LONG-TERM TRENDS IN THE GENDER INCOME GAP WITHIN COUPLES:

WEST GERMANY, 1978–2011

Abstract: Over the past 50 years, women in Western societies have increased their level of education and their participation in the labour market. Nevertheless, they continue to contribute significantly less to a couple's income than their male partners. Here, we ask how the gender income gap within couples has changed over the past decades and in which groups it has decreased or increased. We synthesize streams of argumentation regarding the sources of changes in the gap into one broad perspective on the changing opportunities available to coupled women to convert their income potential into actual income contributions, and how this relates to the income trends of their male counterparts. Using German Microcensus data, we show that West German women contributed 16.5% to couples' income in 1978 and had increased their contribution to 30.1% by 2011. Our decompositions reveal that women contributed to this mostly by changes in composition, namely due to being more highly educated and working longer hours. Women contributed very little due to increased income returns. Income trends of non-working women are a notable exception. In contrast, men contributed to the trend with changes in income returns. Their higher education and full-time premiums have been a strong counter to the overall trend.

Keywords: relative incomes, gender inequality, couples, childcare policies

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Acknowledgements: We are very grateful for comments on this article by Gundula Zoch. Susanna Engel provided very valuable assistance finishing this manuscript. This research was funded by a grant from the Baden-Württemberg-Stiftung.

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1. Introduction

Globally, women typically earn lower wages and work fewer paid hours compared to their male partners, which leads to a significant gender income gap within couples (van Bavel and Klesment, 2017; Dieckhoff *et al.*, 2019). Despite large reductions in the disadvantages faced by women in terms of education and labour force participation in all Western societies, this gap persists.

The question that arises, however, is: why has the large rise in women's income potential (due to their higher level of education) not been matched by a corresponding rise in their contributions to a couple's income over time? Despite extensive research into the gender income gap within couples from a cross-sectional perspective, we do not have sound knowledge about its trend over time. More specifically, we lack research about how much specific groups matter to the overall trend. Have highly educated women driven the general trend and have highly qualified men countered it? How important are increased public transfers for mothers with young children to the overall trend?

To address such questions, we first review argumentations about differences in the gender income gap within couples and discuss how they can help us understand changing trends over time. We focus on four major lines of reasoning: (1) the role of educational expansion and changing educational returns for both genders; (2) the changing labour market integration of mothers; (3) the availability of long and paid child-related employment breaks; and (4) women's increased income from alternative sources, such as unemployment benefits. Our goal is to synthesize streams of argumentation into one broad perspective on the changing opportunities of coupled women to convert their income potential into actual income contributions.

Second, we offer descriptions of the gender income gap within couples using German Microcensus data, covering a large period of time (from 1978 to 2011) with a large representative sample. This helps us track long-term change, even for small and hitherto hard-to-study groups.

Third, we test the explanatory power of the characteristics of women and their partners on trends in the average gender income gap within couples by estimating Kitagawa–Oaxaca–Blinder decompositions over time.

West Germany serves as an interesting case for our purposes. Since its foundation, it has been a conservative welfare state with few employment opportunities for women (Grunow and Aisenbrey, 2016). It created strong incentives for mothers to look after their children themselves for long periods after birth (Gangl and Ziefle, 2015). Over the past 50 years, however, gender norms have changed. This has increased the opportunities available to women to convert their income potential into substantial contributions to a couple's income. Nevertheless, the West German welfare state has remained conservative in many respects, which led to opposing incentives for women, especially for mothers of young children. West Germany therefore offers an excellent case study of how such changing and sometimes contradicting opportunity structures contribute to trends in the gender income gap among couples.

2. Explaining Trends in the Gender Income Gap Within Couples

2.1 Educational expansion and educational returns

The most profound way to augment the income potential of women over the past decades has been to increase their educational attainment and, as a consequence, open up well-paid jobs for them (Klesment and van Bavel, 2017). Men have also profited from educational expansion, with increased attainment in higher education opening up more rewarding jobs for a higher share of

men. However, in contrast to women, men's trends in educational attainment have been less steep, and women have outpaced men in earning higher education certificates in the past years.

In previous research, education has been considered the key explanation for differences in the gender income gap within couples. Studies have shown that the higher a woman's education, the higher her relative income (van Bavel and Klesment, 2017; Steiber, Berghammer and Haas, 2016; Bergsvik, Kitterød and Wiik, 2020). Additionally, higher-educated women increasingly select partners who are equally educated (homogamy) or less educated (hypogamy) (Hauw, Grow and van Bavel, 2017). Both types of partner choices enable women to live in a more egalitarian partnership, which strengthens their labour market integration and helps them advance their careers (van Bavel, Schwartz and Esteve, 2018). Consequently, women with a partner who is equally or less educated contribute more to a couple's income compared to women with a higher educated partner (van Bavel and Klesment, 2017).

We therefore expect that the increasing share of highly educated women over time and their subsequent better labour market chances will have played a major role in closing the gender income gap within couples. The increasing share of higher-educated men is expected to have run counter to this trend, but we expect this to have a much smaller influence than women's relative gains because men's educational attainment has grown less steeply.

Compared to these expectations about the positive effect of the increased shares of higher-educated women on closing the gender income gap within couples, expectations about the role of educational returns for the gender income gap within couples are more complex. Educational wage premiums have increased over the past decades for both genders, although the trend has been more pronounced for men (Dustmann, Ludsteck and Schönberg, 2009). Thus, explanations about the role of educational returns for gender income gap trends within couples need to account for the

relation of educational returns between genders. Furthermore, our analysis is not based on wages but on incomes. Thus, increases in the labour market integration of lower-educated women might run counter to higher educational premiums for higher-educated women.

Technological change has especially hit blue-collar workers, reducing employment and relative earnings for low- and medium-educated men (Alda, Friedrich and Rohrbach-Schmidt, 2019). Occupations relying strongly on cognitive tasks have adapted and typically profited from technological change, which has increased premiums, especially for higher-educated men (Aksoy, Özcan and Philipp, 2021). The increased inequality between men of different social strata is thus likely to exert opposing influences on the income gap within couples. Reduced earnings of low- and medium-educated men should have reduced the gap, but increased premiums of highly educated men should have increased it.

In addition to men's education-specific income changes, we need to account for similar changes over time for women. Highly educated women have typically earned increasingly high incomes over the past decades (Qian, 2018). They are without doubt the group with the highest relative incomes across all women (van Bavel and Klesment, 2017). However, explaining trends in the gender income gap between couples in the entire population is not the same as analysing differences between groups. For the latter, we need to ask which groups drive the overall trend through their income changes. In this regard, we claim that vocationally trained women are an important part of the story. They have strongly increased their working hours over the past decades (Kraus, 2006). They have also witnessed increased labour market returns, especially in healthcare occupations, close-to-industry services, and social work (Witte and Haupt, 2020). This increase in working hours, which is larger than among low-educated and highly educated women, could have led vocationally trained women to drive the closing of the gender income gap within couples over

time. Thus, the increased incomes of vocationally trained women should have decreased the income inequality within couples.

In sum, we expect that low- and medium-educated men will have lost ground in relation to highly educated men, which should have increased women's contributions to the couple's income. This should especially be the case because medium-educated women can be expected to have increased their incomes compared to higher-educated women *and* men. Both trends should explain reductions of the gender income gap within couples over time. In contrast, we expect the more pronounced income increase among higher-educated men compared to women to run counter to this trend.

2.2 Motherhood-related employment and incomes

After the end of the Second World War, West Germany strongly adhered to the conservative welfare state model. The male breadwinner model was promoted as the best option for family life and the mother was considered the best caregiver for pre-school children (Moeller, 1996). Accordingly, investments in childcare facilities were not on the governmental agenda. Consequently, women's labour market participation in West Germany, especially for mothers, was very low in comparison to international standards (Grunow, 2019). Since the 1960s, West German governments have implemented several family policy reforms (Gangl and Ziefle, 2015). We will first describe the development of public childcare opportunities and maternity-related social benefits in Germany, before discussing what this means for labour market participation and the financial situation of mothers with children of different age groups.

2.2.1 Employment opportunities and public childcare

Public childcare provision in West Germany changed in three phases. During the first, which spanned from the 1960s to the 1970s, West Germany started creating childcare facilities (Kreyenfeld, Katharina Spieß and Wagner, 2002). Most of the newly created facilities were, however, available for children aged three and above and did not offer lunch. Mothers had to pick up their children no later than noon, which was also widespread practice for elementary schools (Kreyenfeld, Katharina Spieß and Wagner, 2002). Publicly funded childcare was therefore not suitable for full-time employment. Due to the great expansion in flexible working hours during the period of economic recovery after the recession of the 1970s, there were at least more part-time jobs available for mothers of (pre-)schoolchildren (Buchholz and Grunow, 2006). Thus, West German women increased their labour market participation continuously from the late 1970s onwards, and the classic West German housewife model vanished to a large extent. This transformed the breadwinner model into a “modified breadwinner” model, with the woman being in part-time employment (Dotti Sani and Scherer, 2018).

The second phase, which spanned from the late 1980s to the mid-2000s, showed a continuous and widespread increase in part-time childcare for children aged three and above. After long debate, the reunified Germany established a right to public childcare effective in 1996 for children aged three and above. However, the law did not specify a right to *full-time* care. Many German federal states invested strongly in part-time care for children aged three and above as a cheaper but law-abiding alternative, and one that conflicted less with existing gender roles (Bauernschuster and Schlotter, 2015). In 1998, only 19% of all children above the age of three were in full-time care and only 3% of children below the age of three had a public childcare opportunity at all (Kreyenfeld, Katharina Spieß and Wagner, 2002: 204). The increase of childcare opportunities

was, hence, still not sufficient to offer mothers opportunities for full-time employment (Gottschall and Hagemann, 2002). These numbers show how parents, especially mothers, had to struggle in order to work full-time during this phase, even if they witnessed increases in public childcare opportunities.

The middle of the 2000s marked the beginning of the third phase. Since then, Germany has invested strongly in full-time public childcare, including care for children below the age of three. In addition, the government passed the Child and Youth Welfare Act (*Kinderförderungsgesetz*) in 2008, which included a legal right to public childcare for children aged one and above, starting in 2013 (Stahl and Schober, 2018). Consequently, the proportion of West German children in public childcare under the age of three increased from 8% to 27% between 2006 and 2014 (Zoch and Schober, 2018). Previous literature on the reforms of the third phase has indicated a positive relationship between public childcare provision and maternal employment (Boll and Lagemann, 2019). Mothers with at least a vocational degree, with a second child, and who had access to full-time childcare profited most (Zoch, 2020).

2.2.2 Child-related employment breaks and wage subsidies

While the labour market opportunities available to mothers increased over time due to improved access to public childcare, at the same time policy initiatives created opposing incentives by extending mothers' opportunities for employment breaks. From 1978, the duration of parental leave and the amount of parental leave entitlements changed in several waves (Gangl and Ziefle, 2015). In the late 1970s, maternity leave (*Mutterschaftsurlaub*) had a duration of up to six months. In 1986, parental leave (*Erziehungsurlaub*) replaced maternity leave, with a duration of up to 12 months. Several reforms extended the duration of leave to up to 36 months, with the last extension becoming effective in 1992. The amount of the parental (flat rate) benefit and the duration of the

benefit were adjusted in several minor reforms up to 2007. In 2007, the government introduced an extensive reform of parental leave. While the period of job-guaranteed parental leave remained unchanged at 36 months, the period of parental allowance was reduced from two years to one. At the same time, there was a paradigm shift in parental benefits, with parental benefits no longer being paid as a (means-tested) flat rate, but as a wage replacement payment of up to 67% of previous labour income (*Elterngeld*). The increased generosity of leave entitlements reduced mothers' work commitment over time (Gangl and Ziefle, 2015). Mothers of children below the age of three increased their employment breaks with each reform up to 2007 (Ziefle and Gangl, 2014). However, the latest reform, in 2007, weakened traditional gender ideologies, especially among West German mothers without a college degree (Zoch and Schober, 2018), and increased the working hours of mothers following shorter employment breaks (Boll and Lagemann, 2019).

2.2.3 Women's employment and income depending on the age of the youngest child

Family policies have changed the opportunities of mothers to contribute to a couple's income in two opposing directions. Increased availability of (full-time) public childcare has improved opportunities to participate in the labour market, while incentives for longer employment breaks have decreased them. While the financial situation of women on parental leave has been continuously improved by more (and longer-lasting) parental benefits, the context for a woman's family and labour market-related decisions varies greatly depending on the age of their youngest child.

For mothers with a child under the age of one, the chances of participating in the labour market are still poor today. However, the economic situation of mothers of newborns has become better over time, first because of a longer and higher flat rate of parental leave pay, and second because of the change to a labour income-related benefit since the 2007 reforms to parental leave. This

income improvement should contribute to a reduction of the gender income gap within couples over time, and it should be especially pronounced since the latest reform in 2007.

For mothers with children between the ages of one and three, too, the situation has been only moderately improved by the expansion of childcare. Only as a result of the third phase of changes to childcare provision did employment opportunities for mothers with toddlers improve significantly. Thus, we do not expect that the increased employment of mothers with children aged between one and three will have led to substantial reductions of the gender income gap within couples over time before 2007. However, increased parental leave entitlements should have increased their relative income, which should have reduced the gap over time.

Only mothers with children aged three and above (including schoolchildren) have seen improved employment opportunities over time – at least for marginal and part-time employment. We expect increased employment especially for mothers of older children, which should have reduced the income gap within couples considerably.

We do not expect the penalty faced by mothers, compared to that faced by childless women, to have decreased significantly over time. Mothers face a severe income penalty throughout their employment biographies (Gangl and Ziefle, 2009). This penalty is mostly rooted in persistently reduced working hours and curtailed career prospects. Instead, as women's better education means they face increasingly high opportunity costs for missed working hours when having children, the question that arises is whether they want to become mothers or not (Musick, Bea and Gonalons-Pons, 2020). A growing share of women, especially highly educated ones, decide to remain childless as a consequence of these opportunity costs (Sobotka, 2017). These full-time employed childless women can be expected to have the lowest gender income gaps within couples, and a growing share of them should reduce the overall gender income gap between couples over time.

2.3 Transfer incomes

Apart from increased labour incomes due to higher educational returns and longer maternal working hours, women can increase their relative income within a couple by transfer incomes. In theory, this could include alimonies, regular gifts (from parents), sick pay, or capital incomes. The most typical case of transfer incomes in the group under study are, however, unemployment benefits. In the previous literature, transfer incomes are usually not considered a source of income (Dieckhoff *et al.*, 2019) or an explanation for income differentials (van Bavel and Klesment, 2017). We believe, however, that there is very good reason to include them in order to understand long-term trends. In order to evaluate the role of unemployment benefits in the increasing contribution of women to a couple's income over time, we will discuss changes in unemployment provisions in the following.

Unemployment benefits in Germany are insurance entitlements, which rest strongly on the concept of uninterrupted (male breadwinner) employment prior to job loss. Citizens are only eligible for unemployment pay (*Arbeitslosengeld I*) if they establish their entitlement by paying payroll taxes for at least 12 months in a row. This excludes housewives and persons with very unstable employment patterns (Cousins, 1998). Due to their increased labour market participation, West German women, especially mothers of children above the age of three, have continuously contributed to social security systems, which has increased their benefit claims and (in turn) their relative incomes. Thus, we should be able to explain a substantial part of the trend of the overall gap with reference to the incomes of non-working women who have accumulated entitlements to unemployment benefits (or parental leave entitlements) in earlier phases of their working biography.

In 2005, Germany made far-reaching reforms to the unemployment insurance system. First, income-related unemployment benefit is generally limited to a maximum of 12 months. After its expiry, jobseekers move to the so-called Unemployment Benefit II, which is a public transfer for basic needs (Kemmerling and Bruttel, 2006). Income needs are assessed according to the needs and income of the family (“benefit community”), which potentially excludes long-term unemployed spouses if they are in gainful employment. Although these so-called Hartz IV reforms were intended to promote “activation” and an active worker model for both partners, empirical evidence shows that, in West Germany, women’s assignment to activation programmes has continued to replicate their prior labour market attachment relative to their partner, thereby perpetuating traditional gender role models (Kopf and Zabel, 2017). We thus do not expect increased female employment or working hours in the aftermath of the reform. However, if the woman is partnered with a spouse who has been long-term unemployed, her contributions to the couple’s income will increase sharply if he is no longer eligible for Unemployment Benefit I.

3. Data and Method

3.1 Data

We use data from the German Microcensus, an official statistical survey representative of German households (Federal Statistical Office, 2012). In order to grasp changes over time, we use (non-remote) available waves from 1978 to 2011. We combine the cross-sectional waves into a harmonized trend dataset, as suggested by Lengerer et al. (2010). We restrict our sample to women in heterosexual couples in private households, with both partners aged between 25 and 50.¹ We also exclude respondents in vocational training and students in tertiary education. Our income

¹ We use this age span to avoid the influence of pension incomes. Estimates of models using data with a broader range, however, do not alter our conclusions.

information does not offer a distinction between income sources. Through our selection, however, we assume that labour income and wage replacement benefits account for the bulk of income.

Extensive changes to the German Microcensus survey from 1996 onwards result in a discrepancy between the definition of couples before and after this wave. Before 1996, only married couples were considered to be a family unit; after 1996, unmarried cohabiting couples also fit this category. We thus need to identify unmarried couples in the data between 1978 and 1995 using plausible assumptions about cohabitation, age structure, and family relations within potential couples. For this, we use an algorithm provided by Lengerer (2007).

3.2 Variables

Our dependent variable is the woman's income as a percentage of the couple's income, which we refer to as the woman's contribution to the couple's income. The basis of our outcome is the individual, monthly post-tax income of the survey month. We believe that the monthly post-tax income is a very good approximation of women's economic dependence. Women's economic dependence is not only a result of labour incomes, but also of taxation and transfers. Our outcome includes these dimensions.

The German Microcensus asks respondents about their personal income per month, including any income source net of income tax and social security contributions. The data do not include information about the amount of different income sources. Respondents answer the income question using income brackets. The ranges and the number of income brackets change over time. Lengerer *et al.* (2010) provide an algorithm that assigns the inflation-adjusted median income within each bracket to a person that we adopt. The base year for the inflation adjustment is 2004. We offer an extensive description of the income data in appendix A.

Our harmonized education variable distinguishes four cases based on Germany's strong vocational education system: a) without vocational education; b) with vocational education and without a high school degree; c) with vocational education and a high school degree; d) with tertiary education. We use this information for both genders within the couple.²

Since we assume that a mother's working hours depend strongly on the age of her youngest child, we have created a variable that combines both dimensions. We first constructed a harmonized working-time variable. The first category refers to women working zero hours. This includes women on maternity/parental leave and long-term sickness leave, unemployed women, and inactive women. Due to data limitations in early waves, we are not able to distinguish the unemployed from the inactive. We further separate women in marginal employment (up to 15 hours per week), women in part-time employment (16–34 hours), and women in full-time employment (35+ hours). For the second dimension, we distinguish between women with no children in the household and women whose youngest child is a newborn (<1 year), a toddler (1–<3), a pre-schooler (3–6), a child in primary school (7–11), and a child in secondary school (12+). Since we limit the sample to couples of prime working age, only a small number of such women should be in this category. In sum, we combine four working-time and six children's-age categories, resulting in 24 cells. This enables us to grasp the influence of opportunity structures in a very detailed way, which adds new depth in comparison to previous studies.

² Since we include the education of both genders in the model, we are not able to include a variable for the educational relation. Additional models including educational relations within couples show that women who are equally educated as their spouse and women who are more highly educated than their spouse contribute to a reduced gender income gap over time.

We include men's working hours in three categories: not working, working part-time (up to 34 hours), and working full-time. Marginal work is much rarer for men than for women. Thus, we did not include this category for men.

Further controls are, whether the couple has more than two children, marital status, and the woman's age in five-year intervals.

3.3 Method

Changes in the gender income gap within couples can be based on two different factors: changing shares and changing relative incomes. Consider that the *share* of full-time working women without children has increased over time, and that these women have higher relative incomes than others. The increase of their share alone would decrease the overall gender income gap if everything else has stayed constant. However, full-time working women without children can also further increase their incomes over the observation time. In that case, the overall gender income gap also decreases, if everything else has stayed constant. Our methodological aim is to separate both types of contribution to changes in the gender income gap within couples. In line with Fortin, Lemieux and Firpo (2011), we refer to the first type as “composition effect” and to the latter as “income structure effect”. We calculate Kitagawa–Oaxaca–Blinder decompositions over time using Jann's (2008) Stata implementation, with 1978 as reference year. The formal decomposition model can be expressed as

$$\underbrace{\overline{C_{1978}} - \bar{C}_t}_{\text{overall change}} = \underbrace{(\hat{\beta}_{1978} - \hat{\beta}_t)\bar{X}_t}_{\text{income structure effect}} + \underbrace{(\bar{X}_{1978} - \bar{X}_t)\hat{\beta}_{1978}}_{\text{composition effect}},$$

where $\bar{C}_t$ represents the overall average of all women's contributions to the couple's income in a given year. The model captures income structure effects with differences of $\hat{\beta}$ -coefficients over time and composition effects with differences of group-specific shares. The $\hat{\beta}$ -coefficients result

from ordinary least squares (OLS) regressions and express expected group-specific *differences* in women's contributions. The group-specific shares can be calculated as the sample-averages of our group-specific dummy variables for each group ($\bar{X}_t$).

Our models use a large set of categorical variables. Thus, our results would be highly dependent on the selection of a reference category. To avoid such reference category-driven results, we normalize categorical variables in the decomposition, as proposed by Yun (2005). This approach gives us coefficients, which represent average estimates over all possible models with different reference categories.

4. Results

4.1 Descriptive results

Women's average contribution to the couple's income in West Germany was 16.5% in 1978, and increased continuously to 30.1% in 2011. The trend is linear, with about 0.4 percentage points (p.p.) per year since 1978. Thus, we capture a total difference since 1978 of 13.7 p.p., which we aim to explain through compositional and income structure changes.

4.1.1 Education and educational relations

The educational composition of both genders has changed strongly over time. Since 1978, the share of coupled women without vocational education has decreased from 40.6% to 16.0% in 2011 (Table 1). We also observe a decline for coupled men, but on a much smaller level. Persons with vocational education are the majority in each year for both genders. For women, the trend towards vocational education is u-shaped, with strong increases between 1978 and 1993 and a steady decline since then. However, one out of two coupled women still had a vocational education in 2011, showing that this was still the most important educational track. The share of coupled men

with vocational education has reduced constantly over time, from about 70% in 1978 to 51.4% in 2011. The share of coupled persons with vocational education and a high school diploma (*Abitur*) has increased from a very small to a moderate sized group over time (see Figure 2 in Appendix B). The same is true for coupled persons with an (applied) university degree. Here, women increased their share from 5% in 1978 to 20.1% in 2011. Men also increased their share considerably from 11.6% to 24.7%.

Table 1: Shares, incomes, and income relations, conditional on gender and education over time

	Education	Share rel. to coupled persons of each gender		Average monthly post-tax income		Men/ Women	Ratio to higher education	
		Men	Women	Men	Women		Men	Women
1978	No voc. ed.	15.7	40.6	789	167	4.7	2.0	4.0
	Voc. ed.	69.9	53.0	952	241	3.9	1.6	2.7
	Voc. ed. & h.s.	2.4	1.4	1,273	313	4.1	1.2	2.1
	Higher ed.	11.6	5.0	1,545	660	2.3	1.0	1.0
1993	No voc. ed.	9.9	20.2	1,227	351	3.5	2.1	3.0
	Voc. ed.	65.2	62.6	1,598	531	3.0	1.6	2.0
	Voc. ed. & h.s.	6.2	6.9	1,798	723	2.5	1.4	1.5
	Higher ed.	17.9	10.2	2,562	1,066	2.4	1.0	1.0
2011	No voc. ed.	12.1	16.0	1,600	518	3.1	2.2	3.2
	Voc. ed.	51.4	49.6	2,080	883	2.4	1.7	1.8
	Voc. ed. & h.s.	11.6	14.4	2,524	1,136	2.2	1.4	1.4
	Higher ed.	24.7	20.1	3,556	1,633	2.2	1.0	1.0

The descriptive results strengthen our claim that income gains of vocationally trained women are a major driver of reductions of the overall income gap within couples. Women and men have increased their monthly post-tax income substantially across all educational groups, which speaks for a significant prosperity gain over time. However, income trends vary strongly over educational groups. Men without vocational education earned 4.7 times as much income in 1978 compared to women without vocational education. This ratio decreased to 3.5 in 2011. We also see such a pattern when comparing incomes for men and women with vocational education. In 1978, vocationally trained men earned 3.9 times as much as women, which reduced to 3.0 times in 1993

and further to 2.4 times in 2011. Women with higher education caught up with their male counterparts, but their trend is much smaller compared to other educational categories. Men with (applied) university degree earned 2.3 times as much income in 1978, which reduced to 2.2 in 2011.

In addition to shrinking inequality between genders, the income gains of vocationally trained women have contributed considerably to reductions of within-gender inequality. In 1978, women with a university certificate earned about 2.7 times as much income compared to women with vocational education. This advantage reduced to 2.0 in 1993, and further to 1.8 in 2011. All educational groups reduce their income gap towards women with a university degree. The gap of vocationally trained ones reduced strongest. Furthermore, they are the largest group within the population; thus their income advancement over time carries heavy weight in explaining the overall gender income gap within couples. Notably, we do not calculate significant reductions of educational income inequality for men.

4.1.2 Children and working hours

We observe five large-scale trends regarding the relation of children and employment: a) the persistence of mothers with children aged under three working zero hours; b) an increase in marginal and part-time employment shares for mothers with children aged three and above; c) increased shares of full-time employed women without children; d) an increase in the income contributions of women across all groups, but most significantly for those working zero hours; and e) decreases in employment for men.

Table 2: Average contributions to a couple's income and shares of couples, conditional on the age of the youngest child and the woman's working hours over time

		Average contribution			Share		
	Woman's working hours	1978	1993	2011	1978	1993	2011
Youngest child <1	Zero hours	3.7	13.2	26.6	3.1	5.6	5.3
	Up to 15 hours	24.5	23.6	23.8	0.1	0.2	0.3
	16–34 hours	33.8	30.4	37.8	0.4	0.3	0.2
	35+ hours	44.1	45.3	50.6	0.5	0.3	0.1
Youngest child 1–<3	Zero hours	1.0	6.0	14.9	6.3	8.9	6.4
	Up to 15 hours	20.1	17.7	23.6	0.3	1.0	1.9
	16–34 hours	33.2	32.2	35.6	0.8	1.8	2.3
	35+ hours	45.2	49.4	53.3	1.1	0.9	1.0
Youngest child 3–6	Zero hours	0.7	3.7	12.7	12.2	10.1	6.0
	Up to 15 hours	18.4	16.4	21.9	0.9	2.0	3.8
	16–34 hours	27.7	29.6	32.5	2.4	4.2	5.3
	35+ hours	43.0	46.2	50.3	2.7	2.2	1.8
Youngest child 7–11	Zero hours	0.8	4.2	12.2	16.7	7.0	5.1
	Up to 15 hours	16.8	15.6	20.2	1.5	2.0	4.3
	16–34 hours	26.9	28.6	30.7	4.9	5.0	6.1
	35+ hours	41.2	45.0	49.7	4.0	2.9	2.1
Youngest child 12+	Zero hours	1.4	5.0	12.8	11.0	5.7	4.1
	Up to 15 hours	16.9	15.3	19.7	0.9	1.5	3.7
	16–34 hours	26.6	27.4	30.8	4.6	4.9	6.0
	35+ hours	40.5	43.6	45.0	4.6	4.3	3.1
No children	Zero hours	3.7	9.3	16.6	6.1	5.7	3.8
	Up to 15 hours	22.5	20.4	22.7	0.5	0.9	2.1
	16–34 hours	30.9	31.1	35.8	3.2	5.5	5.6
	35+ hours	45.3	46.2	48.4	11.3	17.1	19.7

Mothers with newborns and with children aged one to three did not increase their employment hours meaningfully during the observation period (Table 1). Employment changes were very similar for coupled mothers with kindergarten-age children (3–6), children in primary school (7–11), and children in secondary school (12+). The share of mothers working zero hours declined for mothers with children aged at least three. Mothers with schoolchildren decreased their share the most. Across all groups, the share of marginal and part-time employment increased and the share of full-time employment decreased. Differences in employment shares were most

pronounced between the first and the second period, with the highest differences for mothers with schoolchildren. Women without a child in the household increased their share of marginal, part-time, and full-time work, with the highest increases for full-time work. A considerable proportion of women without a child in the household worked zero hours in the 1980s, but this share declined throughout the observational period.

In contrast to the increase in women's employment, men's average working hours has declined over time. In 1978, about 93.4% of all coupled men worked full-time, 1.6% worked part-time, and 4% did not work. Only 84% worked full-time in 2011, but 6.5% worked part-time and 9.5% did not work. Notably, the decline in working hours was not correlated with the age of the youngest child for most years. However, since 2004, we observe a growing gap between fathers and men without children in employment patterns (Figure 4, Appendix B). Since 2004, fathers are more likely to be unemployed or work part-time and to have a lower share in full-time employment. This could be a result of higher take-up rates of parental leave. It is, however, beyond the scope of this article to test this claim.

Women across all employment groups increased their contributions to a couple's income over time. Unemployed mothers increased their contributions the most, which speaks for a higher relevance of motherhood-related and other transfer incomes over time. The contributions of mothers with newborns increased from 3.7% in 1978 to 13.2% in 1993, and further to 26.6% in 2011. This 22.9 p.p. increase is the single largest one over all groups, which speaks for the high importance of policies regarding maternity pay for the gender income gap within couples. Furthermore, the increase of the contribution of unemployed women without children from 3.7% in 1978 to 16.6% in 2011 also shows the increased relevance of motherhood-unrelated transfer incomes over time, which are most likely increased unemployment benefits.

4.3 Decomposition results

4.3.1 Aggregate contributions

The decomposition results reveal that reductions of the gender income gap have mostly been driven by women's larger shares in gainful employment (Table 3). Women's increased employment decreased the overall income gap within couples between 1978 and 2011 by 6.15 p.p., which explains 45% of the gap's reduction. Changes regarding education and men's employment explain much smaller parts of the overall picture. We can attribute 10.7% of the gap's reduction to changes in women's educational attainment, whereas men's educational attainment increased the gap by only 1.6%. This is countered by their decreased employment, which explains 8.7% of the overall reduction of the income gap within couples.

Aggregate changes in the income structure are surprisingly small, with the exception of men's employment. Their income trends alone would have reduced the gender income gap by 3.1 p.p., und thus increased the gap by 22.8%. We do not estimate the sizeable contributions of women's and men's education-specific income trends. The same is the case for women's employment.

Table 3: Aggregate contributions to the gender income gap within couples between 1978 and 2011

	A) Composition		B) Income structure	
	Coefficient	% explained	Coefficient	% explained
Women's education	-1.47***	10.7	-0.35***	2.5
Men's education	0.22***	-1.6	-0.02	0.2
Women's employment	-6.15***	45.0	-0.34	2.5
Men's employment	-1.18***	8.7	3.12***	-22.8
Controls	-1.12***	8.2	-0.52	3.8
Constant			-5.85***	42.8

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; $N = 80447$, $N_{1978} = 43781$, $N_{2011} = 36666$, $\Delta = -13.7$ p.p.

4.3.2 Group-specific contributions

Aggregate contributions as shown in Table 3 could mask underlying opposing trends between

educational or employment groups. In the following, we zoom into each group in order to get a deeper understanding of the underlying processes that generate the aggregate patterns.

As expected, the increased shares of women with university certificates constantly reduced the gap, as did reductions in the share of women without vocational education (Figure 1). We have also argued that the income trends of vocationally trained women should explain reductions of the gap. Our results confirm this claim. They furthermore show that all other educational groups of women show very small contributions, which cannot explain reductions of the overall gap.

Figure 1: Contributions of changes in educational attainment and education-specific income trends on the gender income gap within couples over time

Men's increased educational attainment did not matter much. We only estimate a small contribution of men's increased share with university degrees. Their education-specific income trends are, however, more enlightening. These reveal that the incomes of men with a university education run counter to the reduction of the gap. In contrast, falling (relative) incomes of vocationally trained men and men without vocational education have contributed to reductions of

the gap. Here, men's losses contribute to women's gains.

Women's fine-grained employment patterns strengthen our view that, overall, trends towards labour-market integration have played a major part in reducing the gender income gap, whereas income trends are very weak. The left-hand side of Figure 2 shows that the decreased shares in mothers with children aged three and above explain substantial parts of the overall reduction. Increased labour market participation of mothers whose youngest child is aged between 7 and 11 alone reduced the gap by about 2 p.p. over time. This is a larger contribution than all education attainment trends combined.

Figure 2: Contributions of not-working mothers due to changes in shares and income trends over time

Furthermore, the right-hand side of Figure 2 reveals that the income trends of unemployed mothers contributed to reductions of the overall gap. The contributions of mothers with newborns are the most pronounced, and follow the policy timeline we discussed in Section 2 very clearly. In particular, the parental leave reform of 2007 led to a strong increase in the mother's contribution to a couple's income, because since then the wage subsidy has been a function of the previous

labour income, which favoured high-earning women. We also see the effects of the other reforms during the 1980s and 1990s that increased the contributions of mothers with children aged one to three and consequently reduced the overall gap. The contributions of the other groups has also reduced the overall gap, but to a smaller extent.

Figure 3: Contributions of working mothers to the overall gender income gap within couples due to changes in shares and income trends over time

We now turn to the contributions of working women (Figure 3). Here, we see that women without children have mostly driven the reduction of the gap. Their increased part-time and full-time employment has reduced the gender income gap within couples substantially over time. The patterns for all other groups are very similar. The shift away from full-time employment towards part-time and marginal employment runs counter to further reductions of the gap. We also do not see a universal income trend across all groups, which has reduced the gender income gap over time. On the contrary, income trends of women without children have increased the gap.

Figure 4: Contributions of men to the overall gender income gap within couples due to changes in shares and income trends over time

As a last step, we have had a closer look at the contributions of men conditional on their employment status. As expected, their decreased shares in full-time work and increased shares of unemployed men have contributed to reductions of the income gap within couples. However, increased incomes of full-time working men are a huge counter to further reductions. The overall gap could have been about 3.5 p.p. smaller without men's increased full-time premium. Further analyses reveal that growing full-time/part-time gaps across all educational groups are responsible

for this contribution (see Figure 6, Appendix B). We only find very small increases of such gaps for women. Most of these increases happened during the 1980s and early 1990s and turned around for higher-educated men in the middle of the 2000s. This, too, could be an effect of men's changed behaviour after becoming fathers. However, based on our analyses, we can only speculate on this matter.

5. Discussion

In our article, we have asked how and why the gender income gap within couples has changed in West Germany between 1978 and 2011. We have shown that it declined significantly over time. On average, West German women contributed 16.5% to couples' income in 1978, while their contribution had increased to 30.1% by 2011.

We have discussed the influence of historical changes to women's opportunity structures, such as better access to rewarding jobs due to educational expansion; family policies setting contradictory incentives, with better public childcare opportunities on the one hand and increasingly generous leave regulations on the other; and better access for women to public transfers due to more continuous employment biographies. We set this in relation to men's trends of polarized educational returns and increased risk of unemployment.

We conclude that women have driven the overall trend, with a change in composition. Over time, they have increased their share in positions that have enabled them to contribute more to a couple's income. The trend away from the housewife role without labour market participation and towards marginal and part-time work explains a substantial part of this overall trend, which itself rests on better childcare opportunities and changed gender role regimes in West Germany. Increased educational attainment and higher rates of childlessness have accompanied this trend towards a

higher share of working women who are better paid, and who thus contribute larger shares to a couple's income.

The second most important factor in the closing of the income gap within couples are the increased contributions of women to a couple's income if they do *not* work. For mothers with children under the age of three, these increased contributions have resulted from more generous parental leave entitlements. For all other women, they are most likely a result of strongly increased opportunities to receive unemployment benefits, which reflects their increased labour market participation in earlier life phases.

Overall, the contributions of women's educational returns are marginal. With the exception of vocationally trained women, we do not estimate any meaningful positive contribution of education-specific income trends. This is also the case for working hours. We do not calculate any meaningful contribution of higher incomes specific to full-time working women.

This stands in contrast to the contributions of men. On the one hand, their increased returns to higher education and their increased full-time premium counter the closing of the income gap within couples substantially. On the other hand, the lower returns of low-educated and vocationally trained men, as well as their higher unemployment risk, has increased women's relative earnings and decreased the overall gap.

Our results complement recent research by Dieckhoff *et al.* (2019) and Musick, Bea and Gonalons-Pons (2020) focusing on the gender income gap within working couples. Building on these findings, our study nevertheless stresses how important it is to include selection into the labour market into the larger picture, as well as the increased incomes of non-working women based on social transfers. Both aspects explain about two-thirds of the overall change in the gender income

gap within couples between 1978 and 2011. In contrast to the findings of Berghammer (2014) for Austria, we do not observe a return to the breadwinner model in West Germany. We do observe, however, a very stable share of non-working mothers of children under the age of three.

Our results further question the usual taxonomy of employment relations or the sole use of labour incomes to understand women's economic dependence within couples. As we have shown, non-working women in a partnership contribute significantly more to a couple's income over historical time. In 2011, West German non-working women with a newborn child contributed on average about 26.6% to a couple's income, which is higher than the average contribution of all marginally employed women. The (current) employment relation and a woman's relative labour earnings seem thus to become a weaker proxy for her contribution to a couple's income over time in the relatively generous welfare state context of West Germany.

Overall, our results show that the economic dependency of coupled women from their male partners is slowly decreasing. We clearly observe a continuous, but overall very slow, process towards closing the income gap within couples in West Germany. Large parts of the income potential of women still remain unrealized due to unpaid family obligations and fewer working hours. Our results suggest that the income gap within couples in West Germany cannot be closed without sufficient availability of public childcare, allowing mothers to work more hours. Further advances in this area, such as better financing of childcare facilities and the right for public childcare for schoolchildren, are still subject to political struggles in Germany. *The reduced employment opportunities for women have* significant effects on their pensions (Tophoven and Tisch, 2016) and their wealth accumulation over the life-course (Nutz and Lersch, 2020). Therefore, allowing women to realize their income potential further due to better opportunity structures needs to be a key goal if societies want to reduce gender inequality.

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Appendix A: Income Variable

The German Microcensus asks respondents about their personal income per month, including *any* income source net of income tax and social security contributions. The data do not include information on the number and amount of different income sources.

The wording of the income question has stayed the same over time, but the response scale (and the currency) has changed. Respondents always answer using income brackets. These brackets change in number and meaning over time, as Table 1 shows.

Table 1: The change in income brackets for personal post-tax income in the German Microcensus. The last column shows the possible number of response combinations within a couple. Note: across all years, the options “no income” and “self-employed farmer” are always available.

Year	Number of brackets	Lowest bracket	Highest bracket	Poss. bracket combinations
1976	15	Up to 150 DM	3,000 DM and higher	578
1978	18	Up to 150 DM	3,000 DM and higher	800
1980	18	Up to 300 DM	5,000 DM and higher	800
1982	18	Up to 300 DM	5,000 DM and higher	800
1985	18	Up to 300 DM	5,000 DM and higher	800
1987	18	Up to 300 DM	5,000 DM and higher	800
1989	18	Up to 300 DM	5,000 DM and higher	800
1991	18	Below 300 DM	7,500 DM and higher	800
1993	18	Below 300 DM	7,500 DM and higher	800
1995	18	Below 300 DM	7,500 DM and higher	800
1996	21	Below 300 DM	12,000 DM and higher	1,058
1997	21	Below 300 DM	12,000 DM and higher	1,058
1998	21	Below 300 DM	12,000 DM and higher	1,058
1999	24	Below 300 DM	12,000 DM and higher	1,352
2000	24	Below 300 DM	35,000 DM and higher	1,352
2001	24	Below 153 €	17,895 € and higher	1,352
2002	24	Below 150 €	18,000 € and higher	1,352
2003	24	Below 150 €	18,000 € and higher	1,352
2004	24	Below 150 €	18,000 € and higher	1,352
2005	24	Below 150 €	18,000 € and higher	1,352
2006	24	Below 150 €	18,000 € and higher	1,352
2007	24	Below 150 €	18,000 € and higher	1,352
2008	24	Below 150 €	18,000 € and higher	1,352
2009	24	Below 150 €	18,000 € and higher	1,352
2010	24	Below 150 €	18,000 € and higher	1,352
2011	24	Below 150 €	18,000 € and higher	1,352

Lengerer *et al.* (2010) provide an algorithm that assigns the inflation-adjusted median income within each bracket to a person. On that basis, we calculate the gender income gap within couples C_W as

$$C_W = \frac{Inc_W}{Inc_W + Inc_M} \cdot 100$$

If both partners respond on the income question with the same bracket, the value of our dependent variable is 50%. If the woman’s personal income value is half the size of the man’s, the dependent variable takes the value of 33.3%.

In the following, we discuss some possible concerns about these data. Overall, we believe the data are very reliable for our purpose. We do not see any evidence for a systematic bias.

A first concern might be that the income brackets are too broad for any meaningful income analysis. This would be the case if the assigned median income value within each bracket were the middle of a very dispersed income range. In this case, the assigned median value would hide a possibly large income heterogeneity within a bracket. Tables 2 and 3 show these brackets in detail for our first and last time points (1976 and 2011), which are at the same time the surveys with the smallest and largest number of brackets. Overall, the brackets have a narrow range, even for 1976. They show the expected low density for very low and very high brackets and high density for middle ones. This is even more so for 2011. In most cases, the brackets vary by 200 units, indicating that we do not lose much information using the median value within a bracket.

Table 2: Income brackets with absolute numbers and relative shares, conditional on gender, for 1976

Income in DM	Men		Women	
	N	%	N	%
< 150	466	0.3	2,503	2.3
150–<300	2,728	1.5	4,467	4.2
300–<450	5,300	2.9	5,050	4.7
450–<600	10,161	5.5	6,178	5.8
600–<800	16,051	8.8	6,728	6.3
800–<1,000	19,940	10.9	6,103	5.7
1,000–<1,200	25,997	14.2	4,575	4.3
1,200–<1,400	25,449	13.9	2,600	2.4
1,400–<1,600	18,667	10.2	1,281	1.2
1,600–<1,800	11,456	6.3	684	0.6
1,800–<2,000	8,862	4.8	560	0.5
2,000–<2,200	6,283	3.4	390	0.4
2,200–<2,500	5,760	3.1	241	0.2
2,500–<3,000	5,466	3.0	148	0.1
3,000+	7,846	4.3	251	0.2
Farmer	4,981	2.7	6,891	6.4
No income	1,694	0.9	56,265	52.6
Missing	6,027	3.3	1,962	1.8
Total	183,134	100.0	106,877	100.0

Table 3: Income brackets with absolute numbers and relative shares, conditional on gender, for 2011

Income in €	Men		Women	
	N	%	N	%
< 150	569	0.3	3,268	1.7
150–<300	923	0.5	7,977	4.1
300–<500	5,449	3.2	19,094	9.7
500–<700	8,494	4.9	21,010	10.7
700–<900	10,585	6.1	23,942	12.2
900–<1100	13,921	8.1	21,695	11.1
1,100–<1,300	16,468	9.5	19,248	9.8
1,300–<1,500	16,470	9.5	15,055	7.7
1,500–<1,700	15,260	8.8	11,292	5.8
1,700–<2,000	17,972	10.4	10,857	5.5
2,000–<2,300	14,937	8.7	6,964	3.5
2,300–<2,600	10,319	6.0	4,059	2.1
2,600–<2,900	6,028	3.5	2,105	1.1
2,900–<3,200	5,957	3.5	1,782	0.9
3,200–<3,600	5,176	3.0	1,262	0.6
3,600–<4,000	3,433	2.0	724	0.4
4,000–<4,500	3,182	1.8	591	0.3
4,500–<5,000	1,730	1.0	286	0.1
5,000–<5,500	1,193	0.7	186	0.1
5,500–<6,000	788	0.5	146	0.1
6,000–<7,500	1,120	0.6	146	0.1
7,500–<10,000	897	0.5	112	0.1
10,000–<18,000	582	0.3	89	0.0
18,000+	270	0.2	54	0.0
Farmer	982	0.6	190	0.1
No income	1,125	0.7	15,080	7.7
Missing	8,672	5.0	8,968	4.6
Total	172,502	100.0	196,182	100.0

A second concern might be that the data offer too little variation for the dependent variable to measure change over time. First, Walter and Weimer (2018) show that the data generated by the income brackets of the German Microcensus allow the estimation of unbiased inequality measures. Second, our dependent variable is a combination of the income information for both persons within a couple. This opens up 578 to 1,352 possible income bracket combinations.¹ Table 4 shows the number of realized different values of the woman’s contribution to the couple’s income. It ranges from 212 different values in 1976 to 474 in 2010. We believe that this gives us plenty of variation to work with.

¹ The 1976 wave has 15 income brackets and a farmer and a “no income” bracket. The possible combinations (taking account of ordering) of these 17 brackets is $N_1 * N_2 * 2 = 17 * 17 * 2 = 578$.

Table 4: Number of realized different values of women's contribution to a couple's income over time

1976	212
1978	267
1980	281
1982	290
1985	294
1987	302

1989	310
1991	292
1993	307
1995	311
1996	305
1997	314
1998	312
1999	322
2000	464
2001	473
2002	469

2003	454
2004	455
2005	455
2006	466
2007	462
2008	466
2009	469
2010	474
2011	463

A third concern is that the change of the income brackets results in structural breaks of our dependent variable. We do not see any indication for this concern. Figure 1 plots the trends of the average income gap within couples for West Germany. The trend does not show any indication of structural breaks of the dependent variable over time.

Figure 1: Changes in women's average contribution to a couple's income over time for West Germany. Vertical grey lines refer to changes to the income brackets of the response scale.

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Appendix B: Further Results

Figure 2: Share of the educational group, relative to each gender over time

Figure 3: Monthly post-tax income, conditional on education for each gender over time

Table 5: Average post-tax monthly incomes for both genders, conditional on the age of the youngest child and the woman's work hours

	Woman's work time	Women			Men		
		1976	1993	2011	1976	1993	2011
No children	Zero hours	35	158	306	873	1,671	2,034
	Up to 15 hours	229	393	492	827	1,810	2,109
	16–34 hours	380	749	1,016	868	1,803	2,139
	35+ hours	602	1,229	1,812	799	1,554	2,126
Youngest child <1	Zero hours	34	232	801	952	1,679	2,392
	Up to 15 hours	255	474	792	951	1,956	2,710
	16–34 hours	464	696	1,824	914	1,829	2,801
	35+ hours	597	1,084	1,903	747	1,442	2,171
Youngest child 1– <3	Zero hours	12	102	376	966	1,746	2,505
	Up to 15 hours	233	353	655	1,048	1,865	2,583
	16–34 hours	381	749	1,303	933	1,744	2,620
	35+ hours	598	1,204	2,239	794	1,450	2,330
Youngest child 3–6	Zero hours	8	62	348	969	1,795	2,497
	Up to 15 hours	185	336	616	919	1,883	2,694
	16–34 hours	339	701	1,142	903	1,808	2,683
	35+hours	568	1,201	2,067	830	1,526	2,317
Youngest child 7– 11	Zero hours	7	73	341	991	1,898	2,693
	Up to 15 hours	179	340	562	963	2,055	2,740
	16–34 hours	312	696	1,060	916	1,895	2,867
	35+ hours	551	1,209	1,936	822	1,591	2,219
Youngest child 12+	Zero hours	14	95	364	962	1,880	2,627
	Up to 15 hours	162	321	519	907	2,052	2,664
	16–34 hours	303	674	1,017	889	1,908	2,589
	35+ hours	530	1,154	1,708	794	1,610	2,301

Figure 4: Shares of men, conditional on employment status and fatherhood

Figure 5: Changes in average work hours in relation to 1978, conditional on education

Figure 6: The full-time–part-time gap in incomes for each educational group over time