On the nature (and nurture) of gender differences in work preferences. Evidence from East and West Germany

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Abstract

We study the origins of gender differences in work preferences and examine a nature-versus-nurture explanation by exploiting the division of Germany and its reunification in 1990 as a natural experiment. We test hypotheses on how disparate political systems may have nurtured different gender gaps in preferences, based on German-General-Social-Survey data from 1991, 1998 and 2012. Our analyses reveal a substantial East-West difference in the gender gap directly after reunification and no convergence thereafter. In line with the nurture hypothesis, the findings are driven by cohorts who grew up during separation, and are robust to potential pre-separation differences, selective migration and heterogeneity across states.

JEL Codes: C21, J24, P51

Key words: German separation and reunification, work preferences, cohort analysis, natural experiment

1 Introduction

Despite the enormous progress toward gender equality in most Western societies over the past several decades, many of the gender gaps in labor market outcomes persist. Across OECD countries women earn less than men on average, are less likely to be active in the labor market, supply fewer hours of work, and are more likely to interrupt their employment for child-rearing or to provide other family-related services. Many of these differences can be attributed to men's and women's individual choices, and are therefore often viewed as resulting from individual preferences.

A better understanding of gender differences in preferences thus seems essential in order to devise optimal policies in response to gender differences. For example, if women "naturally" preferred family-related work to labor market work, it might be due to their innate preferences that women more often than men choose jobs that allow them to work part-time. The same behavior, however, may be caused by social constraints – such as norms concerning the "appropriate" labor division between male and female partners – while women's innate preferences for labor market work do not differ from men's. Although the outcome in terms of gender inequality in the labor market would be the same in both scenarios, optimal policy strategies to reduce inequality may likely differ. It is for this reason that we investigate the nature of gender differences in work preferences in the context of Germany. The division of the country after WWII into distinct political "nurture systems", and its reunification in 1990, provide a natural experiment to study their evolution.

The importance of gender differences in preferences for labor market outcomes has not only been recognized by policy makers (see for example OECD, 2012), but has also received increasing attention from economics scholars over the past decades (for an overview, see Croson & Gneezy, 2009; Bertrand, 2011). Until today, the bulk of this research has mainly been carried out in the lab. All in all, this literature seems to suggest that women, on average, are more averse to risk-taking and less willing to enter competition than men, and often to a greater extent exhibit other-regarding preferences. The relevance of these findings depends on the extent to which they translate to "real world" gender differences in preferences that affect, e.g., labor market decisions. Although this link seems fairly plausible, it is remarkable how little attention has been devoted to gender differences in preferences outside the lab (with the exception of the studies by Fortin, 2005; Busch, 2013), despite their arguably greater potential for explaining gender differences in real (labor) market outcomes.[1] Moreover, as Bertrand (2011) points out, there is a lack of comprehensive scientific evidence on the root

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[1]See also Nelson (2014) for a critical assessment of magnitude and economic relevance of gender differences in preferences for risk.

cause of gender differences in preferences: On the one hand, they may be driven by cultural norms and institutional contexts; e.g., traditional labor division between spouses, direct or indirect discrimination, barriers to entry in certain professions, lack of childcare facilities. Such mechanisms are often subsumed under the *effect of nurture*, and a series of studies has indeed shown the importance of culture as a driver for women's labor market outcomes (Bertrand *et al.*, 2015; Alesina *et al.*, 2013; Fernández, 2013; Fogli & Veldkamp, 2011; Fortin, 2005). On the other hand, sex-specific preferences might be programmed into our genes through evolutionary adaptation mechanisms, i.e., an *effect of nature* (Buss, 1995b; Trivers, 1972).

In behavioral psychology, so-called origin-theories for gender differences in psychological traits are at the centre of a heated debate between evolutionary psychologists and social psychologists. The former argue that genetic differences between men and women evolved as a result of differential adaptation mechanism drawn on in primeval times, whereas the latter emphasize a social structure mechanism as the main cause of gender differences (Eagly & Wood, 1999). For simplicity, we call the two proposed mechanisms the *nature* and the *nurture* hypothesis, even though in both theories gender differences evolve over time and the reasons for their evolution may have some biological foundation.[2]

According to evolutionary psychologists, adaptation takes a much longer time horizon (thousands of years) and results in differential psychological predispositions of men and women, which are genetically encoded and thus become part of the human "nature". In essence, proponents of evolutionary adaptation argue that among our ancestors in hunter and gatherer societies, women and men had to draw on very distinct strategies in order to maximize their reproductive success (Trivers, 1972; Buss, 1995b,a). Because they faced different degrees of paternal uncertainty, the optimal strategy for men involved fathering as many children as possible, while for women it was optimal to invest maximum parenting effort into a biologically limited number of children. Women were most successful achieving this goal when they selected men who could provide resources to support their extensive parenting efforts. At the same time, reproduction rates were highest among the men who were most successful in providing resources when competing for female mates. In this view, evolutionary adaptation has shaped male and female psychological predispositions and thereby affects their behavior until today.[3] This would imply that, even in modern societies, women's preferences revolve primarily around child-rearing, while men's primary interest lies in a successful labor market career. It would also imply that the gender gap in these preferences should not vary much across societies. [4]

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[2]E.g., the combination of men's greater physical power and women's ability to give birth and lactate might provide an explanation both for why evolutionary adaptation mechanisms differed for the sexes and for why societies first found it beneficial to structure labor division in a certain way.

[3]For an application of the evolutionary mechanism in economic theory see for example Edlund & Korn (2002).

[4]By the same token, the nature hypothesis has been used to rationalize gender differences commonly found in

Proponents of social structure mechanisms, on the contrary, argue that the observed gender differences in behavior are caused by the way societies allocate men and women into different roles and hierarchy levels (Eagly & Wood, 1999). If men are expected to act as providers for their family, they will eventually end up in this role and as a result become more career-minded. Women, on the other hand, by cultural prescription more often take on responsibility for caring and nurturing, and as a result become more family-oriented. Social structure mechanisms thus work to create different psychological dispositions, mainly through sex-specific social prescriptions and, consequently, differential experiences men and women have in certain tasks and positions. Gender differences in preferences, according to this hypothesis, are a result of nurture within a society, which is a combination of institutions and culture. The nurture hypothesis thus predicts that gender differences in preferences can vary substantially between societies. Since male and female experiences are likely to differ more strongly the greater the sorting along gender lines in a given society, so should their preferences for the socially prescribed tasks. A second implication is that gender differences adapt to social change at a much faster rate than would be the case for an evolutionary adaptation process.

In case the nature hypothesis plays the leading role in explaining gender differences, the scope for equalizing policy measures to "nurture" male and female preferences is limited. Implementing such policies may then potentially reduce welfare, if they constitute interventions that enforce behavior of women (or men) against their "nature" or innate preferences. If, on the other hand, the nurture hypothesis were shown to have more bite, this would suggest a greater potential for policy to achieve gender equality in labor market outcomes. Despite this obvious practical relevance to equalizing policy, to date there is little systematic evidence on which of the two effects dominates in economic contexts.

In the economics literature, a small number of (field) experimental studies has attempted to shed light on the root causes of gender differences in preferences. Evidence for the nature hypothesis is scarce, although some studies investigate biological mechanisms: For example, how sex hormones are linked to gender differences in economic decision making is studied by Schipper (2014) and Chen *et al.* (2013). However, the evidence seems far from conclusive concerning precise biological mechanisms and, in any case, cannot rule out nurture as an omitted confounder. Wozniak *et al.* (2014) find that women's willingness to compete varies over the menstrual cycle, but a nurture explanation is not excluded for their findings, either. As Datta Gupta *et al.* (2013) point out, women's lower propensity to compete when they menstruate may be due to a stereotype-threat effect, if menstruating makes women more attentive to the their gender and thereby to prescribed sex roles and stereotypes. However,

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the lab – arguing that risk-taking, competition and other-regarding preferences were of differential importance for the reproductive success of our primeval ancestors.

evidence for the nurture hypotheses is equally scarce: Gneezy *et al.* (2009) study the role of culture by comparing the gender differences in competitiveness across a patriarchal and a matrilineal tribe, and Booth & Nolen (2012a,b) examine gender differences in competitiveness and risk behavior across school types (mixed-sex versus single-sex schools).[5] Bertrand (2011), while highlighting these studies' contributions as some of the few that provide insight into the interplay of nature and nurture, raises concerns about the "evolutionary distance" between the societies compared by Gneezy *et al.* (2009), and, in the case of the Booth & Nolen (2012a,b) experiments, about selection into the different school types. Both threats to the identification of a nurture mechanism are less of a concern in our study of Germany: We compare two societies of presumably minimal evolutionary distance since East and West Germans share a common past and cultural identity up to the artificially imposed separation after WWII. Moreover, a "selection" of individuals into the different Germanies did not occur, at least at the time of the separation.[6] In doing so, our study is the first that can build on a natural experiment and real-world preference measures to analyse the role of nature and nurture in gender-specific preference formation.

Our contribution lies in a synopsis of the experimental research on gender differences in preferences and previous survey-based literature that uses the separation and reunification of Germany to assess the effect of political nurture on preference formation,[7] by identifying the causal impact of political nurture on the magnitude of *gender differences in preferences* for work. Furthermore, the interesting question of how preferences that formed under the influence of the socialist GDR-nurture develop in a market economy, has so far been largely overlooked (one exception is Kuhn, 2013). Using the German separation and reunification as a natural experiment allows us to test several hypotheses regarding the role of nature versus nurture in gender-specific preferences. During separation, the political systems in East and West Germany differed markedly in their institutions and the role for women in society they promoted. After the reunification in 1990, Western institutions were quickly established in

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[5]See also Dreber *et al.* (2011); Cárdenas *et al.* (2012) and Sutter & Glätzle-Rützler (2015) who study gender differences in the competitive behavior in children and adolescents and find evidence for the importance of socialisation and social learning, as well as for the influence of culture.

[6]We explore the validity of our assumption on minimal evolutionary distance in Section 3, and we show that cross-migration flows between the two Germanies do not pose a threat for our identification in Section 2.

[7]The particular feature of German history – its separation and reunification – has attracted the interest of a number of economic scholars who aimed to identify the causal impact of differential political regimes on various preference and attitude variables, such as tax morale (Torgler, 2003), preferences for redistribution (Alesina & Fuchs-Schündeln, 2007), trust in others and government institutions (Rainer & Siedler, 2009), gender role attitudes (Bauernschuster & Rainer, 2011), inequality perceptions and equity norms (Kuhn, 2013), conspicuous consumption (Friehe & Mechtel, 2014), or behavioral variables such as college attainment and labor market outcomes (Fuchs-Schündeln & Masella, 2015). While Bauernschuster & Rainer (2011) provide us with important insights regarding the cultural norms and attitudes toward working mothers and wives that prevail in the Eastern and Western parts of Germany, we cannot conclude anything about the *gender gap in preferences* for work. This remains an open question since none of the previous studies has considered the differential evolution of gender differences across the two regions.

the East. Thus, if nurture influences the formation of preferences, we should find different gender gaps in preferences in East and West around reunification. A convergence of these gaps following the political integration, over the rather short period of time we observe (roughly 20 years until 2012), would make an even stronger case for the nurture hypothesis: if it is indeed social structural mechanisms rather than evolutionary processes, male and female preferences should be influenced most strongly by the roles they are assigned to in a given society, and as gender-specific assignments most likely become more similar in reunified Germany, so should gender differences in preferences.

Disentangling the dynamics into cohort, time or life cycle effects, may help us clarify if any potential regional differences in gender-specific preferences at the end of the German separation were indeed causal to the socialist nurture experienced in the GDR, and shed light on the relative importance of nature vs. nurture. If, however, as predicted by the nature hypothesis, genetic sex-specific dispositions are more relevant for gender differences in work preferences, we should find a universally lower preference for work among women than among men – essentially unaffected by the GDR-treatment because evolutionary adaptation would take much longer. Moreover, gender differences in preferences could be expected to be fairly stable over time, and most importantly, any life cycle patterns we find should be similar across regions and cohorts.

To test our hypotheses, we first examine historical data from the 19th and early 20th century in order to verify that there were no systematic differences between East and West Germany that could be related to differential gender gaps in work preferences prior to separation (e.g., in female labor force participation or marriage and fertility behavior). The historical analysis delivers support for the identification strategy using the German separation and reunification not only for the present paper, but also for other studies relying on this assumption. We then combine data from the German General Social Survey (ALLBUS) with a comprehensive set of time-specific macro-indicators at the federal-state-level that we compiled from official German register data, and conduct our main analyses of the gender gaps in work preferences across the two regions. Since the ALLBUS included a sample of East German respondents almost immediately after reunification, in 1991, it allows us to analyse regional differences in gender-specific work preferences almost as accurately as if we had survey data for the East *during* separation.

Our outcome variable measures the importance an individual assigns to work. We choose this "stated preference measure" to complement the above-mentioned evidence on "revealed preference measures", such as labor force participation, that may be subject to region-specific constraints. It also complements preference measures extracted from lab and field experiments, which are commonly extrapolated to gender differences in real world labor market preferences.

We argue that our stated preference-for-work measure can be useful as an intermediary measure between these two poles and can help circumvent both external and internal validity issues. As several studies demonstrate a causal effect of "stated preferences" on labor market outcomes (Fortin, 2008; Humlum *et al.*, 2012; Zhan, 2015), we consider our measure for work preferences an advantageous choice that complements existing studies using revealed preference measures (e.g. Fernández, 2013; Fogli & Veldkamp, 2011; Alesina *et al.*, 2013).

Our findings are supportive of the "nurture hypothesis": In 1991, even though we detect a significant gender gap in preferences for work in both parts of the country (with women finding work less important than men), it is significantly smaller in the former GDR. Over time, both gender gaps narrow. By 2012, the gender gap in the West has reduced considerably but remained statistically significant, whereas the gap between Eastern men and women has vanished completely. Thus, in both regions the gaps seem to follow a generally fading trend, as individual attitudes become more progressive and work preferences less gender-typical. Because this trend took off earlier in the former GDR, East German regions maintain a head start such that the "gap in the gap" (we will refer to this as the "GiG") across the two parts of the country remains economically and statistically significant at almost the same level, even 20 years after reunification. These findings are robust to the inclusion of a broad set of individual and macro-level control variables and to a series of further robustness checks, e.g., an analysis based on the German region where respondents lived during their adolescence rather than at the time of the interview. A detailed cohort analysis reveals that the effect is driven entirely by cohorts who spent at least 15 years of their life in the East before the fall of the wall in 1989, i.e. have received the critical dose of GDR "nurture". It also reveals that institutions, not culture, are the decisive component of this nurture.

The paper is organized as follows: Section 2 briefly reviews the division of Germany into two countries after WWII, the respective political contexts of female employment during separation and after reunification and, against this background, derives our hypotheses concerning the gender gaps in work preferences in East and West. Section 3 investigates historical data to verify our assumption that potential differences between the two regions did not already exist prior to the division. Section 4 introduces the different data sources and preference measure we use for our main analyses, and outlines our empirical strategy. Section 5 supplies the regression results for the aggregate sample and separate analyses by cohorts. Section 6 explores causality; we examine the robustness of the effects by exploring potential heterogeneity across Eastern federal states as well as the preferences of East-West migrants. Finally, Section 7 offers a discussion of the results and concludes the paper.

2 The German separation and reunification and gender differences in work preferences: What do we expect?

The German separation offers an ideal natural experiment to study the role of nature versus nurture in the formation of gender-specific preferences because it allows us to examine the effect of two types of political and social nurture that were imposed exogenously on an evolutionary uniform population. While we provide support for this claim by evaluating historical data in Section 3, this section is intended to motivate and derive our hypotheses, as we lay out the institutional background. It will also explain why the self-selection of individuals into the two Germanies *during* the time of separation is not a concern for the present study.

We start by documenting the striking difference in the labor market behavior of East and West German women *after* reunification until today. Figure 1 shows German labor force participation rates from 1991 to 2013 by gender and region. While East and West German men hardly differ in their participation rates, East German women, for most of the observation period, look more similar to men than to West German women. The resulting gender gap in participation rates has thus been smaller in the East than in the West over the past 20 years, even though the difference is declining. This decline is mostly due to an increase in participation rates of *West* German women. Surprisingly, participation rates of East German women never drop to a noticeably lower level, despite the fact that both regions, after reunification in 1990, were governed by *West* German institutions.

Figure 1: Labor force participation rates in East and West Germany by gender and year
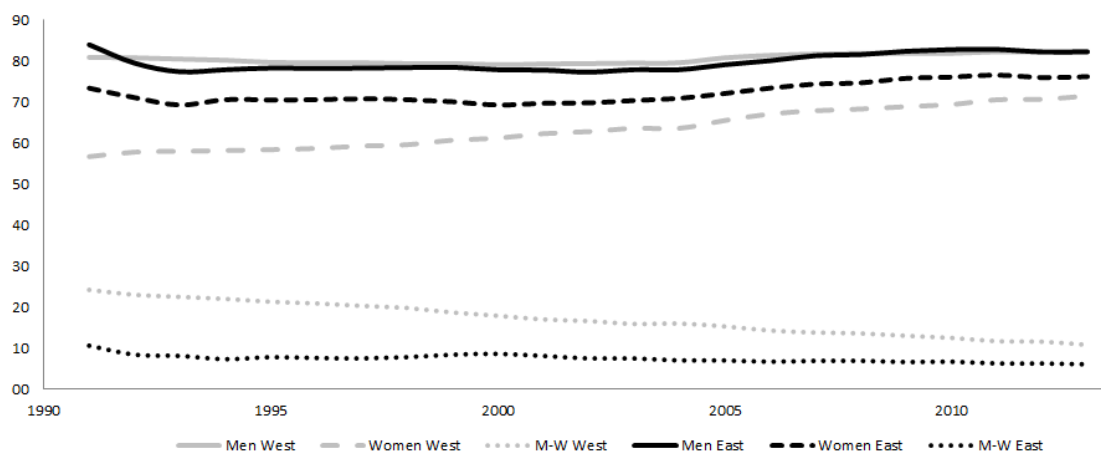
Note: The y-axis shows the percentage of the working-age population in the labor force.

Because female labor force participation rates in the East remained much higher after reunification and under West German institutions (German Federal Labour Bureau, 2013) – both at the extensive and intensive margins – and because East German women also continue

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to report higher desired hours of market work than West German women (Holst & Wieber, 2014), it has long been conjectured that the political nurture of the socialist regime in the GDR has had a long-lasting impact on East German women's attitudes towards work. Drawing this conclusion based on the contemporary participation rates may, however, be too hasty, since these might as well be driven by the disparate economic conditions in East and West Germany today. In order to understand how the German separation could have produced differential gender gaps in *preferences* for work, we thus need to look further back.

After World War II Germany was divided into two distinct countries along the Soviet occupation zone borders. Having shared a common cultural past as one country until then, the German Democratic Republic (GDR) was constituted on the grounds of the Soviet occupation zone, which covered the five Eastern Laender. The remaining 11 Länder, occupied by the Americans, British, and French, formed the Federal Republic of Germany (FRG). In 1989, a peaceful revolution led to the fall of the Berlin Wall and a swift political reunification of the two German parts soon followed in 1990 (with a rapid imposition of monetary union and FRG institutions in East Germany; see Krueger & Pischke, 1995).

During the political division, people living in the two German states received differential treatment through labor market and educational institutions, as well as gender role norms, particularly with respect to female employment. Migration flows from the FRG (West) to the GDR (East) were practically negligible. Migration in the reverse direction was in principle possible until 1961 (Fassmann & Munz, 1994), but exiting the GDR without a departure permit and handing in one's ID card was criminalized after 1954. During the existence of the wall from 1961-1989, only about 800,000 GDR citizens managed to legally depart to the FRG (Fassmann & Munz, 1994). Since we will focus on individuals born 1942 or later, and exploit information on where respondents lived when they were 15, selective migration should thus hardly be an issue here.

From earlier studies we know that labor market participation was much higher among women in the GDR (East) than in the FRG (West) – both at the intensive and extensive margin (Holst & Schupp, 2001; Rosenfeld *et al.*, 2004). In the FRG in the 1950s and 1960s, many social and tax provisions were introduced that favoured the breadwinner household with nonworking spouse, such as joint taxation of married couples (Gerhard, 1992). Up until the 1990s, child care for pre-schoolers was scarce and elementary schools had varying daily schedules or would even close over the lunch hour (Ostner, 1993). The GDR, on the contrary, enforced women's obligation to work and supported maternal employment (Rosenfeld *et al.*, 2004). In 1950, the Mother and Child Care and Women's Rights Acts (Gesetz über den Mutter- und Kindesschutz und die Rechte der Frau) established "a network of public child care centers,

kindergartens, and facilities for free school meals, maternity leave, and days off to care for sick children" (Cooke, 2006: 5). In addition, the Family Law Code (Familiengesetzbuch) in 1965 emphasized the equality of spouses. Due to the state provision of universal child care and the East German citizen rights based on the status of labor force workers, most women, including mothers, were employed full-time (Duggan, 1995).

Given the contrasting roles that the two states promoted for women, the nurture hypothesis would predict women in the East to have differed from men much less with respect to the importance they assigned to paid work than women in the West. In this case, we expect to find a regional gap in the gender gap (GiG) in preferences for work directly after reunification and the unification process may serve to study its dynamics. This is not to say that only the *absence* of a gender gap in preferences in the East is consistent with the nurture hypothesis. Although women and men were allocated to the role of workers with almost equal probability in the GDR, this did not necessarily extend to equal representation across occupations and hierarchy levels. As a matter of fact, even though the share of women who attended professional colleges and universities was much higher in the East than the West, East German women only entered into 16 traditionally female vocational tracks out of many hundreds available to them (Nickel, 1992, cited by Cooke, 2006). Gender-specific job segregation was not less pronounced in the GDR (Rosenfeld & Trappe, 2002), and still looks similar today (Beblo *et al.*, 2008). Becker (1985), even before the fall of the Iron Curtain, notes that women's higher integration into the labor force in socialist countries is usually not accompanied by a reduction in their housework and childcare obligations. He remains agnostic with respect to the question why societies, even under socialism, seem to assign these reproductive responsibilities primarily to women – it could be due to intrinsic comparative advantages of women in home production, it could be due to their exploitation, or a mix of both (Becker, 1985:S40f.). But the fact that this has been the common practise in most societies, he argues, forced women to supply less energy per time unit devoted to market work, and thus explains occupational gender segregation and differences in pay. To summarize, the nurture hypothesis would find support if gender differences in preferences for work were *smaller* in the East, though not necessarily non-existent.

If, instead, gender differences in preferences were due to genetic sex-specific dispositions, and thus driven by nature, then the GDR regime would have enforced an "unnaturally" high female labor force participation, counter to the true preferences. In this case we should observe equally large gender differences in preferences for work in both parts of the country and very little change in the universal gap over time. The absence of a GiG does not seem entirely implausible given the heterogeneous labor market developments in male and female employ-

ment after reunification. Hunt (2002) documents a large drop in the East German female employment rate by 23 percentage points over the four years following reunification, compared to a smaller drop of 17 percentage points for men.[8] This would be consistent, she notes, with both a supply side and a demand side explanation: On the supply side, a convergence in female preferences for home production, i.e. a nature effect, could have been the cause for the disproportionate female exit from the labor market. If this explanation were supported by our data, we should find equally large gender gaps in preferences for work around 1991, which would indicate a relatively greater role for nature than for nurture. On the demand side, the large drop in female employment would be consistent with a convergence in employers' taste for discrimination, which could potentially have had a "reverse nurture effect" on East German women who encountered higher levels of discrimination. Evidence that would support this explanation would show that initially, shortly after reunification, East German women's preferences for work differ less from men's, but could be responsive to the contrasting nurture shock if the experience of higher levels of employer's gender discrimination qualifies as such. Whether a regional gap in gender-specific preferences exists initially, and how it evolves over time, hence reveals the relative roles of nature and nurture for the formation of preferences.

Furthermore, different dynamics in the GiG would be plausible, depending on which of the components of nurture is more important – culture or institutions. We might anticipate that the gender gaps in the East and in the West converge toward the same level for several reasons, the most obvious being that the whole country is now governed by West German institutions. Despite the GDR state's progressivism in terms of the gender roles it promoted, the legislation delegated a large share of family-related obligations exclusively into women's realm of responsibility, as exclusively married women had a monthly day off to perform housework, and only mothers had fewer weekly working hours and were eligible for parental leave (Duggan, 1995). In the absence of these supporting policies, East German women's preferences may converge to those of the West German women, who always had to balance work and family responsibilities on their own account, while men, in their role as breadwinners, were responsible for providing income. Thus, we expect any 1991 GiG to close relatively short-term if institutions are the main channel for nurture.

Different convergence dynamics, however, may result if the pace of the adaptation process depends on the intergenerational transmission, and thus more on a culture channel for nurture: If nurture affects only one generation, we should see a convergence of Eastern and Western gender gaps, speeding up when younger generations enter the sample. A slow convergence (or

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[8]This development was accompanied by a similar development of the gender pay gap. From comparable levels of about 25% at the time of reunification (Krueger & Pischke, 1995), the East German wage gap dropped to 8% in 2013 (Destatis (Federal Statistical Office Germany), 2014).

lack thereof), on the contrary, where the GiG is handed over from one generation to the next, even when exposed to the different conditions in a market economy, would make a case for a sustainable impact of nurture that works mainly through intergenerational transmission of culture, and only to a lesser extent through institutions.

While we refer to the general trend in the aggregate sample as a time effect, we may also distinguish cohort and life cycle effects. The cohort effect refers to the size of the GiG for different birth cohorts at a given point in time. In the presence of nurture, the GiG is predicted to become smaller the younger the cohort, since age is correlated with length of exposure. According to the life cycle effect, we may expect the GiG to become larger with progressing age and time in older cohorts, if the hypothesis holds that gender differences in preferences are nurtured by the different experiences men and women accumulate in a specific society. The older a cohort at the time of reunification, the more likely a given woman will continue to fill the role that was routinely chosen in her "native" society (i.e., as worker in the GDR, or homemaker in the FRG). Thus, only if nurture constitutes an important factor in shaping gender differences in preferences, we will expect that in older cohorts West gender differences over time increasingly exceed East gender differences, whereas under the nature hypothesis any life cycle patterns shall be similar in East and West.

3 Pre-separation Germany: Minimal evolutionary distance assumption

In the preceding Section 2, we formulated hypotheses assuming "minimal evolutionary distance" between the East and West German societies. Hence, before analysing individual preference data to draw conclusions on the separation and reunification affecting gender gaps in work preferences differentially, we should consider a competing, intuitive explanation for potential East-West differences: Maybe East and West Germans differed already prior to separation? In order to be able to treat separation and reunification itself as exogenous shocks that neither population was able to anticipate, we must verify that the historical conditions in Eastern and Western regions in Germany did not differ systematically before the separation in 1949.

To mitigate any concerns about historical differences between the two German regions, we draw on an ancient Prussian data set that contains detailed information on agricultural, industrial and occupational structure, educational systems, and demographic structure at the district level in the second half of the 19th century (for a comprehensive description of the data set, see Becker *et al.*, 2012). These historical data are available at the district level (335 in total) for several years during the 19th century. We augment the relevant indicators with

statistics from the yearbook of the Statistisches Reichsamt (1936), which includes 1930s data on industry sectors, labor force participation, marriage, and fertility behavior.

Using both data sources, we identify districts that later, in succession of WWII, became part of the GDR and those that became part of the FRG (until the fall of the wall in 1989), in order to determine whether systematic structural differences already existed between the two regions in the late 19th and early 20th century. It must be noted that the GDR can be mapped almost entirely with Prussian districts, whereas only about a third of West Germany falls within Prussia, leaving mostly the North and South outside the borders. A map illustrating the match is provided in Appendix A (see Figure A).[9] With respect to our second historical data source, the 1936 Yearbook of the Statistisches Reichsamt, not all districts could be unambiguously sorted into GDR or FRG territory due to overlaps or regions that, after 1945, were no longer part of Germany. Nonetheless, the coverage is still well above 80 percent. Please note that we can abstain from reporting standard deviations since we use full population numbers.

Table 1: Socio-economic indicators in Eastern and Western German regions, pre-separation

	1849*		1882/86*		1933/34**	
	East	**West**	**East**	**West**	**East**	**West**
Employment by sector						
Agriculture %	72.76	74.46	56.32	49.91	18.40	20.24
Handcraft %	12.83	12.83	—	—	—	—
Industry %	6.78	6.88	26.54	31.61	—	—
Industry and Handcraft %	—	—	—	—	42.53	37.93
Services %	7.63	5.83	12.37	12.83	9.06	9.03
Retail %	—	—	4.78	5.66	—	—
Retail and Transport %	—	—	—	—	15.93	16.08
Free occ./Self-employed %	—	—	—	—	14.08	12.16
Total workforce (m)	2.48	2.15	2.13	1.77	14.15	34.31
Female share of employees %	—	—	—	—	34.32	31.28
Girls' share elementary school %	49.37	48.68	50.11	49.51		
Marriages per 1000 inhabitants	—	—	—	—	9.85	8.97
Births per 1000 inhabitants	—	—	—	—	14.40	14.58
Child-woman ratio %***	64.43	64.18	—	—	—	—

Sources: Own calculations based on Prussian data sets of 1849, 1882 and 1886 (Becker *et al.*, 2012) and on Statistisches Reichsamt (1936:27, 37, 306) for 1933/34.
*) Only Prussian districts within the later GDR and FRG boundaries (1948 to 1989). 1882: Total workforce without handcraft.
**) All regions of the later GDR boundaries, including Berlin, and FRG boundaries, excluding Berlin (1948 to 1989).
***) The child-woman ratio is calculated as the number of children under the age of 5 per women aged 15-45.

Table 1 summarizes the indicators related to our research question which we could compile from these sources. It begins by listing the shares of employees in economic sectors in East and West districts for the years 1849, 1882, and 1933. The general trend is that agriculture has declined in relative workforce (from three-fourths to around one-fifth), while the industry sector has gained (from below 7% to around 40%, including handcraft). Services have increased only

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[9]From the 335 Prussian districts, we were able to assign 198 to either FRG or GDR territory.

slightly in importance; retail is first mentioned in 1882, while transport appears as a sector in 1933. Differences between East and West regions seem to evolve in the second half of the 19th century due to a faster industrialization process in the West, which then reverses and partly converges until 1933, as documented by the respective shares of the agricultural and industry sectors in 1882 and 1933. All in all, structural differences in types of economic activity do not appear to vary in a systematic manner between the East and the West prior to the political separation that would alter our interpretation of observed differences thereafter. If any, East German women would have started with *lower* labor force participation into separation, as female involvement in the industry sector has traditionally been lower than in agriculture (Goldin, 1995). We might expect this to bias any potential regional differences in gender differences toward zero, but the most important sector for female employment, the service sector, does not seem to differ in size across regions since the 1880s.

Regarding the link between Protestantism, girls' education, female literacy, and economic outcomes throughout Prussia established by Becker & Woessmann (2008), we also examined gender-specific school enrolment and literacy. Table 1 shows that in the years 1849 and 1886, about 50% of elementary school pupils were girls, both in the East and the West German county average. We do not see any systematic differences here, neither for male nor female literacy rates (only available for 1871, hence not displayed).

The percentage of women among all employees averaged to about one third in pre-WW II Germany, varying between 26% and 38% across regions (Landesarbeitsamtsbezirke). Saxony (East) and Bavaria (West) showed over-proportional and Westphalia (West) and Thuringia (East) under-proportional female labor force participation which resulted in only a marginal difference between the historical halves of Germany (on average 34% of women in Eastern regions were employed as compared to 31% in the West).

With regard to the demographic past, the Prussian data provide numbers on population-age groups from which we derived the child-woman ratio for East and West districts. The child-woman ratio gives the number of children up to age 5 divided by the number of women of child-bearing age (15-45). We calculated 64% for both East and West (matching exactly the average level documented by Becker *et al.*, 2013). The statistics by the Statistisches Reichsamt (1936) further document similar marriage and fertility behavior between later GDR and FRG districts. In 1933, marriage distributions look very much alike between provinces later forming the GDR and those forming the FRG. The number of marriages per 1,000 inhabitants averaged 9.85 (East) versus 8.97 (West). The number of births differs even less between the East and West, counting 14.40 births per 1,000 inhabitants in the Eastern provinces compared to 14.58 in the West. To summarize, our data seem to underpin a similar marriage and absolute fertility

behavior across Germany.

Non-marital fertility, however, is not documented in these data sources. We know that in the late 19th century, non-marital fertility was about twice the level in areas that would later become the German Democratic Republic than in those that would become West Germany, and is still higher today (Klüsener & Goldstein, 2014). To the extent that non-marital family formation is linked to work preferences, this may arguably weaken the notion of minimal pre-separation differences. We would then be unable to attribute any gap in the gap, or GiG, in preferences we observe right after the separation years to the differential nurture provided by the two states. Since, according to Klüsener & Goldstein (2014), Bavaria had similarly large non-marital fertility rates as the Eastern German regions in the 19th century, we are able to investigate this issue in a sensitivity analysis. We will present the results in Section 5, they reveal that the East German gender gap still significantly undercuts the one found in Bavaria. We thus feel fairly confident concluding that this potential threat does not invalidate our identification strategy so that we can proceed with our primary analysis.

4   Methodology

4.1   Data & sample

To study whether the separation treatment and GDR nurture had an effect on gender differences in work preferences, and whether the reunification and the subsequent nurture mix (West institutions and East culture) further affected such a potential regional heterogeneity, we combine data from the German General Social Survey (ALLBUS) with official German register data. The ALLBUS regularly surveys a random sample of the German population on a wide variety of social and political topics as well as demographic background characteristics. The survey began with West German inhabitants in 1980 and has included East German respondents since 1991 (Terwey, 2000). For our research design, we employ three cross-sections (1991, 1998, and 2012) because only these include our dependent variable and they allow us to cover a meaningful time horizon from just after reunification up to two decades later. Additionally, two of these waves provide information on the federal state in which respondents lived when they were 15 years of age (as opposed to where they lived at the time of the survey). By distinguishing between the region in which a respondent spent her adolescence and the region of her present residence, we are able to study the importance of socialization in preference formation and the influence of political environments more precisely than the aforementioned studies, which were limited to birth or residence information only.

Since we are interested in the influence of the two different political regimes formerly in-

stalled in East and West Germany on gender differences in preferences, we reduce the noise potentially introduced by individuals with more heterogeneous cultural backgrounds and restrict our sample to respondents of German citizenship. In doing so we are able to avoid any issues of selective migration from outside Germany to either East or West that relates to work preferences. Furthermore, we exclude individuals above the age of 50 to avoid issues related to early retirement policies, a strategy the German government adopted extensively in order to mitigate unemployment during the restructuring of the East German economy after the formation of the monetary union (Krueger & Pischke, 1995).[10] Finally, by excluding people born before 1940 and using the information on residence during *adolescence* for the remaining respondents, we can essentially rule out any selection concern relating to the arguably greater migration opportunities for East Germans before the GDR regime tightened its departure regulations in the 1950s.

We complement the survey information provided by ALLBUS with official register data compiled from different sources in order to construct a comprehensive set of federal-state-level macro-controls (Destatis, 2015). We will provide further details on the controls in Section 4.3.

4.2 Variables

Main independent variable

The key estimator in our set-up is a dummy variable indicating whether a respondent i lives in one of the former GDR federal states. Thus, the dummy $East_i$ takes on the value 1 if the respondent is a resident of the Eastern part of Germany (the set E) at the time of the interview. The dummy is 0 if, on the contrary, the respondent resides in the Western part of Germany.

$$East_i = \begin{cases} 1 & \forall i \in E = \left\{ \text{East Berlin, Brandenburg, Mecklenburg Pomerania, Saxony, Saxony-Anhalt, Thuringia} \right\} \\ 0 & \forall i \notin E \end{cases}$$

As a sensitivity analysis, we repeated all analyses excluding Berlin residents (East *and* West) and the results are very similar. For the robustness checks in Section 6, we use a refinement of this variable. In some of our cross-sections (1991 and 2012), respondents provide information on the German federal states they predominantly resided in throughout their adolescence. This variable thus takes on the value 1 for all individuals who reported spending their youth in one of the Eastern states and zero for individuals who lived in one of the Western states.

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[10]Moreover, there is evidence from the sociology and psychology literature that individuals' self-concept, i.e., their assessment of aspects they consider important in life, changes substantially in the middle-age life phase (Helson & Soto, 2005). One's assessment of the importance of work and job aspects also seems to change drastically in this phase of life, as retirement grows closer (Kalleberg & Loscocco, 1983; Ekerdt *et al.*, 2000).

Dependent variable: work preferences

To estimate the gender gaps in work preferences, we use the importance of job and work that ALLBUS respondents evaluate, amongst other life aspects, on a 7-point Likert-type scale, where a higher value corresponds with higher importance. All items are presented to the respondents in a random order and are evaluated independently from each other.

Thus, our dependent variable is ordinal and ranges from 1 to 7.[11] In the sample, the 95% confidence interval for the 'preference for work' measure ranges from 6.03 to 6.10 across all individuals. The overall mean for the importance of work is 5.84 in the West sample (5.94 for men and 5.74 for women) and 6.39 in the East sample (6.41 for men and 6.38 for women). We confirm that a higher preference for work in our sample is positively correlated with the probability to work full time and with income.

Shortly after reunification, the unconditional gender gap is larger in the West, while East Germans overall assign a relatively higher importance to work, such that we have a scale shift for both women and men. However, from these figures, we cannot yet draw conclusions on different gender gaps between regions since potentially competing preferences and confounding factors in the macroeconomic environment have not yet been taken into account.

4.3 Estimated model

To investigate the conditional influences of political nurture provided by the socialist institutions in the GDR (East) versus market economy institutions in FRG (West) on the gender gap in work preferences, we estimate the following OLS model using the pooled cross-sections from 1991, 1998, and 2012[12]:

$$Y_i = \sum_{t=1991}^{2012} year_t \boldsymbol{\Theta} + \sum_{t=1991}^{2012} (year_t \times East_i)\boldsymbol{\Gamma} + \sum_{t=1991}^{2012} (year_t \times Female_i)\boldsymbol{\Phi} + \sum_{t=1991}^{2012} (year_t \times East_i \times Female_i)\boldsymbol{\Pi} + \boldsymbol{X_i}\boldsymbol{\Lambda} + \epsilon_i$$

Y_i denotes work preferences and $East_i$ is our dummy variable indicating whether a respondent i was living within the borders of the former GDR at the time of the interview. $Female_i$ indicates a female respondent. The vector $\boldsymbol{\Theta}$ contains the survey-year fixed effects including the constant and thus captures time shifts in Y_i for the reference group, West German men. The vectors $\boldsymbol{\Gamma}$ and $\boldsymbol{\Phi}$, respectively, hold the coefficients that capture the divergence in the time trend for East German men and West German women with respect to the reference group, i.e. the 'regional gap' between men and the 'gender gap' in the West. Our main interest rests with

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[11]Further descriptive statistics for all preference measures are provided in Table A.1 in Appendix A.

[12]We have re-estimated all analyses to be presented using a probit model, and the results are qualitatively identical.

the coefficients contained in the vector $\boldsymbol{\Pi}$, which we obtain from interacting the East dummy with the dummy for female respondents and the survey year, thus revealing *variation in the gender gap between the two regions* directly after reunification and over time (as previously explained, we will refer to this as the gap in the gap or GiG). $\boldsymbol{X_i}$ is a vector of individual preference-related, socio-demographic and macro-level control variables, all of which allow us to flexibly control for federal state and time heterogeneity. ϵ_i denotes the individual error term.

Note that taking the double difference (by gender *and* region) rules out the potential problem of different response behavior due to interpretative differences between East and West respondents. Therefore, we are not so much concerned that the effect might be driven by interpretative differences (i.e., that we encounter a measurement error in the dependent variable), because this would be a problem only if we compared East/West differences for *all* respondents. For our difference-in-difference analysis of the GiG, however, we only need to rely on the sensible assumption that men and women within the Eastern and Western regions interpret the question in the same way. Thus, any potential general "scaling" differences between East and West Germans, which can bias the comparison between men (or women) across regions, would not affect the GiG.

Controls

Our set of controls can broadly be divided into three categories: preference, socio-demographic and macro-level controls. By including the *preference control variables* we evaluate the priority respondents assign to work conditional on preferences for competing means of time use.[13] The reason that we are interested to learn about the conditional importance of work is that we assume individuals to maximize their utility under constraints, i.e., to prioritize according to their preferences when choosing her hours of labor supply. We thus include respondents' evaluation of the importance of: family and own children, leisure and relaxation, friends and acquaintances, and relatives. A probit regression using these life aspects as independent variables confirms that a higher *ceteris paribus* evaluation of the importance of work in our sample corresponds with a higher probability of being employed.

The second set of *socio-demographic* controls poses a few challenges. Even though stated preferences have been shown to causally affect labor market outcomes (Fortin, 2008; Humlum *et al.*, 2012; Zhan, 2015), one might be concerned about the potential endogeneity of, e.g., individual human capital investment and labor market participation decisions. Thus we try to reduce the problem of reversed causality, which may arise even in a natural experiment setting, by including only variables in $\boldsymbol{X_i}$ that cannot be influenced by the individual herself. Among

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[13]To achieve this, we make use of the wide variety of items the ALLBUS provides, which request respondents to evaluate other life aspects than work on the same Likert-type scale.

the individual-level controls, this leaves us with the respondent's age and the parents' level of schooling, as well as the father's occupational status.[14] We exclude individuals' employment status, income, marital status, and number of children from the analysis for intuitive reasons, since they are all likely to be outcomes of an individual's work preferences. Note, however, that the results we provide in the subsequent sections are relatively insensitive to the inclusion of these variables (except for employment status, naturally).

Our third set, the *macro-level* control variables, capture a wide range of economic and demographic federal state characteristics in order to mitigate the concern that any regional differences we find in the gender gaps regarding work preferences are merely driven by structural differences in respondents' economic conditions by virtue of living in a certain federal state. Still today, more than 20 years after reunification, the economic development and labor market conditions in the Eastern states lag behind the West. Goldin (1995) shows a strong relationship between economic development and female labor force participation, and thus one of our main concerns is to account for heterogeneity in economic development. Consequently, we include federal-state level per-capita GDP, deflated at the state-level consumer price index, and the share of GDP in agriculture and industry. Since we are interested in East-West differences in the gender gaps with regard to preferences, we also include gender-specific unemployment rates[15], a measure of public childcare availability[16], the share of church members, and, among them, the share of Protestants.[17] We obtain all macro-level variables from official register data (Destatis, 2015).

5 Results

5.1 The evolution of the gaps

Table 2 shows the OLS-estimated coefficients of the importance of work in four different model specifications. Model I displays the results for the fully interacted model without further controls. Models II, III and IV successively add the preference, socio-demographic, and macro-level controls. Shortly after reunification, in 1991, we see that East German residents assign

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[14]Mothers' occupational status was not recorded in the ALLBUS before 2002. In a robustness check, we include this variable using only the 2010/2012 cross-section to verify that this does not alter our 'gap in the gap' effect.

[15]Ideally, we would also want to include gender pay gaps at the federal-state level. Unfortunately, for the years prior to 2006, this information is not available in the register data. We checked the robustness of our findings for the 2012 cross-sections, for which we have the administrative information. The results were unaffected.

[16]We constructed this measure from official register data as the ratio of the number of public childcare spaces for children below the age of 7 that have been allocated in a federal state in a given year to the number of children below the age of 7 who then lived in the same state.

[17]Becker & Woessmann (2008) show that, historically, female literacy in Germany first spread in regions with a higher share of Protestant church members. We thus include the share of Protestants as a proxy for different rates of female empowerment, which evolved differentially prior to the German separation, in order to avoid over-estimating the effect of the separation on the 'gap in the gap' in work preferences.

significantly more importance to work than West Germans. A point estimate of 0.61 for the East dummy variable tells us that an average East German man's evaluation of work is more than half a point higher than that of a West German man in the reference year 1991. Likewise, West German women's preferences for work fall short of men's, their average evaluation is 0.288 points below the men's. Including the preference controls in Model II reduces the East-West difference somewhat, and increases the gender difference, which supports our initial conjecture that there might be scaling differences in response behavior between East and West, and men and women. It is reassuring to see that the regional gap in the gap (GiG), the coefficient on the interaction of East and Female, is unaffected by this exercise, as well as by the inclusion of the other control sets.

Across all specifications, we see the East-West difference shrinking in 1998 and vanishing to almost zero until 2012. This pattern (initially) applies almost equally to men and women, although women rate work lower than men and the gender gap becomes smaller over time, as explicated in Figure 2, which displays the conditional means of the work preferences for the two genders in both regions as well as their changes over time, using the conditional means from Model IV, our preferred specification. This figures shows that, mainly due to women's increasing valuation of work, the initial West German gender gap of -0.39 falls to a still significant -0.19 within 20 years. Only starting from just above this level in reunification-East Germany (-0.24), this gender gap disappears entirely until 2012, due to a downward convergence of women's and men's preferences for work. Figure 2 further illustrates that, given these parallel trends in a shrinking gender gap, the GiG remains more or less stable at around 0.15 to 0.22 scale points over time, indicating that gender-specific preferences in the East and West follow a similar converging process after reunification, but still at very distinct levels.

The finding of distinct levels in the two regions points toward a lasting nurture effect of political systems. At the same time, we cannot fully rule out nature's play, as even those who had experienced the GDR nurture exhibited a gender gap in work preferences in 1991 – though significantly smaller than West Germans. Restricting attention to these 1991-figures, the mere existence of an Eastern gender gap leaves room for two interpretations: One may conclude that, possibly, the GDR policy enforced East German women's participation in the labor force at a higher level than they would have chosen themselves. An alternative explanation may derive from the fact that, despite greater equality of men and women in the East German society, some roles and responsibilities were still divided along gender lines (see Section 2). However, we do not observe a convergence of the East gender gap toward the Western level over the course of time after 1991, as we would have expected, had the high participation of women in East Germany been fully diametric to their "natural" preferences. Since we find Western levels

slowly catching up with the East instead, the second interpretation is arguably more plausible.
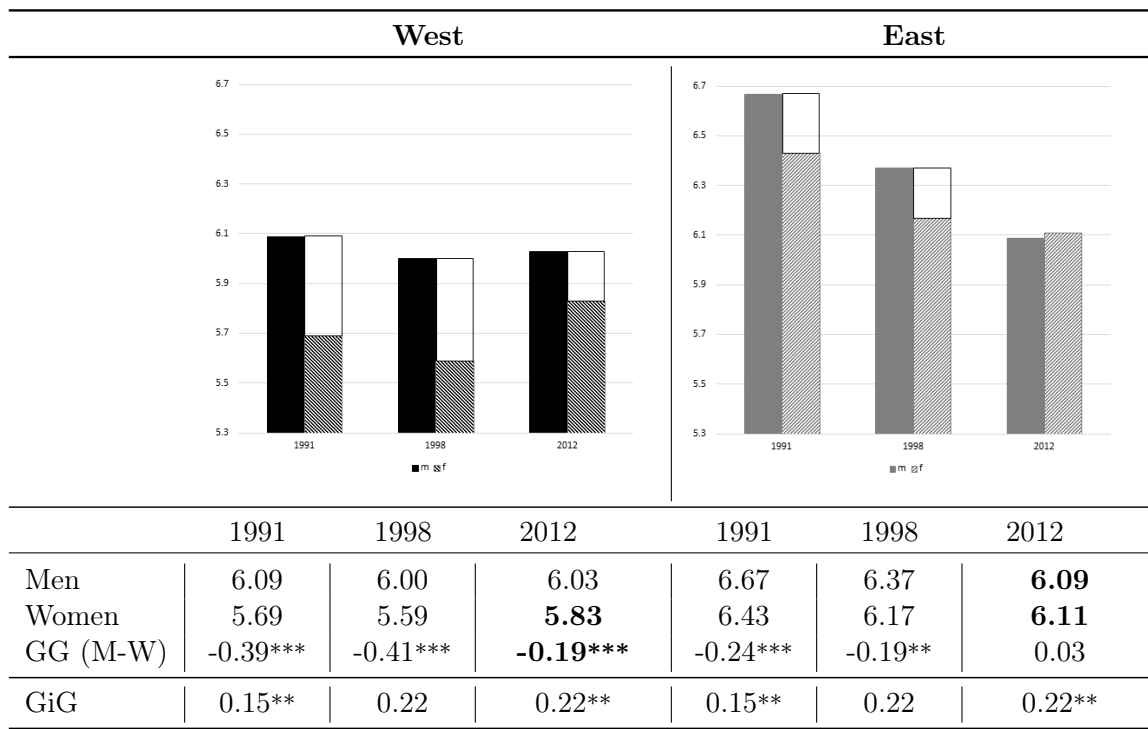
The regionally heterogeneous evolution of the gender gaps in work preferences, conditional on preferences for family, is also consistent with an application of the "learning models" proposed by Fogli & Veldkamp (2011) and Fernández (2013). The idea is that women make labor market decisions in a setting of incomplete information, which can thus be characterized by a learning process. In these overlapping-generations models, if more women can be observed participating in the labor force, the information signal about the consequences of participating becomes less noisy to the individual female decision-maker. This may also explain why East German women, with a longer and more comprehensive collective experience of labor market integration compared to West German women, may have extended their "head start" in work preferences.

Table 2: Preferences for work

VARIABLES	I	II	III	IV
East	0.610***	0.568***	0.554***	0.582***
	(0.057)	(0.056)	(0.058)	(0.127)
Female	-0.288***	-0.396***	-0.393***	-0.394***
	(0.057)	(0.060)	(0.060)	(0.065)
East x Female	0.156*	0.148**	0.149**	0.150**
	(0.075)	(0.068)	(0.066)	(0.067)
1998	-0.121	0.072	0.053	0.077
	(0.083)	(0.088)	(0.090)	(0.104)
East x 1998	-0.154	-0.170	-0.159	-0.217
	(0.135)	(0.136)	(0.126)	(0.129)
Female x 1998	0.019	-0.032	-0.019	-0.018
	(0.155)	(0.156)	(0.156)	(0.158)
East x Female x 1998	0.046	0.089	0.070	0.068
	(0.180)	(0.173)	(0.170)	(0.172)
2012	-0.098	-0.075	-0.078	0.010
	(0.067)	(0.058)	(0.063)	(0.077)
East x 2012	-0.434***	-0.417***	-0.407***	-0.520***
	(0.085)	(0.074)	(0.073)	(0.088)
Female x 2012	0.226**	0.204**	0.198**	0.200**
	(0.083)	(0.084)	(0.080)	(0.084)
East x Female x 2012	0.074	0.067	0.070	0.070
	(0.119)	(0.119)	(0.108)	(0.119)
Constant	6.020***	2.860***	3.405***	3.773***
	(0.047)	(0.272)	(0.324)	(0.394)
Preference controls	NO	YES	YES	YES
Socio-dem. controls	NO	NO	YES	YES
Macro controls	NO	NO	NO	YES
Observations	5,165	5,141	5,141	5,141
R-squared	0.064	0.213	0.222	0.223

Note: Robust standard errors in parentheses (clustered at the federal state level). *** p<0.01, ** p<0.05, * p<0.1

Figure 2: Conditional means for work preferences in West and East by gender and year

	West 1991	West 1998	West 2012	East 1991	East 1998	East 2012
Men	6.09	6.00	6.03	6.67	6.37	**6.09**
Women	5.69	5.59	**5.83**	6.43	6.17	**6.11**
GG (M-W)	-0.39***	-0.41***	**-0.19*****	-0.24***	-0.19**	0.03
GiG	0.15**	0.22	0.22**	0.15**	0.22	0.22**

Note: Black bars refer to male and grey bars to female respondents. Note that the y-axis is zoomed in because more than 95% of our sample assign at least a value of 5 to the importance of work. Calculations of conditional means are based on coefficients from the full estimation model; see Table 2 in the Appendix. Stars indicate joint F-test significance at the *** 1%, ** 5%, and * 10% level. Bold figures indicate joint F-test significance (below 10%) for within-group changes over time with respect to the 1991 value.

5.2 How much nurture does it take? A cohort analysis

Having identified an overall nurture effect of the political system of the GDR on gender differences in work preferences, we are now interested in disentangling the sources more precisely: Does the GiG result from pure exposure to different regimes, and can we determine a critical length of exposure for a nurture effect to unfold? And how do work preferences that have been shaped in the East German socialist system, but with varying time intensity, behave when confronted with the conditions of the West German market economy?

We exploit the exogenous variation in age in our sample to approach these questions since it allows us to compare different subgroups that naturally vary in treatment intensity. East German cohorts differ by length of exposure to the GDR system, but also with respect to the point in time of their life when they were hit by the 'shock of reunification' and had to adapt to the dramatic changes that East German institutions and markets were undergoing in the subsequent years. While the youngest respondents in our sample had only experienced their childhood and adolescence in the GDR, and were about to commence their work lives in reunified Germany, the oldest had already been employed for a substantial number of years in the socialist system.

We run separate regressions for four different birth cohorts, defined in a manner to achieve a reasonable degree of variation in their experiences with the GDR regime (cohort effect), and to have enough observations for three pseudo-panel cross sections (life cycle effect). Both dimensions together will allow us to compare the same age groups over time (time effect). For our first group we choose those who were born and raised in the GDR and were impacted by reunification after having spent a substantial share of their working lives in the socialist regime (the eldest cohort 1, born 1953-59). This cohort has consciously experienced both regimes and arguably might have faced the greatest challenges in adapting to the new labor markets and institutions because they were already 32-38 years old around reunification. For the second group we examine those who experienced the GDR mainly during childhood, adolescence and when entering the labor market but spent most of their work life in reunified Germany with Western labor market institutions (the second eldest cohort 2, born 1960-66, aged 25-31 around reunification). For the third group the transition took place quite early in life (just after adolescence) and adaptation to the Western system may have been less challenging, most likely they did not collect considerable employment experience within the GDR, as they were aged 18-24 around reunification (cohort 3, born 1967-73). Finally, we look at the youngest cohort (cohort 4, born 1974-80), i.e., those without any direct employment experience within the GDR or its labor market, being 16 years of age or younger at the time of reunification, and thus having only experienced the new West German institutions in their working life. Over the

full observation period from 1991 to 2012, we are able to observe the older and intermediate cohorts at three points in time – 1991, 1998, and 2012. The youngest cohort is only observed twice, as they were still too young to be surveyed (and to be active on the labor market) in 1991.

Our cohort regression analyses reveal very different gender dynamics in preferences for work in East and West Germany across age groups, which result in very different GiGs over time (the full set of estimated coefficients is provided in Appendix-Table A.2). As illustrated in Figure 3, we observe a persistent GiG for the oldest cohort throughout the 1990s, which is due to significantly more pronounced differences between genders in the West than in the East. Until 2012 male and female preferences in both parts of the country converge, such that the GiG disappears over time for this cohort. The second and third cohorts of 1960-1973-borns, on the contrary, who experienced reunification in their 20s, head into unified Germany and into their working life without displaying any gap in the gap in 1991, due to similar gender gaps in the East and West, but then develop a statistically significant one over the course of time. Although all groups share a common trend of work becoming increasingly less important over time, by the year 2012, the average GiG in the intermediate cohorts has grown to a similar size as the GiG displayed by the (then same-aged) older cohort 14 years earlier in 1998, and for precisely the same reason: gender preferences converge in the East – predominantly due to the men lowering their valuation – while they do not show a systematic evolution in the West.

Interestingly, the youngest cohort displays a different pattern. In 1998, they are in their early twenties and first observed, West German respondents hardly report any gendered preferences, while the East German women appear to care *less* for work than men. Thus, we find a reverse GiG that is remarkable in size. This finding could possibly result from the transition shock, which may have initiated selective migration and/or a reverse nurture effect. With respect to the first effect, it is important to note that this youngest group is the most likely to be highly selected: Hunt (2006) shows that in 1990-2000, among the 18-25-year-olds, East German women were 89% more likely than men to emigrate to the West. Thus, for this cohort, we might expect the gender difference in work preferences in the West to be biased toward zero, while it could be upward biased in the East.[18] As for the reverse-nurture effect the argument relies on studies showing that the reunification had adverse effects especially on female employment, as noted earlier. Hunt (2002) shows that, in the years following reunification, women in East Germany were disproportionately affected by unemployment, and Witte & Wagner (1995) demonstrate that these women, as opposed to the general trend of sharply declining fertility

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[18]Unfortunately, in 1998, the ALLBUS did not include the region where respondents lived throughout their adolescence; thus, we rely on residence information at the time of the interview for this cross-section while we will provide selectivity checks for the other years in the next section.

in the East, showed a *higher* likelihood of having children. This is also confirmed in a recent study of Chevalier & Marie (2015).
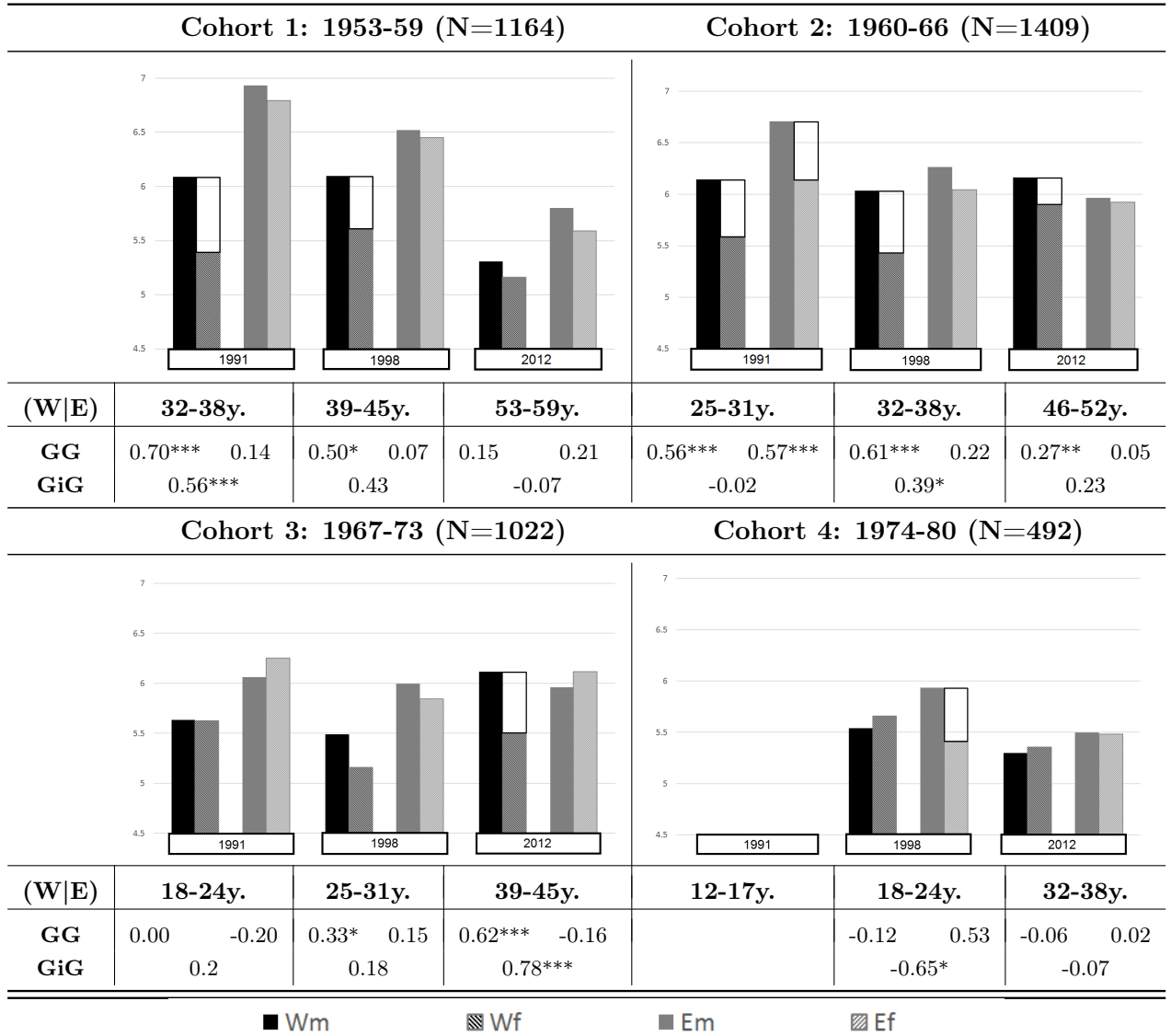
Age at first birth also differed considerably between East and West German women at the end of the 1990s. As a result, the number of children is higher for the early twenties in the East than in the West; female employment rates also differ atypically at that age. A sensitivity analysis including these variables in the regression consequently yields a smaller GiG. Additional support for this family-timing explanation is provided by the subsequent responses of this cohort. When we observe them in their thirties in 2012, 14 years later, the East gender gap has reduced to essentially zero. As a result, the reversed GiG has vanished as well. The different dynamics in the GiG help us reveal which of the components of nurture is more important – culture or institutions. Given that the whole country took over West German institutions and that we observe the GiG to close for younger cohorts, and not be culturally transmitted by the parent generation, strongly suggests institutions as the main channel.

To identify the "critical age" or the decisive length of exposure to the GDR for political nurture to have a long-lasting effect, we analyse the GiG in preferences for work in the 2012 cross-section separately for even smaller age groups. As a matter of fact, the GiG as a treatment effect is detectable only for those who are 38 years and older in 2012, i.e., they were at least 16 years of age at the time of reunification. We therefore conclude that individuals must have spent at least 15 years of their life in the GDR in order to be influenced by a long-lasting nurture effect. The pronounced GiG for the older cohort, together with a non-detectable GiG for the younger cohort, who have not received the critical level of GDR nurture, makes a causal link even more plausible.

6   Causality explorations

So far, our analyses provide evidence that nurture, procreated by the diverging social structure and cultural context in political regimes, can influence gender differences in preferences. However, they do not necessarily exclude alternative channels through which the effect might be driven. In this section, we explore competing explanations for regional differences in the gender gaps in work preferences, including selective migration *after* reunification, the possibility that a specific Eastern federal state might be driving the results, and the special case of the Western state of Bavaria because it had a non-marital fertility rate similar to the Eastern states prior to political separation.

Figure 3: Conditional means for work preferences for cohorts 1-4 by region, gender and year

	Cohort 1: 1953-59 (N=1164)			Cohort 2: 1960-66 (N=1409)		

(W|E)	32-38y.		39-45y.		53-59y.		25-31y.		32-38y.		46-52y.	
GG	0.70***	0.14	0.50*	0.07	0.15	0.21	0.56***	0.57***	0.61***	0.22	0.27**	0.05
GiG	0.56***		0.43		-0.07		-0.02		0.39*		0.23	

	Cohort 3: 1967-73 (N=1022)			Cohort 4: 1974-80 (N=492)		

(W|E)	18-24y.		25-31y.		39-45y.		12-17y.		18-24y.		32-38y.	
GG	0.00	-0.20	0.33*	0.15	0.62***	-0.16			-0.12	0.53	-0.06	0.02
GiG	0.2		0.18		0.78***				-0.65*		-0.07	

■ Wm   ▨ Wf   ■ Em   ▨ Ef

Note: From left to right, bars show conditional means for West men and women, and for East men and women, calculated from the full model (see Table A.2 in the Appendix). Note that the y-axis is zoomed in because more than 95% of our sample assign at least a value of 5 to the importance of work.

6.1   Youth vs. residence and mover analysis

Our first objective in this section is to rule out the possibility that selection issues resulting from East-West migration drive our results. Although we can essentially exclude selective migration before or during separation as a threat to identification in our analytical set-up (see section 2), we may have reason to be concerned about the migration flows after reunification. Right after the fall of the wall (and via Czechoslovakia and Hungary even before that), a substantial labor migration from East to West began. The migrants were highly selective in terms of education level, gender, and, presumably, labor market attachment. If highly educated East German women with an over-proportional labor market attachment (for the GDR) comprise a substantial portion of our West German residence sample, our results for the East-West gaps are likely to be underestimated. To examine this, we take advantage of the fact that, for two of our cross-sections (1991 and 2012), ALLBUS respondents provide information on the federal state in which they lived when they were 15 years old.

Columns 1 and 2 of Table 3 serve as the reference for our main analyses presented in Section 4; here we use, as before, the current residence to sort respondents into the East and West categories.[19] In columns 3 and 4, we sort them according to the region they lived in during their adolescence. Finally, for the migrant analysis in columns 5 and 6, we restrict our sample to those respondents who live in the West at the time of the interview, i.e., by construction must have migrated to the West if they report having spent their youth in an Eastern federal state – and thus examine the gender gaps in preferences between "lifelong" West Germans and East-West migrants. Since they have been exposed to the socialist system and its institutions during a rather formative period of their lives, we expect to observe greater preference gaps between this group of migrants and the lifelong West sample.

The composite effects in Table 3 show the gender gaps in preferences for work by region and year, and reveal the resulting GiGs over time. The results support our previous findings. Comparing the estimations using the adolescence information to the estimations using residence information confirms that the selection bias within the East German population seems partly negligible, as the gender gaps as well as the gaps in the gaps we obtain are very similar. Compared to the original residency sample, the gap in the gap in 2012 is no longer statistically significant and is smaller in magnitude (though still of similar size as the original one in 1991). This is likely a result of elevated migration flows within the country in more recent years, allowing the respective population samples to intermix and individuals to self-select, possibly also with regard to their work and family model preferences, so that the West gender gap is

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[19]Note that the estimated coefficients differ slightly from those presented in Table 2 since, for the sake of comparability, we re-estimated the model excluding the 1998 cross section.

smaller and the positive Eastern gap is larger.

Within the West German population, as the estimation results for East-West migrants show, a selection bias due to the inflow of employment-oriented female migrants from East Germany can be traced in the year 1991. As a result, we see reverse gaps between female and male East migrants (comparing the positive GG East in the column E-W Migrants), with the moving women being much more work-oriented than the men. The resulting 1991-GiG in preferences for work amounts to a full Likert-scale grade (1.016). The fact that it is much larger than the one between our East and West residence samples (0.154) suggests the latter to be a lower bound estimate of the true effect. With a changing composition of migrants, the starting GiG in preferences for work disappears statistically between 1991 and 2012 (when the point estimate even shows a reversal to -0.317).

Table 3: Youth vs. residency: The gender gap in preferences for work by region and year

	East Residency		East Adolescence		E-W Migrants	
Work	N=3509		N=3344		N=1927	
	1991	**2012**	**1991**	**2012**	**1991**	**2012**
GG West	-0.361***	-0.151***	-0.376***	-0.116*	-0.396***	-0.122**
GG East	-0.207***	0.09	-0.199***	0.045	0.62**	-0.439
GiG (E–W)	0.154*	0.241***	0.177**	0.161	1.016***	-0.317

Note: Calculations based on coefficients from the full model (see Table A.3 in the Appendix), using the 1991 and 2012 cross-sections.
In columns 1 and 2, we use 'current residency' to sort respondents into the East and West categories, and for columns 3 and 4, we replicate this procedure but sort respondents according to whether they spent their youth in an Eastern or Western federal state (this information is not available in the ALLBUS 1998 cross-section). For columns 5 and 6, we restrict our sample to those respondents who live in the West at the time of the interview, i.e., those who migrated to the West if they spent their youth in an Eastern federal state.
Stars indicate joint F-test significance at the *** 1%, ** 5%, and *10% level. Bold figures indicate joint F-test significance (below 10%) for within-group changes over time with respect to the 1991 value.

6.2   Heterogeneity across Eastern states

Another concern we want to address is whether our estimated "East effect" on gender differences in preferences, rather than representing a general East German particularity, is in fact due to only one specific Eastern federal state. Despite controlling for the heterogeneous environments with our set of macro control variables, the effect we observe may be driven by some environmental differences the respondents are exposed to in a particular GDR state rather than by general exposure to a different political regime. Naturally, the GDR states were not homogeneous in terms of industry structure, economic power, etc. – but neither were the West German states. The GDR regions also varied in distance to the inner-German border and by reception of West German radio and TV channels. Variable exposure to West German programmes also

implies a natural variation in exposure to respective norms that may contribute to preference formation. A study by Hyll & Schneider (2013), for instance, indicates that TV consumption in the former GDR was positively correlated with material aspirations. We approach this issue by applying the same regression analysis as before, but differentiating the GiG for the five former GDR states. If the effect were distributed homogeneously across federal states, we should observe similarly sized coefficients for each of the Eastern federal states' interaction dummies.

Table 4 shows our standard regression with this particular modification. Including separate interactions of the female dummy for all Eastern federal states allows us to examine potential heterogeneity in the GiG across the different Eastern states. The West German states (excluding Bavaria) constitute the reference group. As we can see from the unanimously positive signs of the coefficient estimates, gender differences in preferences for work in 1991 are larger in all Eastern federal states compared to the West, though not all marginal effects meet statistical significance at conventional levels – presumably due to the small group sizes. In 2012 none of the state gender gaps differs from the one observed in 1991 (as none of the coefficient estimates adds a statistically significant marginal 2012-effect). Hence, our results are largely in line with the GiG we found for the aggregated East population, with the exception of East Berlin, where, not surprisingly, the gender gap in preferences differs quite markedly from the Western one (though still not at a statistically significant level).

6.3   A Bavaria placebo test

As a final causality exploration we investigate the special case of the Western German state of Bavaria. Since, according to Klüsener & Goldstein (2014), Bavaria had similarly large non-marital fertility rates as the Eastern German regions in the 19th century, we are interested in any traces of a potentially long-lasting impact of differential non-marital fertility on work preferences. For this purpose we added an indicator for respondents who report Bavaria as their place of residence at the age of 15 and its interaction with Female the regression. The latter is displayed alongside the interactions for the Eastern federal states in Table 4, where the West German states (excluding Bavaria) constitute the reference group. The marginal Bavaria effect in 1991 has a positive sign, similar to the Eastern states, but at a lower level and only comparable in size with Berlin East. This implies that, if any, a potentially positive placebo GiG for Bavaria, still significantly undercuts the one found with regard to the former GDR. We thus feel fairly confident concluding that this potential threat does not invalidate our identification strategy, and that GiG is most likely a result of the GDR nurture. Even if the GiG were nourished in part by differing non-marital fertility behavior prior to separation, this does not undermine our argument of social nurture rather than biology driving the formation of

Table 4: OLS estimates for the gap in the gender gap, by federal state in which respondents resided during adolescence

Female dummy interacted with:	1991	2012
Brandenburg	0.169**	0.133
	(0.077)	(0.190)
Mecklenburg Pomerania	0.165	-0.093
	(0.122)	(0.157)
Saxony-Anhalt	0.274**	-0.101
	(0.094)	(0.151)
Saxony	0.132	-0.010
	(0.076)	(0.141)
Thuringia	0.274*	-0.099
	(0.143)	(0.210)
East Berlin	0.085	-0.310
	(0.142)	(0.188)
Bavaria (West)	0.087	-0.199***
	(0.053)	(0.064)
Constant		YES
Preference Controls		YES
Socio-dem. Controls		YES
Macro controls		YES
Observations		3,344
R-squared		0.173

Note: Estimates from the full model using the 1991 and 2012 cross sections (see Table A.3 in the Appendix). Respondents are sorted into the federal states according to the residence information they report for when they were 15 years old. In addition to the single 'East dummy', the model includes separate interactions with the female dummy for each Eastern federal state, which are displayed. It also includes indicators for respondents who have spent their youth in Bavaria, and the interaction with female.
Robust standard errors in parentheses, clustered at the federal state level. Significance levels are indicated by *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

preferences. Our conclusion is supported by the subsequent evolution of the marginal Bavarian gender gap into a negative one in 2012, indicating that women in Bavaria rate work much less important compared to men than in the whole rest of West Germany. This development contrasts the evolution of non-marital fertility rates, where the elevated levels in Bavaria and the East German states still persist today (Klüsener & Goldstein, 2014). We thus conclude that the two phenomena are likely independent.

7 Discussion & conclusion

In summary, we find that women, on average, differ systematically from men in their preferences for work, but the difference over the whole observation period is much smaller in East Germany than in West Germany. That is, a regional gap in the gender gap (GiG) existed around the time of reunification and still persists in 2012, even though the gender gaps are decreasing in both parts of the country. These findings confirm the notion that political regimes can substantially nurture gender differences in preferences. The conclusion that the GiG is most likely caused by the natural experiment of exposure to differing political and social systems is supported by our investigation of potential differences before separation based on historical data sources.

Our second aim was to gain a better understanding of the channels through which the GDR nurture deploys its long-lasting effect and to exclude alternative explanations. For example, differences in the individual valuations of work could be driven by structural differences in the East and West German labor markets or institutions closely linked to them, such as the availability of public child-care. We show that our findings remain robust to the inclusion of an exhaustive set of covariates from official register data that allowed us to flexibly control for time-variant differences at the federal state level. With regard to the channels, we employed a cohort analysis to trace out the nurture mechanism that shapes preference formation. It reveals that age at exposure and length of exposure are important determinants of the size of the effect, which is not detectable in 2012 among respondents who were younger than 16 years in the reunification year. More specifically, at the time of reunification, a GiG in preferences for work existed only among the 1953–1960 born cohort, but for the middle cohorts it did not evolve until later. In all three of these cohorts, regional disparities seem to widen over the life cycle, since East German women and men exhibit rather similar preferences for work at any age, whereas the gender gap in West Germany appears to either remain stable at a higher level, or to increase in family formation age. For the youngest cohort, born 1974–1980, a GiG did not develop at all. We interpret these patterns as further evidence for the nurture hypothesis, as well as evidence that it is working mainly through institutions rather than culture. The

patterns strongly support the notion that gender differences in preferences are, to a large extent, a product of social structure, which determines how likely it is that men and women experience similar roles in a given society, e.g., as breadwinners or care-providers. The fact that the GiG has not been transmitted to the younger generation and that we identify a critical age emphasizes the role of institutions, and speaks against culture as the main component of social nurture.

Comparing the preferences in East and West from older to younger cohorts also suggests that, after reunification, both parts of the country exhibited essentially the same overall pattern of gender convergence. The socialist system with its "Leitbild" of a working woman, and hence longer and more comprehensive collective experience of women who were fully integrated into the labor market, just seems to have had an accelerating impact on this trend. With respect to gender equality in work preferences, East Germans indeed appear to have had a head start into modernism, prompted by the political agenda, and much earlier commenced a development that would only later begin in West Germany.

Our findings contribute to a better understanding of how gender differences in preferences evolve and align with real (labor) market outcomes observed in East and West Germany. In dealing with both external and internal validity issues, our analysis of stated preference dynamics with regional variation complements the experimental literature on gender differences in preferences. Using real-world work preferences, it demonstrates the power of preference manipulation in a natural experiment setting, thereby making an even stronger case for the nurture hypothesis than previous studies have done. We studied two societies that share a common past and cultural identity up to an exogenously imposed separation and, up to this point, were characterized by a very small evolutionary distance. By exploiting a variation in treatment intensity (length of exposure to the GDR) that can hardly be replicated in a lab or field experiment, we were able to disentangle distinct mechanisms (GDR socialisation vs. GDR work experience) that promote cohort-specific patterns in the differential gender gaps in East and West after reunification.

Our insights into the mechanisms that determine gender differences in preferences, and thereby in economic decision-making, are particularly relevant for the design of equalizing policies. Understanding whether the *nature* or the *nurture* component has a stronger influence on shaping preferences may serve as a guide in devising effective strategies to target gender-specific inequalities in labor market outcomes. Our results indicate that, unlike evolutionary adaptation mechanisms that would require several thousands of years for gender differences in preferences to either be imprinted into our genes or wiped out, relatively short-term changes of social structure can have detectable effects already. Policy measures that actively change the

roles that women and men are assigned to in a society (e.g., female quotas in boards or parental leave months dedicated to fathers) may thus have a positive effect on gender equality in labor market outcomes, not only directly through increasing a gender's respective representation, but also indirectly, as they have the potential to shift female and male preferences to fill these roles. Our finding that preferences for work vary systematically with the political and institutional setting during one's youth, at the height of preference formation, underlines the particular impact of nurture in this context.

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A Appendix

Figure A.1: Geographical overlap of Prussian counties within the contemporary German borders

Table A.1: Descriptive statistics for preference measures for work and other aspects of life

Variable[a]	**n**	μ	σ
Job and work	5165	6.06	1.22
Own family and children	5166	6.28	1.4
Leisure time and relaxation	5167	5.78	1.22
Friends and acquaintances	5165	5.72	1.18
Relatives	5165	5.1	1.52

[a]Question: The cards here list various spheres of life. We would like to know how important each of these spheres of life is for you.

Table A.2: Cohort Analysis: Gender gap in preferences for work by region and year

VARIABLES	1953-59	1960-66	1967-73	1974-80
East	0.846***	0.567***	0.427*	0.394
	(0.201)	(0.154)	(0.215)	(0.366)
Female	-0.699***	-0.556***	-0.004	0.119
	(0.120)	(0.103)	(0.120)	(0.178)
East x Female	0.558***	-0.018	0.199	-0.649*
	(0.135)	(0.133)	(0.191)	(0.341)
1998	0.210	-0.064	0.243	
	(0.199)	(0.203)	(0.263)	
East x 1998	-0.424**	-0.337	0.079	
	(0.194)	(0.217)	(0.217)	
Female x 1998	0.204	-0.054	-0.325	
	(0.265)	(0.163)	(0.203)	
East x Female x 1998	-0.132	0.405	-0.022	
	(0.285)	(0.252)	(0.334)	
2012	-0.834**	0.174	0.520	0.321
	(0.286)	(0.330)	(0.379)	(0.560)
East x 2012	-0.351	-0.763***	-0.584**	-0.194
	(0.294)	(0.168)	(0.245)	(0.315)
Female x 2012	0.551**	0.286	-0.619***	-0.063
	(0.230)	(0.185)	(0.114)	(0.284)
East x Female x 2012	-0.625	0.243	0.583*	0.575
	(0.364)	(0.290)	(0.287)	(0.618)
Constant	3.037	2.222*	2.602***	-0.387
	(2.231)	(1.179)	(0.866)	(1.763)
Preference controls	YES	YES	YES	YES
Socio.-dem. controls	YES	YES	YES	YES
Macro controls	YES	YES	YES	YES
Observations	1,164	1,409	1,022	492
R-squared	0.250	0.260	0.219	0.211

Note: Estimates from the full model, estimated separately for each of the four cohorts.
Robust standard errors in parentheses, clustered at the federal state level. Significance levels are indicated by
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.3: Preferences for work: Youth in the GDR

VARIABLES	(I) East Residency	(II) East Adolescence	(III) E–W Migrants	(IV) Fed. States
East	0.479***	0.513***	0.003	0.479***
	(0.125)	(0.098)	(0.219)	(0.106)
Female	-0.361***	-0.376***	-0.396***	-0.388***
	(0.061)	(0.060)	(0.072)	(0.062)
East x Female	0.154*	0.177**	1.016***	—
	(0.075)	(0.070)	(0.304)	—
2012	0.016	-0.000	-0.062	-0.002
	(0.078)	(0.094)	(0.107)	(0.104)
East x 2012	-0.470***	-0.376***	0.418*	-0.339**
	(0.106)	(0.125)	(0.229)	(0.138)
Female x 2012	0.210**	0.260***	0.274**	0.292***
	(0.083)	(0.087)	(0.099)	(0.092)
East x Female x 2012	0.087	-0.016	-1.333***	—
	(0.121)	(0.132)	(0.294)	—
Bavaria	—	—	—	-0.029
	—	—	—	(0.083)
Bavaria x Female	—	—	—	0.087
	—	—	—	(0.053)
Bavaria x 2012	—	—	—	-0.012
	—	—	—	(0.083)
Bavarian x Female x 2012	—	—	—	-0.199***
	—	—	—	(0.064)
Brandenburg x Female	—	—	—	0.169**
	—	—	—	(0.077)
East Berlin x Female	—	—	—	0.085
	—	—	—	(0.142)
Sax.-Anhalt x Female	—	—	—	0.274**
	—	—	—	(0.094)
Meck. Pom. x Female	—	—	—	0.165
	—	—	—	(0.122)
Saxony x Female	—	—	—	0.132
	—	—	—	(0.076)
Thuringia x Female	—	—	—	0.274*
	—	—	—	(0.143)
Brandenburg x Female x 2012	—	—	—	0.133
	—	—	—	(0.190)
East Berlin x Female x 2012	—	—	—	-0.310
	—	—	—	(0.188)
Sax.-Anhalt x Female x 2012	—	—	—	-0.101
	—	—	—	(0.151)
Meck. Pom. x Female x 2012	—	—	—	-0.093
	—	—	—	(0.157)
Saxony x Female x 2012	—	—	—	-0.010
	—	—	—	(0.141)
Thuringia x Female x 2012	—	—	—	-0.099
	—	—	—	(0.210)
Constant	4.824***	4.940***	3.779***	4.928***
	(0.347)	(0.275)	(0.880)	(0.344)
Preference controls	YES	YES	YES	YES
Socio.-dem. controls	YES	YES	YES	YES
Macro controls	YES	YES	YES	YES
Observations	3,509	3,344	1,927	3,344
R-squared	0.167	0.172	0.113	0.173

Note: Columns report estimates from the full model, using either residency at the time of the interview (I), or reported residency during adolescence for the full sample (II) and for Western residents only (III). Column IV reports the estimates from a model including separate interactions of the Female dummy and each of the Eastern federal states, and for the Western state of Bavaria as a placebo test. Here, too, we use reported residency during adolescence to sort respondents into the federal state. All models use the 1991 and 2012 cross sections.

Robust standard errors in parentheses, clustered at the federal state level. Significance levels are indicated by *** $p<0.01$, ** $p<0.05$, * $p<0.1$.