point; that is, the year in which the incremental increase in n_t has been the largest), and $\widehat{\beta}_2 = 0.123$ describes the steepness of the fitted function (note that, ceteris-paribus, a larger absolute value of parameter β_2 implies a steeper function). Quite remarkably, the proportion of gender-neutral job posts increased by about 31 percentage points between 1996 and 2006 (i.e. the ten years around the estimated inflection point in the year 2001) alone. The estimated sigmoid fits the observed data series almost perfectly, as indicated by the associated R-squared of 0.994.

Figure 2

Figure 2 shows the fitted logistic function, along with the observed values of n_t, for the full observation period, and it further extends the fitted function somewhat into the future, until the year 2040. The figure illustrates the good fit of the estimated function when compared with the observed data series, and it further shows that n_t is expected to rapidly approach its estimated upper limit (for example, $\widehat{n}_{2030} = 96.96$ and $\widehat{n}_{2040} = 98.86$).

3.2   Differences between the two main language regions

However, as mentioned in section 2, there is a potential problem when focusing on the aggregate trend in n_t over time because Switzerland hosts significant minorities who speak another language than (Swiss-)German as their mother language.[17] This could be especially relevant later on, when comparing the evolution in the proportion of gender-neutral job posts with the time path of search terms taken from Google's German book corpus, given that several empirical studies have shown that differences exist between the language regions in both work-related behavior and educational decisions (Aepli *et al.*, 2021; Eugster *et al.*, 2017; Kuhn *et al.*, 2022). That is, one could argue that the observed evolution of n_t may be driven, at least partially, by potentially different time trends in this variable in the different language regions. The data

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[17]There are four official languages in Switzerland: (Swiss-)German (62.1%), French (22.8%), Italian (8.0%), and Rhaeto-Romansh (0.5%). The numbers in parentheses give the percentage shares of individuals stating that the language is (one of) their main language as of the year 2019 (the numbers do not add up to 100% because many individuals use another language (22.7%) and because the respondents could name more than one language as their main languages, e.g. second-generation immigrants). See BFS (2021b) for additional details.

from the SJMM allow a distinction by language region, and I can thus check whether or not there is a difference in the time trend of n_t across the two main language regions.

Figure 3

Reassuringly, figure 3 shows that the time path of n_t is essentially the same for the two main language regions, i.e. job ads from firms located in the German speaking part of the country versus firms located in the non-German speaking regions. With regard to the onset of the change in the proportion of gender-neutral job posts, a large difference in the evolution of n_t does not appear to exist over time (if anything, it appears that the proportion of gender-neutral job posts started to increase slightly earlier in the German-speaking regions). At the same time, the proportion of gender-neutral job posts in the 1950s and 1960s appears to be slightly higher in the Romansh-speaking regions. The close similarity between the two language regions is confirmed by estimating the parameters of the logistic function describing the time path of n_t separately for the two language regions (cf. appendix table A.1). Apparently, this yields very similar estimates for the two language regions, suggesting that differences between the language regions play no major role for the present analysis.

4 Additional evidence on public narratives about the role of women

In the second part of the empirical analysis, I will focus on complementary time series describing the relative frequencies of specific keywords from Google's 2019 German book corpus.[18] These additional data allow me to infer whether the observed change in the proportion of gender-neutral job posts was accompanied or preceded by (or possibly unrelated to) public narratives about the role of women in both the private sphere and in the labor market (on the relevance of narratives, see Shiller, 2017, 2020). Indeed, this additional evidence suggests that the evolution of gender-neutral job posts is accompanied, and partially preceded, by public narratives about

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[18]There is also a potential issue concerning the usage of the German book corpus because the corpus covers books written in German, which obviously will, for the larger part, cover books written by German or Austrian rather than by Swiss authors. Again, however, the evidence from the study by Buchmann and Eisner (1997), which explicitly only refers to the German-speaking part of Switzerland, suggests a very similar timing of events.

the role of women in the labor market as well as about the terms of a personal and intimate relationship (see Michel *et al.*, 2011; Twenge *et al.*, 2012, on similar topics using the same data source). Moreover, these data allow me to look much further back in time than it is possible with the data from the SJMM.

<p style="text-align:center">Figure 4</p>

Specifically, figure 4 plots the relative frequency of "equality between men and women" in panel (b), "discrimination of women" in panel (c), "feminism" in panel (d), "sexuality" in panel (e), and "partnership" in panel (f). For easier comparison across the with series from the SJMM, panel (a) replicates the evolution of n_t over time. Moreover, in all six panels of figure 4, the shaded area marks the years 1996 to 2006, the ten years around the estimated inflection point concerning the evolution of n_t in the year 2001 (cf. table 2). As argued above, if there is a common underlying meta-narrative, one may expect that there is a broad consistency in the timing across the different series at least in the timing of the corresponding peak, but perhaps also in the onset of the different sub-narratives.

Note that, for each of the selected search terms plotted in figure 4, the relative frequency shows an approximate bell-shaped pattern with a more or less unique peak in the relative frequency, suggesting that the corresponding sub-narrative starts to spread at a slow pace, but then appears to pick up speed, peaks, and then fades away (also note that some search terms are much more frequent than others; specifically, "sexuality" and "partnership" are much more frequent than the other three search terms).[19] Even more remarkably, the peak of each of the series happens to be observed in or very close to the period around the estimated inflection point regarding the evolution of n_t, i.e. the year 2001 according to the estimates from table 2, suggesting to some extent that they might all reflect a common and broad cultural shift with a common peak close to the turn of the century, somewhere near the period between 1996 and 2006.[20]

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[19]This is more easily evident from figure 6, which shows some of the search terms in the same figure and over an extended period of time, running from 1850 until 2019.

[20]Not surprisingly, this broader change also included discussions about the role of men (see panel (a) in appendix figure A.2 for the evolution of the term "househusband" (*"Hausmann"*) over time. As for the other sub-narratives shown in figure 4, there is a unique peak close to the period from 1996 to 2006. Interestingly, however, it appears that the onset for this keyword happened before 1950.

<p style="text-align:center">14</p>

It is also worth pointing out at this point that the evolution of other related search terms show very different patterns, further corroborating the evidence from figure 4. One closely related search term where one would expect a different evolution over time is the institution of "marriage (*"Ehe"* in German), which has roots in the middle ages (e.g. Henrich, 2020; Schulz *et al.*, 2019). Indeed, the evolution of the term in Google's German book corpus shows a widely different path, both in terms of the overall shape as well as regarding the average frequency over the observation period (see panel (b) in appendix figure A.2). First, it is notable that the frequency associated with the term "marriage" is about three times higher than even the most frequent keyword from figure 4 at its peak value. Second, there is no (global) peak in or close to the period around the year 2001, unlike for the keywords from figure 4 above, consistent with the fact that the institution of the marriage has been in place for centuries.

4.1   Determining the onset of the various sub-narratives

Another, and perhaps even more interesting feature evident from figure 4 is that there is obvious variation in the timing of the onset of the different sub-narratives. More specifically, the figures suggest that there are presumably two, or maybe even three, distinct (though obviously also overlapping) narratives, one more focused on partnership and intimacy in personal relationships (which could also reflect two distinct narratives) and a second, more politically-oriented narrative oriented towards equality between men and women in legal relations as well as in the labor market (e.g. discrimination). In fact, the temporal sequence of these two or three sub-narratives, respectively, with the narrative on sexuality and partnership leading the discourse over the public sub-narrative, which is concerned with issues such as wage discrimination, appears quite reasonable, in hindsight, because questions such as the gender wage gap or discrimination of women in the labor market can arguably only become the subject of a broader public narrative once a sufficient number of women has decided to (more or less) permanently enter the paid labor market.

To explore this issue more formally, I have estimated a single, unknown break-point for each of the series shown in figure 4 (e.g. Andrews, 1993; Bai, 1997).[21] That is, for each search

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[21]Because I am interested in the onset of the different sub-narratives, I restrict the observation period to the period until the peak year of the corresponding series. For example, in the case of "feminism", the relative frequency peaks in the year 1995, and I thus right-censor the period used to estimate the break-point for this

term shown in figure 4, as well as for the proportion of gender-neutral job posts, I estimate the following linear regressions:

$$y_t = \alpha_0 + \alpha_1 \mathbf{1}(t \geq t^\star) + \beta_0 t + \beta_1 (t \times \mathbf{1}(t \geq t^\star)) + \epsilon_t, \tag{2}$$

with y_t the outcome of interest and with t denoting calendar time. The procedure searches for that breakpoint $t^\star$ which yields the highest Wald statistic associated with testing the null hypothesis that $\alpha_1 = \beta_1 = 0$. Because the series in panels (e) and (f) have no obvious onset within the period 1950 to 2019 as judged by the graphical evidence, I extracted somewhat longer time series for these two search terms, as well as for "feminism" for the sake of comparison, for which there appears to be a unique breakpoint within this period, for the years 1900 to 2019 (see also figure 6 below, which plots the evolution of these three terms in the same figure and over an even more extended period of time). Moreover, the table shows two break points for the series on "sexuality" because the longer-run series on this search term shows that there are two consecutive and clearly distinguishable peaks.

Table 3

The results are shown in table 3, and they are consistent with the visual impression from figure 4. Specifically, it indeed appears that there are two, or maybe even three, distinct sub-narratives in terms of their first onset. The first sub-narrative, concerning the more private realm (i.e. sexuality and partnership), definitely begins after the end of the Second World War.[22] Interestingly, the onset of this sub-narrative is further corroborated by the findings of an earlier empirical study by Buchmann and Eisner (1997) on changes in individuals' descriptions of both themselves and their prospective (marriage) partners in national newspapers, already mentioned in the introduction. This study also finds a massive and relatively rapid change in how individuals describe both themselves and their prospective partners, with a large change from a more utilitarian to a more expressive and individualistic description. While Buchmann

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specific series at 1995.

[22]However, figure 6, discussed in more detail in section 4.3 below, makes it clear that there was already an earlier peak in this narrative in the mid-1920s, which fits with the observation that the international movement pushing women's rights. Consistent with this, there were a large number of attempts to implement women's right to vote and to be elected to political office at the cantonal level beginning in 1919. For the case of Switzerland, see the detailed account in Seitz (2020).

and Eisner (1997) do not directly date the onset of the change in their series, the graphical illustrations in their paper (cf. figure 3 in Buchmann and Eisner, 1997) suggests that the change towards a more expressive and individualistic perspective on personal relationships started in the late 1940s at the latest; but one could also argue that the change started already at around the early 1920s, which is in fact line with the estimates from table 3 concerning the sub-narrative on "sexuality", where there is a first peak at around the same time. In contrast, a second sub-narrative, dealing with the more political dimension such as the discrimination of women in the labor market, kicked-off only about a generation later, somewhere around the mid- to late-1970s (again according to the break-point estimates from table 3). This may reflect the fact that topics such as the potential discrimination of women in the labor market could only become topics of public discussion once a sufficient number of women had more or less permanently entered the labor market and could in fact compare their own performance (e.g. wages or professional position) with those of their male co-workers.

Interestingly, the estimated onset in the change in the proportion of gender-neutral job posts only started after another ten years had gone by, at around the mid-1980s. This suggests that the change in employers' stated attitudes towards the gender of their prospective workers may initially have been kicked-off by changes in self-identity, a change which was arguably already complete by the time the proportion of gender-neutral job posts began to increase, if judged by the evidence provided by Buchmann and Eisner (1997). The timing of events evident from the different series suggests that legal changes may also have contributed to the observed change in the proportion of gender-neutral job posts. Specifically, there was an important legal change at the national level which took effect in the year 1996, i.e. the legal equality between men and women was explicitly written into national legislation within the framework of the gender equality act ("Gleichstellungsgesetz"). However, another look at figure 4 suggests that the change in the proportion of gender-neutral job posts had already begun several years before that point in time. Thus an alternative, and perhaps more plausible, storyline in this context is that the legislation mainly reflects and codifies the societal change, rather than being the causal factor that initiated the change.

4.2 Making the change visible: Public posters used in the run-up to plebiscites demanding women's right to vote

The magnitude of the change underlying these data series can be further illustrated by showing some of the public posters used in the run-up to various cantonal- or national-level plebiscites that eventually led to the introduction of women's right to vote at the national level in the year 1971; see Seitz (2020) for a detailed account and timeline of the political process involved.[23] Indeed, there were many earlier attempts to introduce women's suffrage in Switzerland at both the national and the cantonal levels, closely paralleling the evolution in other countries, such as in the United States or several European countries (and in fact also in line with the timing suggested by the time path of search terms shown in figure 4, especially the one related to "sexuality"). For example, there were several attempts in several cantons to introduce women's right to vote and to be elected to political office, the first one in the French-speaking canton of Neuchâtel in the year 1919 (Seitz, 2020, p. 244–247). Because political demands for a change in voting and electoral eligibility would necessitate a change in the corresponding cantonal constitution, this also meant that they would have to pass a plebiscite at the cantonal level. In the run-up to these votes, both supporters and opponents of the proposal would often use, among other things, public posters to convince the (male) electorate of their cause.

Figure 5

Figure 5 shows two specific examples of such posters, and these two posters illustrate two topics that also pop up in other such posters. The poster shown on the left-hand side of the figure appeared in the context of a cantonal-level vote on women's right to vote in the canton of Basel-Stadt in the year 1920, one of the earliest attempts to implement women's political rights at the cantonal level (the canton of Basel-Stadt was also one of the first cantons to actually implement women's right to vote and to be elected through a cantonal plebiscite in the year 1966). The poster, showing a "zombified" female white-collar worker, obviously played to the discomfort of the then prevalent division of gender roles being challenged (the text on the poster

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[23]There was a first national-level vote in the year 1959, which received only 33% of the (male) votes in support of the demand. Interestingly, and somewhat surprisingly, the proportions were reversed in the second vote on the issue only 12 years later (with 65.7% of the votes in support of the initiative). This again underlines the substantive shifts in attitudes in this time period.

asks whether (men) "want such women"). Nonetheless, the poster was prophetic to some extent in that it correctly anticipated that women would soon start to flock into the paid labor market in large numbers. Somewhat ironically, however, the debate about gender and gender roles has become much more, not less intense in the last couple of years. Interestingly, this also shows up in the data extracted from Google's book corpus (see panel (d) of appendix figure A.2). While the ratio of the relative frequency of "man" to "woman" has been converging towards parity over time, there is a sudden and huge jump in the relative frequency of both "man" and "woman" after the year 2000, suggesting that discussion about gender roles have become much more prevalent in the public discourse. In fact, one may argue that the discourse about gender identities is the continuation of feminism and the sexual revolution (e.g. Eberstadt, 2019).

The poster on the right-hand side, in turn, appeared in the run-up to another popular vote in the canton of Basel-Stadt, held in the year 1946. Obviously, this poster tried to evoke the fear that giving women more rights would result in mothers who would neglect their newborn children. These depictions are clearly outdated, not the least because the moral aspect of this discussion has largely been stripped from the public discourse. Similar to the topic brought up in the first poster, however, and again not without some irony, it has become increasingly clear over time that the restrictions and trade-offs that are necessarily involved in a household's decisions over children and paid work remain one of the main obstacles for the remaining differences in working hours between men and women (e.g. Bertrand *et al.*, 2010; Goldin, 2014).

4.3 The longer-run perspective

Probably the most unique features of the information amassed in Google's book corpus is that it runs much further back in time than 1950. This allows me, in a final step, to go way beyond the time period covered by the SJMM and to check whether some of the sub-narratives already started to evolve before that year. Thus figure 6 takes a look at the longer-run the evolution of three selected keywords for an extended period of time, running now from 1850 to 2019.[24]

Figure 6

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[24]Going back even further in time shows that there are no relevant peaks in the relative frequency for any of these three search terms in the years before 1850, and thus these earlier years are not shown here.

As already mentioned above, there is no relevant additional peak in relative frequency in the years before 1950 for either "feminism" or "partnership". In contrast, however, there is a first, but much smaller peak in the relative frequency associated with "sexuality" in the early decades of the 20th century already (as shown in table 3 above, the first onset of this sub-narrative is dated as the year 1902). This coincides with the evidence presented in Buchmann and Eisner (1997, p. 173), who note in their conclusions that their "findings suggest that the rise of the expressive self started as early as the 1920s and has gained momentum since the early 1950s. This is not in line with the expectations derived from the literature, which focus on the mid-1960s as the decisive historical turning point".[25] Moreover, the timing of events evident from the different data series also aligns surprisingly well with what has been labelled the first and the second wave of feminism (e.g. Goldin, 2014). A slightly different interpretation, in light of the potential continuity in the discourse, especially evident from figure 6, is that the narrative was only temporarily suppressed during the Second World War.

Moreover, a cursory comparison with the longer-run evolution of selected key demographic and economic variables (see appendix figure A.3) suggests that the fundamental demographic and economic shift in the course of the country's industrialization has presumably enabled the broad cultural shift documented in this paper as well as in related studies on the subject. Specifically, it appears that the longer-run evolution in the number of children per woman coincides not only with the onset of the change in the discourse about sexuality and self-identity in the early 1920s but also with the temporary decline during and after the Second World War.

5   Discussion and conclusions

Using data from the Swiss Job Market Monitor, this paper documents a large, unambiguous, and comparatively swift change in Swiss employers' stated preferences towards prospective job applicants' gender, measured by the proportion of gender-neutral job posts within a given year. Within the observation period from 1950 to 2020, there was an almost complete reversal in the proportion of gender-neutral jobs posts, from about 3.7 percent in the 1950s to about 95

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[25]The timing is also broadly consistent with the qualitative account of D'Emilio and Freedman (1997) concerning the longer-run evolution of sexuality in the US.

percent in the year 2020. Moreover, a significant part of the overall shift in the proportion of gender-neutral posts happened within a very short period of time – an increase of more than 31 percentage points between 1996 to 2006 – and there is no sign whatsoever for a reversal in this trend.

However, one somewhat dubious feature with regard to the observed evolution in the proportion of gender-neutral job posts is the surprisingly late onset of the change in the mid-1980s, when compared to, for example, the public discussion about women's right to vote which arguably had started much earlier than that date. This is the main reason why I also looked at additional time series on the relative frequency of specific search queries, such as "partnership" or "feminism", taken from the 2019 German book corpus underlying Google's N-gram viewer. In general, and comparability issues notwithstanding, the evolution of relative frequencies associated with the different keywords are broadly consistent with the evolution in the proportion of gender-neutral job posts – in the sense that they also point to a substantive change in attitudes towards and norms related to the role of women. Moreover, the time series for the different keywords broadly share a common peak around the turn of the century, corroborating the claim that they represent a common yet latent change in attitudes towards the role of women. Whatever the underlying causal mechanisms, assuming that gender norms have not, or only marginally, changed in the past couple of decades in Switzerland seems inconsistent with the evidence based on the different data series.

Moreover, there are obvious differences in the onset of change across the different time series, the most obvious difference being that between the proportion of gender-neutral job posts and between most of the keywords extracted from the Google book corpus. Specifically, the data show that the narrative dealing with intimate relations and sexuality kicked off substantially earlier than the public discussion about the political dimension of the debate; and that both sub-narratives started earlier than the change in the proportion of gender-neutral job posts. Taken together, it thus appears plausible that an overarching and broader narrative about the role of women, including women's self-identity and their role in an intimate partnership, preceded and perhaps drove, to some extent, the observable change in employers' stated attitudes towards their prospective employees' gender. Reassuringly, the timing implied by my results is also consistent with earlier evidence based on yet another source of data, namely personal ads in

search of a marriage partner placed in Swiss-German newspapers (Buchmann and Eisner, 1997), further corroborating the fact that the timing of events documented in this paper is not just a peculiarity of the data used in the present analysis.

One may object that the observed change in the proportion of gender-neutral job posts does not necessarily imply true changes in employers' behavior because it may be no more than signaling on the part of the employers that their job advertisements align with public opinion (or signaling that they are synced with the prevailing legal rules, which also changed within the observation period). However, bear in mind that the vast majority of job posts in the most recent years tended to be gender-neutral – and this fact squares very well with the evidence from several recent studies on the Swiss labor market, suggesting that there is neither a large or robust effect from societal gender norms on adolescents' occupational choices (Kuhn and Wolter, 2022a) nor evidence of employer discrimination against females in adolescents' access to specific apprenticeship positions (Fernandes *et al.*, 2019; Fossati *et al.*, 2020). While this does not imply that gender roles and stereotypes play are irrelevant today, the evidence does arguably bring up the question of whether gender norms can really still be a primary, let alone the only, reason for the remaining residual differences between men and women in their performance in the labor market.

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Table 1: The proportion of gender-neutral job posts, by decade

Decade	#Obs	Mean	ΔMean
1950	10	3.72	—
1960	10	6.50	2.78
1970	10	9.06	2.56
1980	10	15.49	6.43
1990	10	32.81	17.32
2000	10	61.75	28.94
2010	10	83.06	21.31
2020	1	94.90	11.84

Notes: The table shows the mean of n_t by decade, as well as the change in the mean across decades (ΔMean equals the mean of n_t in the current minus the mean of n_t in the previous decade).

Table 2: Parameter estimates, logistic function

Parameter	Estimate
β_0	4.693***
	(0.575)
β_1	94.962***
	(2.753)
β_2	0.123***
	(0.006)
β_3	2001.357***
	(0.543)
Number of observations	71
R-squared	0.994

Notes: *** denotes statistical significance at the 1% level. The table gives the point estimates and standard errors (in parentheses) of the parameters of equation (1), estimated via nonlinear least squares.

Table 3: Estimated break points in the various data series

Keyword(s)	Estimation period	Break point	sup Wald
Job posts	1950 − 2019	1985	1174.031
			(0.000)
Equality	1935 − 2002	1974	342.853
			(0.000)
Discrimination	1935 − 1995	1977	4634.340
			(0.000)
Feminism	1900 − 1995	1974	12945.253
			(0.000)
Sexuality	1900 − 2005	1967	1220.461
			(0.000)
	1850 − 1923	1902	538.311
			(0.000)
Partnership	1900 − 2008	1949	401.883
			(0.000)

Notes: The table lists the estimated year in which there is a structural break, along with the associated supremum Wald statistic (as well as the corresponding p-value in parentheses below). To determine the break point, a trimmed sample period is used (10% of the observations at each end of the given estimation period are trimmed). For the variables shown in the lower panel of the table, the estimation period ends with the year in which the relative frequency of the corresponding keyword peaked (e.g. 2002 in the case of "equality", cf. figure 4). Note that figure 6 shows that there are two peaks in the case of "sexuality".

Figure 1: The proportion of gender-neutral job posts, 1950 to 2018
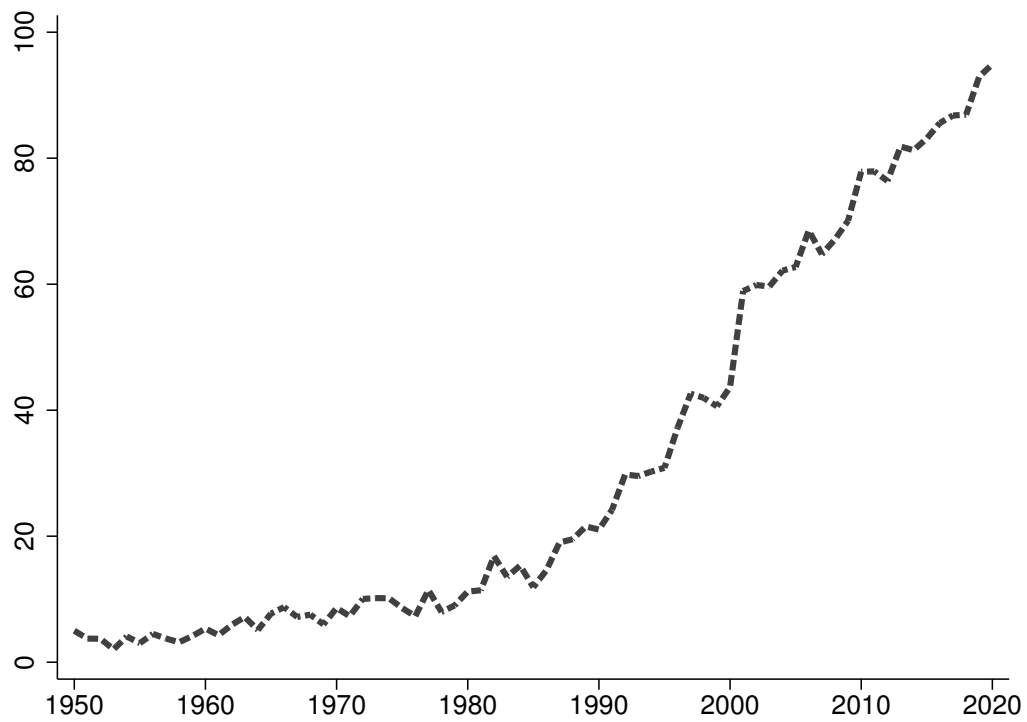
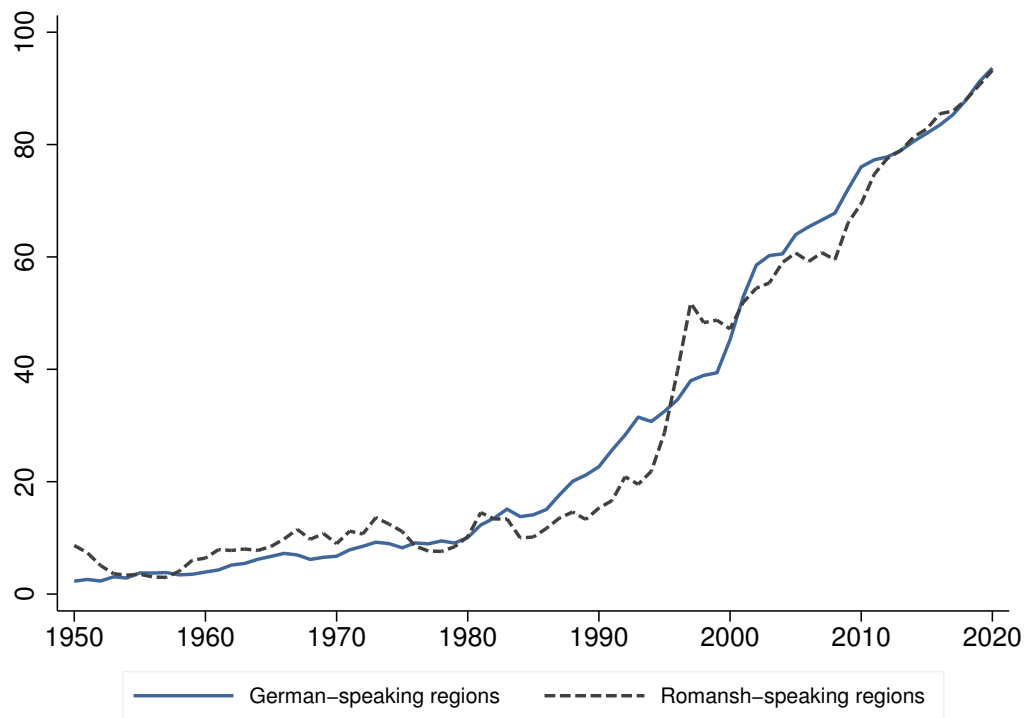

Notes: The figure plots the evolution of n_t, the percentage proportion of gender-neutral job posts, over the full observation period, running annually from 1950 to 2020.

Figure 2: The proportion of gender-neutral job posts, observed values and fitted logistic function
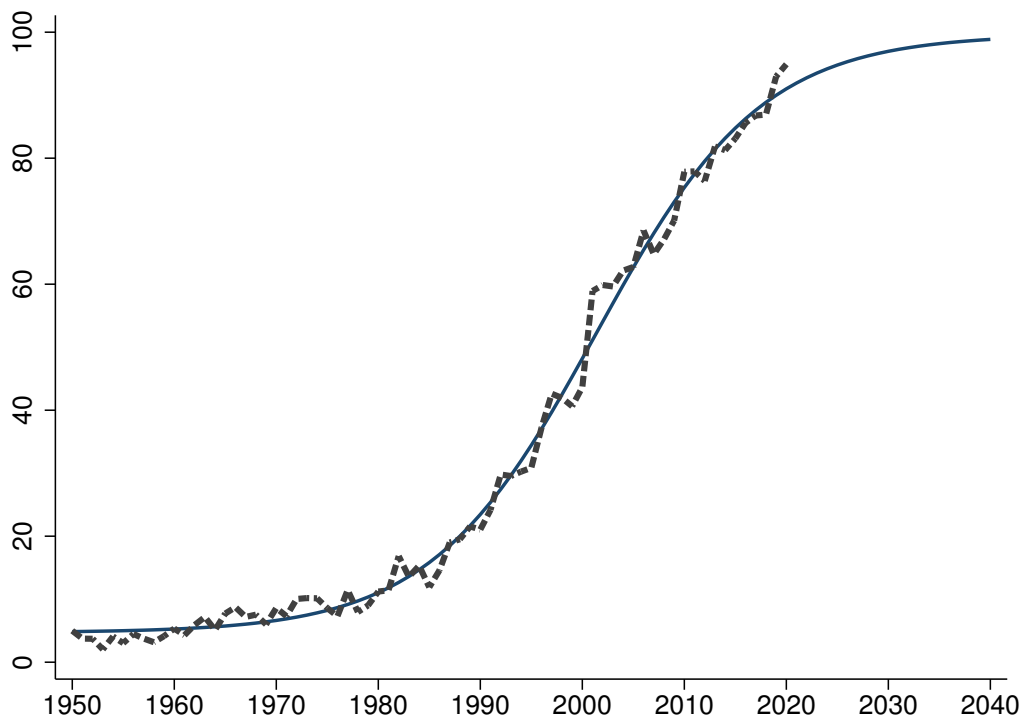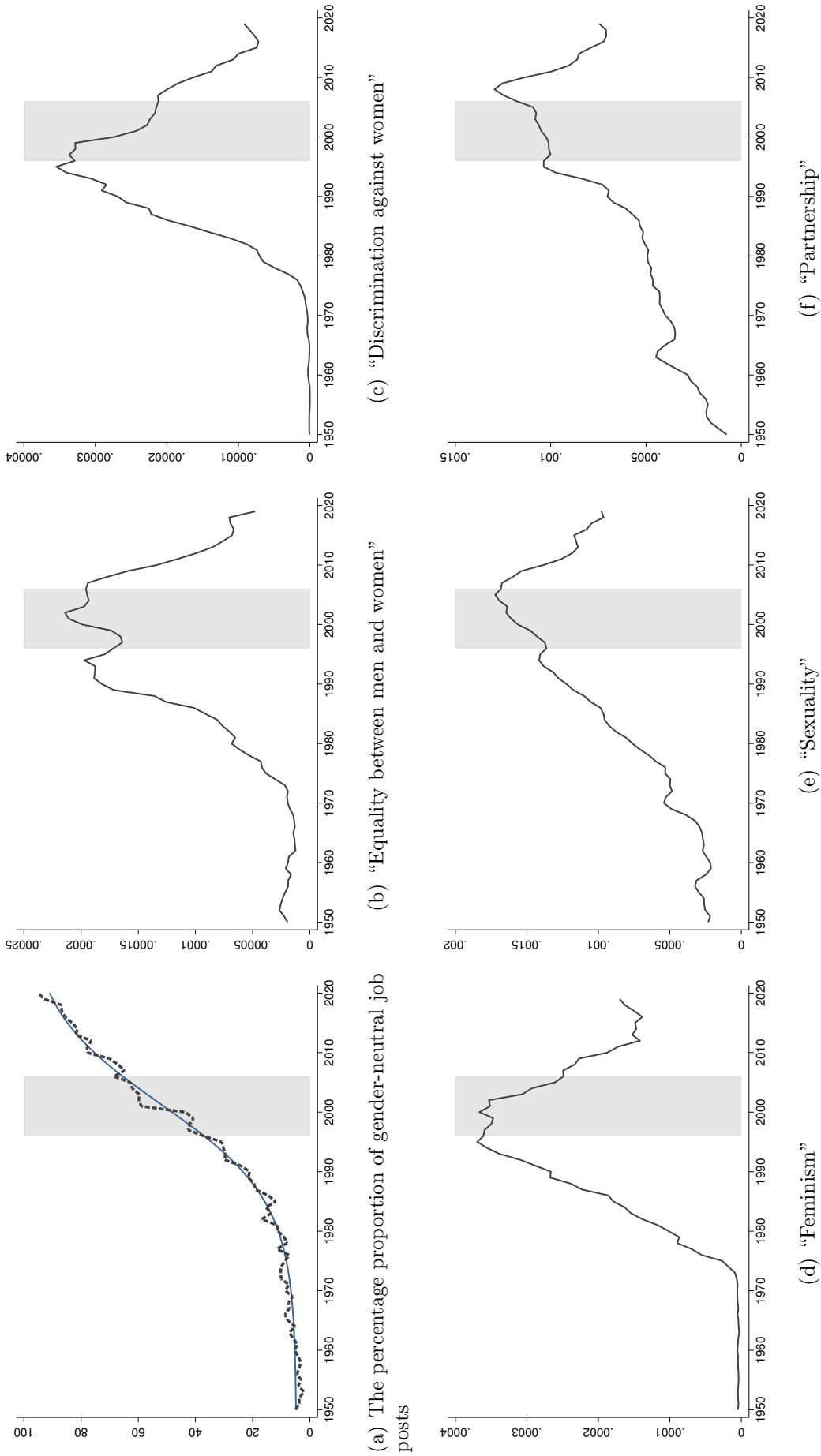

Notes: The figure shows the observed series of n_t, along with the fitted logistic function from equation (1). The figure extends the fitted logistic function until the year 2040 (the observed series ends in the year 2020; cf. figure 1).

Figure 3: The proportion of gender-neutral job posts by main language-region

Notes: The figure shows the evolution of n_t, separately for the two main language regions, i.e. the German-speaking regions versus the Romansh-speaking regions. The latter group includes all non-German speaking regions, where either French, Italian or Rhaeto-Romanic is the dominant language. To draw the figure, each of the two series has been smoothed using a three-year moving average. See also appendix table A.1.

Figure 4: Relative frequency of keywords from Google's German book corpus

(a) The percentage proportion of gender-neutral job posts

(b) "Equality between men and women"

(c) "Discrimination against women"

(d) "Feminism"

(e) "Sexuality"

(f) "Partnership"

Notes: Panel (a) reproduces the evolution of n_t over time, along with the estimated logistic function. Panels (b) to (f) show time series of the different keywords extracted from the German book corpus of Google. The data in panels (b) to (f) have been smoothed using a three-year moving average. In each panel, the shaded area marks the years 1996 to 2006.

Figure 5: Two examples of public posters used in the run-up to plebiscites about women's right to vote in Switzerland
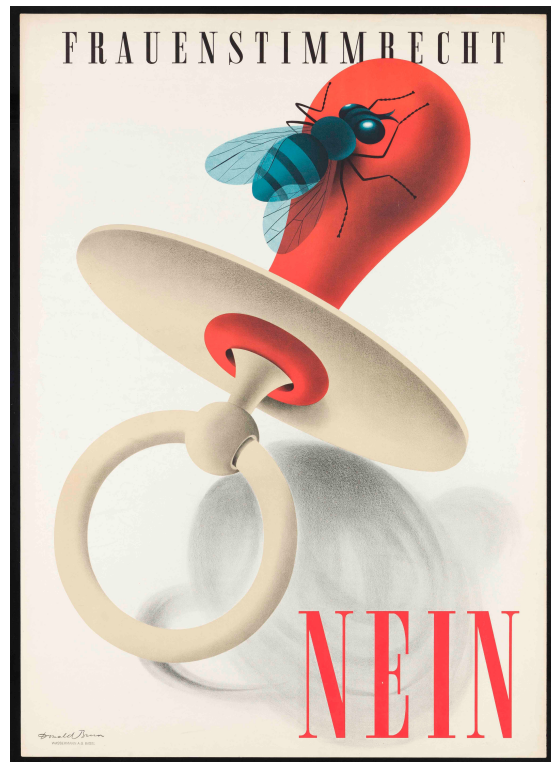

(a) Otto Baumberger, "Wollt ihr solche Frauen – Frauenstimmrecht NEIN", 1920 (©Prolitteris)

(b) Donald Brun, "Frauenstimmrecht NEIN", 1946 (©Prolitteris)

Notes: The poster on the left was drawn by Otto Baumberger (1889–1961), a Swiss painter and poster artist born in Zurich; the poster on the right by Donald Brun (1909–1999), a Swiss designer and illustrator born in Basel.

Both photographs: Plakatsammlung, Museum für Gestaltung Zürich, ZHdK.

Figure 6: The longer-run evolution of selected keywords
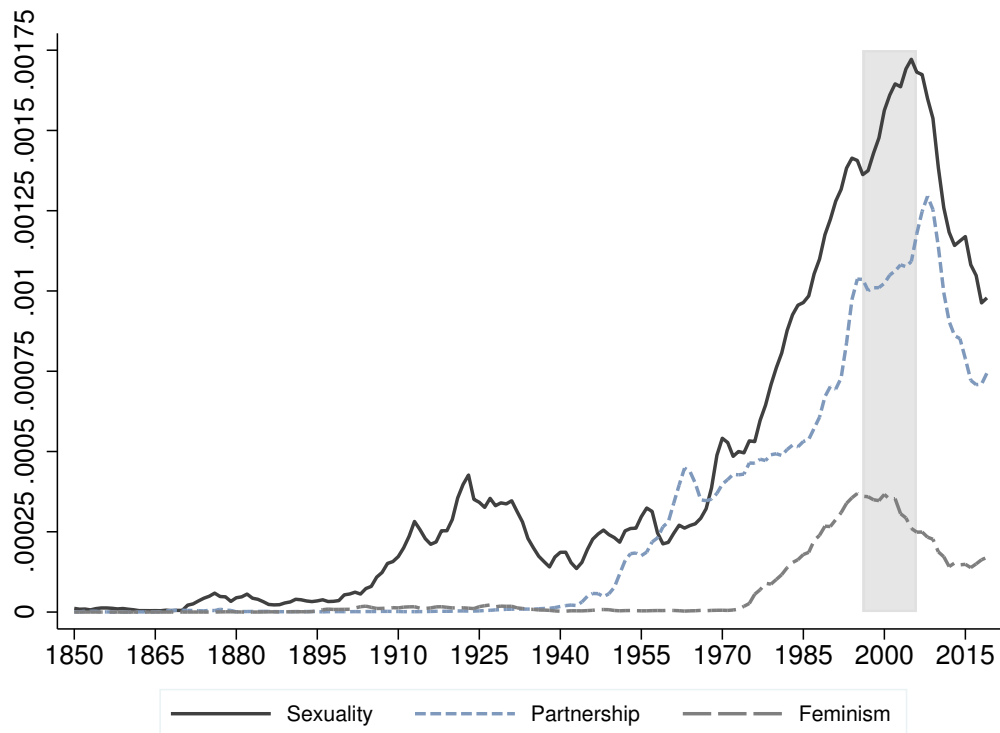
Notes: The figure shows shows the evolution for three selected search terms for an extended period, from 1850 to 2019. Each series has been smoothed useing a three-year moving average. The shaded area marks the period from 1996 to 2006. There are no relevant peaks in the relative usage of any of the three keywords before the year 1850. See also panel (b) in appendix figure A.2, which shows a very different level and pattern over time for the term "marriage".

A   Additional tables and figures

Table A.1: Parameter estimates (logistic function), by main language region

| Language region	Estimate		
	Both	German	Romansh
β_0	4.693***	3.999***	6.475***
	(0.575)	(0.634)	(1.203)
β_1	94.962***	96.259***	89.009***
	(2.753)	(3.167)	(5.654)
β_2	0.123***	0.120***	0.139***
	(0.006)	(0.006)	(0.016)
β_3	2001.357***	2001.625***	2001.971***
	(0.543)	(0.625)	(1.123)
Number of observations	71	71	71
R-squared	0.994	0.993	0.964

Notes: *** denotes statistical significance at the 1% level. The table gives the point estimates and standard errors (in parentheses) of the parameters of equation (1), estimated via nonlinear least squares and by main language region. The Romansh speaking regions include the French, Italian, and Rhaeto-Romanic speaking regions. For the ease of comparison, the first column replicates the estimates from table 2, based on the data pooled across the two language regions.

Figure A.1: The onset and timing of narratives in the German book corpus, additional keywords unrelated to gender norms or the role of women
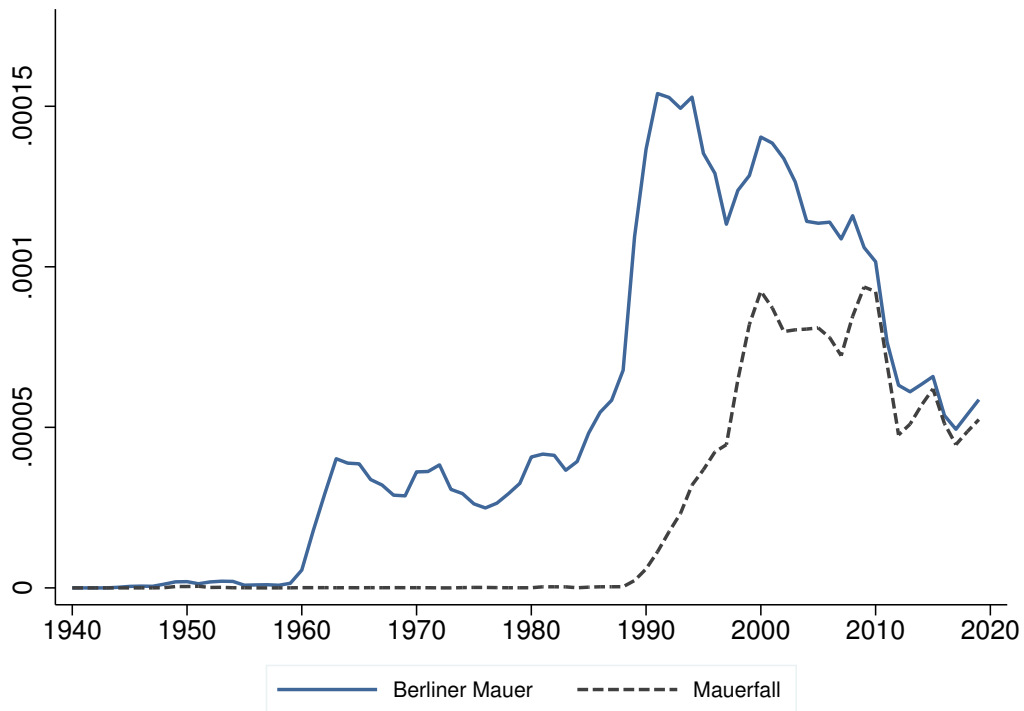

(a) The Berlin wall
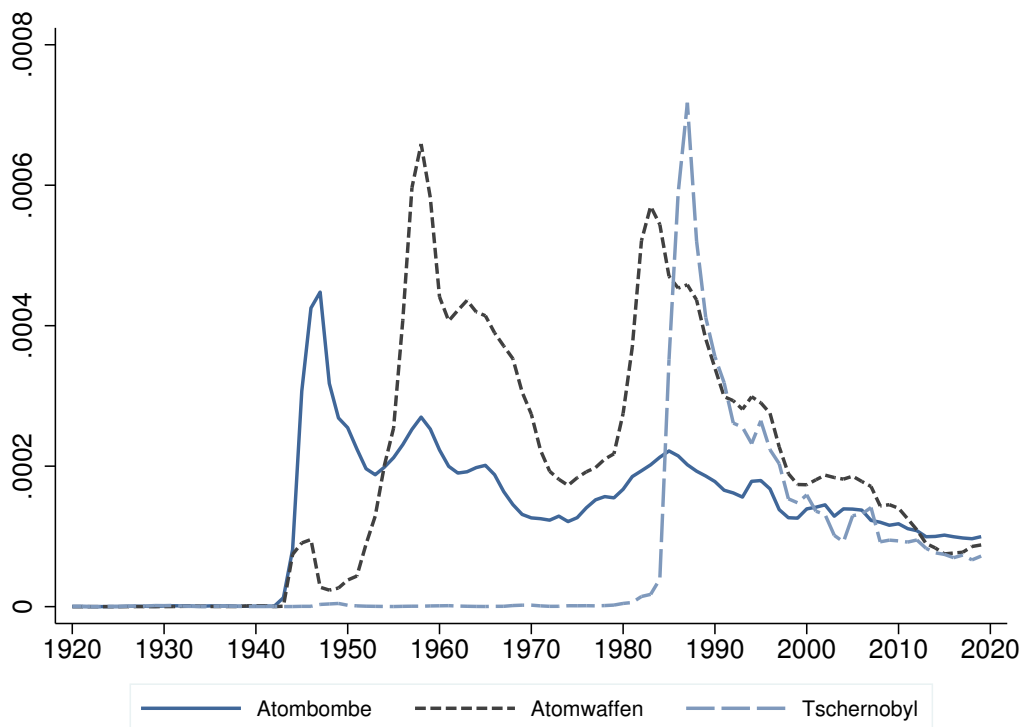
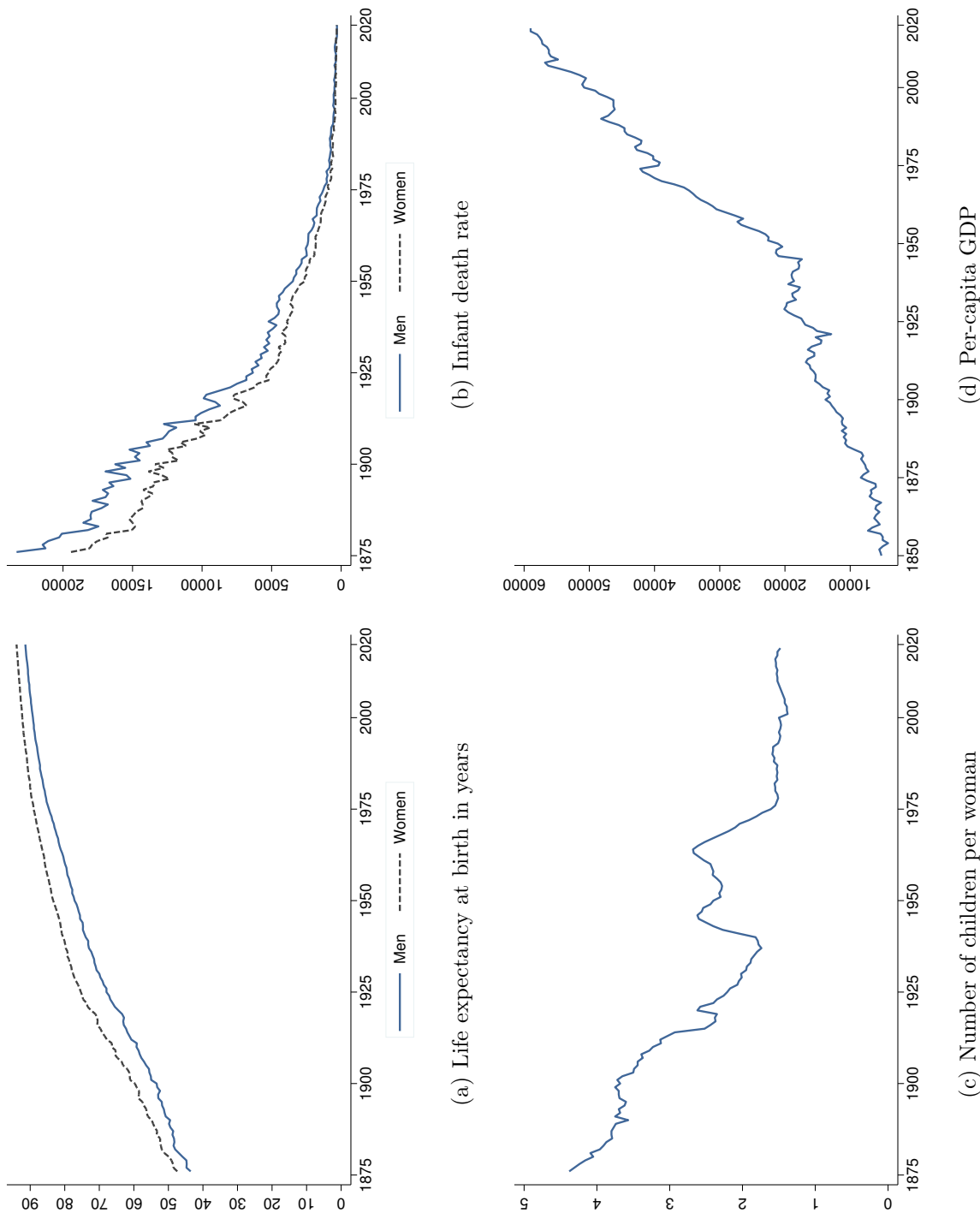(b) Nuclear weapons and nuclear meltdown

Notes: Panel (a) shows the relative frequencies of the Berlin wall ("Berliner Mauer") and of the fall of the wall ("Mauerfall"). Note that the wall was built from 1961 onwards and taken down from 1989 onwards. Panel (b) shows the relative frequencies of atomic bomb ("Atombombe"), nulcear weapons ("Atomwaffen") as well as Chernobyl ("Tschernobyl"). The term "Atombombe" peaks in the year 1946, while the series on nuclear weapons peaks first in 1958 and then in 1983. The nuclear accident in the nuclear power plant of Chernobyl happened in 1986, and the corresponding series peaks in that same year.

Figure A.2: The relative frequency of selected ancillary keywords from Google's German book corpus

(a) "Hausmann"

(b) "Ehe"

(c) "Homosexualität"

(d) "Mann" versus "Frau"
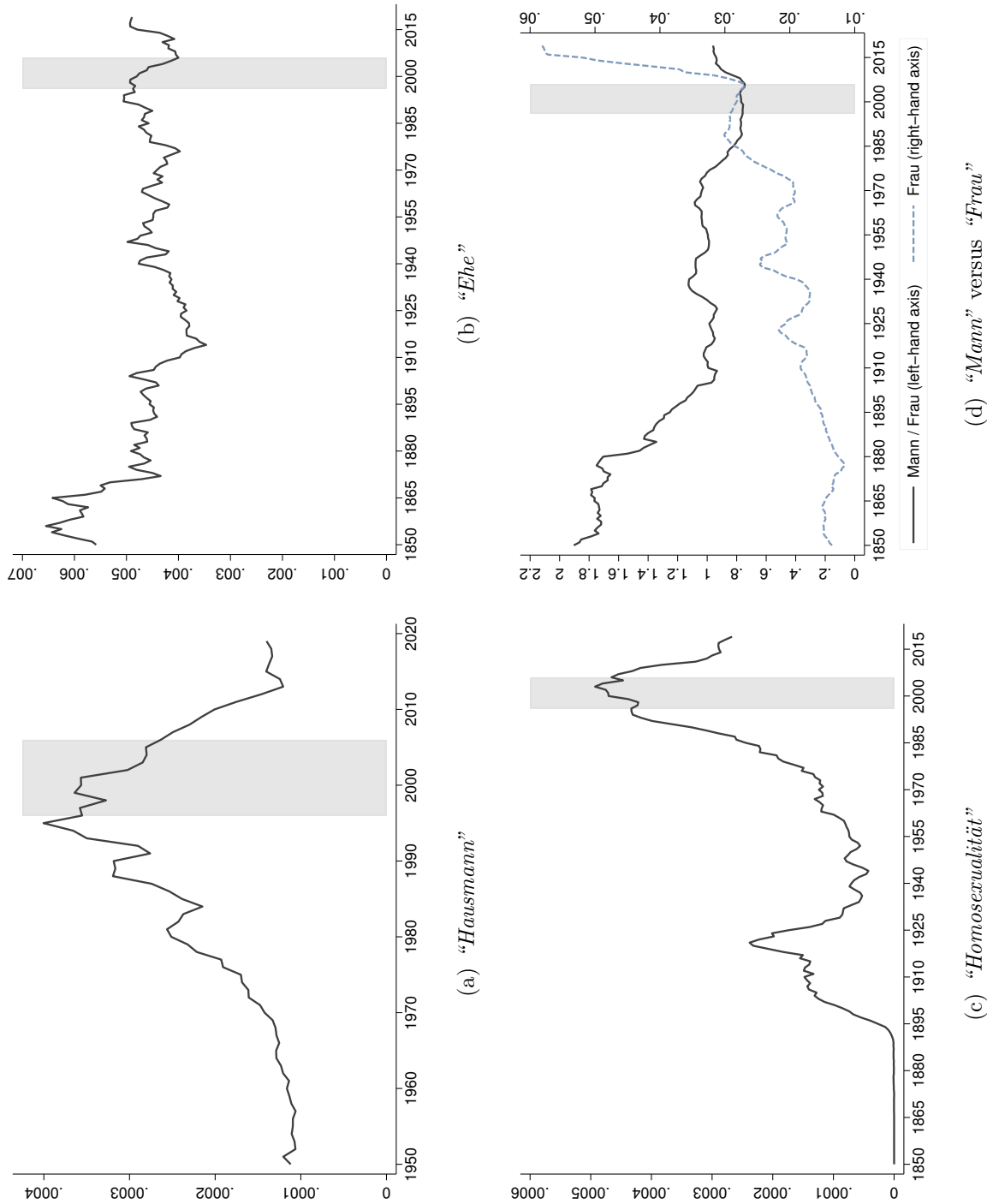
Notes: The figure shows the relative frequency over time for some ancillary search terms: namely "Hausmann" (househusband) in panel (a), "Ehe" (marriage) in panel (b), "Homosexualität" (homosexuality) in panel (c), and both the ratio of "Mann"/"Frau" as well as the level of "Frau" (man and woman, respectively).

Figure A.3: The evolution of selected demographic and economic variables

(a) Life expectancy at birth in years

(b) Infant death rate

(c) Number of children per woman

(d) Per-capita GDP

Notes: The figure plots the evolution of selected demographic and economic variables (note that the observation period differs slightly across the variables). The first three panels are based on data from the FSO. The infant death rate gives the number of infant deaths (i.e. deaths within the first year of life) per 100,000 live births. The series on per-capita GDP is taken from www.gapminder.org (which, in turn, combines data from the World Bank, the IMF, the Penn World Table, and historical time series from the Maddison Database; see https://www.gapminder.org/data/documentation/gd001/ for details).