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WIDER Working Paper 2021/154

Gender and vulnerable employment in the developing world

Evidence from global microdata

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October 2021

United Nations University World Institute for Development Economics Research

wider.unu.edu

Abstract: This paper investigates gender inequality in vulnerable employment: forms of employment typically featuring high precariousness, inadequate earnings, and lack of decent working conditions. Using a large collection of harmonized household surveys from developing countries, we measure long-term trends, describe geographical patterns, and estimate correlates of gender inequalities in vulnerable employment. Conditional on individual and household characteristics, women are 7 percentage points more likely to be in vulnerable employment than men. The experiences of marriage and parenthood are important drivers of this gender gap. Across countries, the gender gap is smaller in richer countries, with lower fertility rates, and more gender-egalitarian laws, particularly those laws regulating marriage, parenthood, access to assets, and access to entrepreneurship. Since the 1990s, rising levels of female education and rapidly falling fertility have pulled women away from vulnerable employment at a faster rate than men. However, that process is largely exhausted, with current levels of the gender gap in vulnerable employment being almost entirely unexplained by standard labour supply factors.

Key words: vulnerable employment, gender gap, developing countries, International Income Distribution Database

JEL classification: J16, J21, O57

Acknowledgements: We are greatly indebted to Kathleen Beegle, at the World Bank, for valuable comments and for providing us access to the I2D2 data; Andrea Atencio and David Newhouse offered valuable help during the process.

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This study has been prepared within the UNU-WIDER project Women's work – routes to economic and social empowerment.

Information and requests: publications@wider.unu.edu

ISSN 1798-7237 ISBN 978-92-9267-094-8

https://doi.org/10.35188/UNU-WIDER/2021/094-8

Typescript prepared by Siméon Rapin.

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The Institute is funded through income from an endowment fund with additional contributions to its work programme from Finland, Sweden, and the United Kingdom as well as earmarked contributions for specific projects from a variety of donors.

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1 Introduction

In 1990, the global labour force participation rate for women was 29 percentage points below that of men (ages 15+). Since then, the gender gap has remained stubbornly stagnant, declining by 2 percentage points over the next three decades (ILO 2019), even though glacial change at the global level hides widely uneven progress across regions (Klasen et al. 2021).

Gender gaps in labour market access are mirrored by gender disparities in employment outcomes. In rich countries, where the vast majority of workers are wage employees in the formal sector, an extensive literature has documented that women earn less than comparable men, are often segregated in specific industries and occupations, and are under-represented in high-paying jobs (e.g., Bertrand 2018; Blau and Kahn 2017; Cortes and Pan 2018).[1] In contrast, most workers in developing countries are self employed, with women more likely than men to be unpaid workers in family enterprises and less likely to be employers or own-account workers (Gindling and Newhouse 2014; Rijkers and Costa 2012). Thus, in the developing world, gender wage gaps and career progression in salaried employment are only informative outcomes for a relatively small (and highly selected) group of women. To fully assess women's position in the workforce, more comprehensive employment indicators are needed.

In this article, our primary employment indicator is vulnerable employment, as defined by the International Labour Organization (ILO). Vulnerable employment was one of the four key indicators used in the Millennium Development Goals (MDG) framework to assess and monitor progress towards the 'achievement of full and productive employment and decent work for all, including women and young people' (MDG Target 1B).[2] The ILO's definition is based on status in employment and classifies as vulnerable the categories of own-account workers and contributing family workers (ILO 2010).[3] Vulnerable workers are less likely to have formal work arrangements, access to benefits, or social protection programmes and are more exposed to economic cycles (ILO 2013).[4] Worryingly, over the past decade, no progress has been achieved globally on this indicator: vulnerable employment rates have essentially remained above 46 per cent (of total employment) in emerging economies and reached up to 76 per cent in developing countries (ILO 2018).

Apart from a few studies that describe vulnerable employment by gender using ILO global and regional aggregate estimates (Elder and Kring 2016; Gammarano 2018; ILO 2016, 2018) and a few country case studies (e.g. Otobe 2017), very little is known about gendered patterns of vulnerable employment. At the macro-level, the literature lacks a comprehensive assessment on, and explanation of, cross-

[1] For literature surveys of gender inequality in labour economics, see Altonji and Blank (1999) and Bertrand (2011).

[2] The other key indicators used by the ILO to monitor MDG Target 1B were the employment-to-population ratio, labour productivity, and the share of working poor (at 1 US$/day) in total employment.

[3] Most household survey questionnaires do not have clear instructions on how to distinguish own-account from contributing family workers within the same household. We worry that, in many contexts, the male household head is, by default, identified as own-account worker in a family enterprise, while female members are, by default, classified as contributing family workers to the same enterprise. As a result, we purposefully abstain from exploring gender differences between these two categories. However, notice that vulnerable employment estimates are unaffected by mismeasurement between own-account and contributing family workers, since both categories are classified as vulnerable.

[4] Other definitions of employment vulnerability have been proposed by the literature. However, these definitions tend to focus on formal employment and largely apply to the context of developed countries. For instance, Bardhan and Tang (2010) define vulnerable occupations in the United States in terms of the risk of job loss owing to adverse economic shocks. Hudson (2006) and Pollert and Charlwood (2009) focus instead on low incomes and define vulnerable workers as those earning below given thresholds of the median wage. Using data from European countries, Bazillier et al. (2016) propose an extended definition of vulnerable employment that takes into account, among other indicators, the type of employment contract, employment relationship, type of organization, firm size, ability to influence policy decisions regarding the organization's activities, responsibility for supervising other employees, and ability to decide how daily work is organized.

country heterogeneity in levels and trends of vulnerable employment by gender. At the micro-level, evidence is needed on the proximate drivers of vulnerable employment—such as worker and household characteristics—and how these drivers differ by gender, country, and time period.

Our study makes a relevant contribution in these directions. Using global microdata from the World Bank's International Income Distribution Database (I2D2), a large collection of harmonized household surveys from developing countries (Montenegro and Hirn 2008; World Bank 2020), we measure long-run trends, describe geographical patterns, and estimate drivers of gender inequalities in vulnerable employment.

There are two main advantages of focusing on ILO's vulnerable employment indicator. First, status in employment information is widely available in household surveys and is measured in a relatively consistent way across countries and over time. In contrast, definitions of labour market informality, for example, are conceptually context specific and, in practice, have less coverage across surveys and are typically not measured in a comparable fashion across countries. Second, status in employment is a meaningful descriptive tool to rank workers in terms of welfare. Using global microdata for 98 countries, Gindling and Newhouse (2014) show that jobs exhibit a clear ranking with respect to worker education and household income: on average, employers are the best off, followed by wage employees—i.e. the two non-vulnerable categories according to the ILO. Among the vulnerable, off-farm own-account workers are better off than off-farm contributing family workers.[5] Agricultural workers are the worst off, irrespective of status in employment.[6] In short, vulnerable employment aims at capturing the most precarious and 'at risk' types of work, using straightforward and widely available indicators.[7]

Our analysis proceeds in four stages. First, we present aggregate stylized facts on vulnerable employment using the latest year available for each of 101 developing countries. There is substantial cross-country variation in vulnerable employment as a share of total employment. However, in 81 per cent of the countries, working women are more likely to be vulnerable than working men. The average gender gap in vulnerable employment across countries is 9 percentage points. Whereas the largest share of vulnerable workers are found in agriculture (72 per cent of male workers and 79 of female workers in the average country), the largest gender *gap* across industries occurs in manufacturing (16 percentage points) and commerce (10 percentage points).

Second, we pool detail individual and household characteristics for 76 countries and estimate regression correlates of vulnerable employment for all workers and by gender. Although all estimates are descriptive and do not have a causal interpretation, the large sample size allows us to remove considerable heterogeneity at various levels and rely on increasingly fine-grained variation: within sub-national region, within industry, within occupation, and even within household. We find that, conditional on individual and household characteristics, women are 7 percentage points more likely to be vulnerably employed than comparable men, irrespective of how restricted the models are.

By gender, the experiences of marriage and parenthood create an important wedge between male and female vulnerable employment propensities. On average, for women, being currently married is associ-

[5] Gindling et al. (2016) further distinguish between own-account professionals and own-account non-professionals. While employers and own-account professionals earn more than comparable employees in most countries, own-account non-professionals earn a premium in the poorest countries, but face a penalty in middle- and high-income countries. Across income levels, women face larger self-employment penalties than men.

[6] Because status in employment on farm is likely ill defined in contexts where subsistence agriculture is prevalent, we conduct all our analyses with and without agricultural workers.

[7] The binary nature of the vulnerable employment indicator is also in line with theories of labour market duality in poor countries (e.g. Harris and Todaro 1970; Lewis 1954). For a recent example, see Rud and Trapeznikova (2021), who model a dual labour market in a low-income setting, consisting of a wage sector (with frictions, such as entry barriers, search, and matching) and a residual, frictionless, subsistence sector.

ated with a 5–6 percentage point increase in the probability of working in vulnerable employment, but, for men, the association is not statistically significant (and the point estimate is negative). The number of children at all ages has a vulnerability-increasing effect for both genders, but the magnitudes are always larger for women and inversely related to the child's age. The difference in the effect of children is particularly large when agricultural workers are excluded; the female-specific coefficients are two to three times larger than the male-specific counterparts. For instance, a married woman with one child of age 0–2 is around 6–7 percentage points more likely to be vulnerably employed than a man with identical characteristics—a difference similar to the conditional gender gap in the pooled sample.

Third, we relax the assumption of coefficient homogeneity across countries. The conditional gender gap in vulnerable employment is positive in the vast majority of countries (67 out of 76, or 88 per cent). Excluding agriculture, the gender gap is positive in 71 out of 76 countries. We then correlate the estimated country-specific gender gaps with economic and demographic structural factors, as well as legal gender disparities, which are measured from the World Bank's 'Women, Business, and the Law' (WBL) database (Hyland et al. 2020). The off-farm gender gap correlates negatively with per capita income and the old-age dependency ratio, and positively with total fertility rate, the young-age dependency ratio, and the overall prevalence of vulnerable employment. Laws also matter. Countries with more gender-egalitarian laws exhibit smaller conditional gender gaps in vulnerable employment. Negative correlations are particularly strong for laws regulating marriage, parenthood, assets, and entrepreneurship.

Fourth, we exploit temporal variation in the data: first by estimating birth-cohort effects for all country-years, and then by decomposing the change in vulnerable employment shares by gender between the 1990s and the 2010s for a selected group of countries with surveys in both periods. Overall, once individual and household characteristics are controlled for, cohort effects are limited.[8] Over a 50 birth-year period, roughly two generations, the decline in vulnerable employment propensity is around 5 percentage points, which compares to the conditional difference in propensity between currently married and non-married women. Consistent with limited cohort-effects, the reductions in the share of vulnerable employment for both genders between the 1990s and the 2010s are almost entirely explained by composition effects, streaming in particular from rising education, declining fertility, structural change, and urbanization. In contrast, current levels of the gender gap in vulnerable employment remain almost entirely *unexplained* by standard labour supply factors at the individual or household levels.

Our findings relate to several strands of literature. One prominent set of studies investigates gender and micro-entrepreneurship in developing countries.[9] Typically, microenterprises are defined as off-farm businesses with less than five workers (Jayachandran 2020), with most enterprises having no employees other than the owner (McKenzie and Paffhausen 2019; Nagler and Naudé 2017). On average, female micro-entrepreneurs run smaller and less productive firms and operate in low-productivity sectors of the economy (Hardy and Kagy 2018; Islam et al. 2020; Rijkers and Costa 2012). Moreover, evidence from randomized business grants (or loans) finds that returns to capital are substantially higher for male than for female micro-entrepreneurs (e.g., de Mel et al. 2008; Fafchamps et al. 2014; McKenzie 2017).[10]

[8] To estimate cohort effects, we leverage all surveys available since 1991. The sample of roughly 19.2 million workers includes 531 surveys from 95 countries.

[9] See Jayanchandran (2020) for a recent survey of micro-entrepreneurship in developing countries with a special emphasis on gender issues.

[10] However, a recent study by Bernhardt et al. (2019) shows that this gender gap in returns to capital is entirely explained by female grants being partly invested in (or captured by) businesses run by *male* household members. When business outcomes are measured at the household (rather than at the microenterprise) level, there are no significant differences based on the gender of the grant recipient.

One limitation of the micro-entrepreneurship literature is the conflation, under the label 'micro-entrepreneur', of employers, own-account workers, and (sometimes) contributing family workers. As shown by Gindling and Newhouse (2014), there is a clear welfare ranking among off-farm employment categories, with employers ranked first, wage employees second, followed by own-account workers, and, lastly, by unpaid family workers. The indicator of vulnerable employment used in this article preserves this welfare ranking. In practice, because women are more likely than men to work unpaid in family enterprises, vulnerable employment is particularly well suited to investigate gender differences at the very bottom of the job-quality scale.[11]

Our findings also add to a large literature documenting the labour market consequences of the unequal gender distribution of the costs of reproductive labour and unpaid household production (e.g., Bittman et al. 2003; Chen et al. 2006; Folbre 2018; Sayer 2005). Often, vulnerable employment constitutes the only type of activities that is compatible with the constraints imposed on women by unpaid domestic work.[12] These constraints are interlinked with social norms on women's 'appropriate' role in society that often hinder women's access to better labour market opportunities, in particular paid employment outside the home (e.g., Boserup 1970; Heintz et al. 2018; Jayachandran 2021).

We also contribute to a recent but growing literature arguing that gender discrimination embedded in legislation affects women's labour market outcomes.[13] At the country level, more gender-egalitarian laws associate positively with female labour participation outside of agriculture and negatively with the gender wage gap (Hyland et al. 2020). Using firm-level microdata across 94 developing countries, Islam et al. (2019) find that legal gender disparities are associated with fewer women hired as paid employees, as top managers, and with fewer female business owners. In a case study, Hallward-Driemeier and Gajigo (2015) exploit the staggered regional roll-out of a reform of Ethiopia's family law in the early 2000s. By striking out restrictions to wives' work outside the home and expanding their access to marital property, the reform increased women's share of wage and full-time employment.

Lastly, at a broader level, our results attest to women's continuing position as secondary earners in many households. Previous studies have found that, in the short term, female self-employment is mostly stress driven and counter cyclical in all developing regions, rising in recessions and decreasing during booms (Bhalotra and Umaña-Aponte 2010). Over the long term, the development process is accompanied by a rising share of wage employment and a reduction in the share of own-account and family workers, who first move out of agriculture to the non-farm sector (Beegle and Bundervoet 2019; Boserup 1970; Gindling and Newhouse 2014; World Bank 2011). However, the expansion of the formal wage employment sector is not a gender-neutral process. As a result of high and persistent levels of gender segregation by industry and occupation, women's opportunities in salaried employment depend to a large extent on the sectoral pattern of labour demand (Arora et al. 2021; Borrowman and Klasen 2020; Seguino and Braunstein 2019).

[11] Naturally, some own-account or contributing family workers might be high-potential, highly productive entrepreneurs operating under severe capital constraints (e.g. lack of access to credit). See, among others, de Mel et al. (2008) and Grimm et al. (2012). However, to the extent that those constraints are real and hard to overcome, it seems reasonable to classify them as vulnerable. They may not be 'queuing' for salaried employment, but they are likely 'queuing' for becoming employers.

[12] For example, childcare is easier to combine with work on a family enterprise or as own account than with a full-time wage job (Delecourt and Fitzpatrick 2021; Rijkers and Costa 2012). Family-related time constraints prevent women from growing their businesses and absorb shocks (Berge and Pires 2020). McKenzie and Paffenhausen (2019), for instance, find that female-owned microenterprises are much more likely to fail due to household shocks (sickness or family reasons), whereas male-owned firms are more likely to fail due to market shocks (lack of profits or better earning opportunities in another activity).

[13] See Roy (2019) for a survey of the literature on legal discrimination against women.

The rest of the paper is organized as follows: Section 2 presents the I2D2 data and descriptive statistics. Section 3 describes the econometric methods used, with the results shown and discussed in Section 4. Section 5 concludes.

2 Data and descriptives

Our main source of data is the World Bank's International Income Distribution Database (I2D2), a collection of over 1,000 household surveys from 150 countries (World Bank 2020). The I2D2 includes about 50 harmonized variables on demographic characteristics, education, labour, and household income or consumption. The database draws on different types of nationally representative surveys, usually conducted by national statistical agencies, including Household Budget Surveys, Household Income and Consumption Surveys, Labour Force Surveys, and multi-topic surveys (such as Living Standards Measurement Study Surveys).[14]

2.1 Sample selection

We consider the period 1990–2017 for low- and middle-income countries and exclude surveys with missing information on employment status, sex, or household identifiers. Surveys are also excluded if two or more categories of status in employment are missing. In the I2D2, status in employment information distinguishes between employers, paid employees, own-account workers, and unpaid employees. These categories are a good approximation to the ILO's standard (ICSE-93), which divides workers into employers, paid employees, own-account workers, members of producers' cooperatives, contributing family workers, and workers not classifiable by status. Following the ILO definition (ILO 2010), we classify own-account workers and unpaid employees in the I2D2 as vulnerable, and paid employees and employers as not vulnerable (see Table A1 for a schematic overview).

To systematically assess data quality, we compare the estimate of vulnerable employment as a share of total employment for the 15+ population from I2D2 with ILO's modelled estimate for the same year. We exclude from our micro database all country-years for which the two estimates differ by more than 10 percentage points (in absolute terms). After this step, our final sample contains 101 countries for which vulnerable employment can be meaningfully defined and estimated: 11 from East Asia and the Pacific, 17 from Europe and Central Asia, 19 from Latin America and the Caribbean, 7 from Middle East and North Africa, 6 from South Asia, and 41 from sub-Saharan Africa.[15]

2.2 Female and male vulnerable employment: patterns and trends

We start by describing patterns of vulnerable employment by gender across countries. To provide the latest snapshot, we select the most recent year available for each country.[16] The median year is 2011; the 25th and 75th percentiles are 2008 and 2014. Across the 101 developing countries, the (unweighted) average share of vulnerable employment in total employment is 0.478 for men and 0.567 for women, resulting in a global gender gap of 8.9 percentage points (Table 1).

[14] See Montenegro and Hirn (2008) for a description of the database and its construction.

[15] See Table A2 for a list of the countries included.

[16] See Table A2 for a list of country-years included.

Table 1: Vulnerable employment by world region

		Vulnerable employment as a share of total employment		
	Number of countries	Male	Female	Female − male
East Asia & Pacific	11	0.544	0.592	0.048
Europe & Central Asia	17	0.273	0.288	0.015
Latin America & Caribbean	19	0.371	0.414	0.043
Middle East & North Africa	7	0.259	0.419	0.160
South Asia	6	0.469	0.638	0.169
Sub-Saharan Africa	41	0.632	0.763	0.131
Total	101	0.478	0.567	0.089

Note: based on World Bank's regional classification. Regional means are based on unweighted country means. For each country, the most recent year is selected; it ranges from 1992 to 2017.

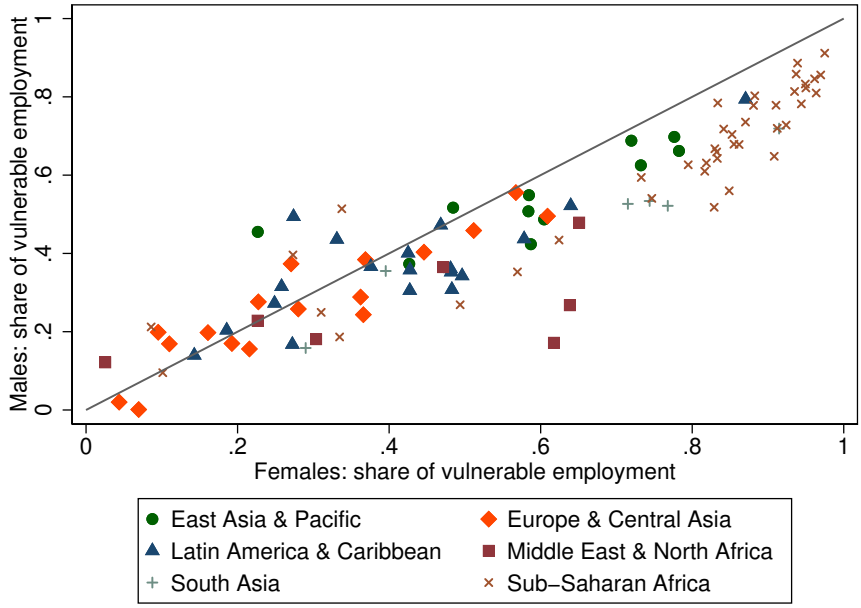
Source: authors' calculations based on I2D2.

There are clear regional differences in the extent of vulnerable employment, as shown in Table 1. Vulnerable employment is least prevalent in Europe and Central Asia, where, in the average country, 27 per cent of employed men and 29 per cent of women are vulnerable. In sub-Saharan Africa, vulnerable employment is most prevalent, with 63 per cent of employed men and 76 per cent of women being vulnerable in the average country. The average female–male gender gap in vulnerable employment shares is positive in all regions. The gender gap is relatively small (below 5 percentage points) in East Asia and the Pacific, Latin America and the Caribbean, and Europe and Central Asia. The gender gap is relatively large (above 13 percentage points) in sub-Saharan Africa, Middle East and North Africa, and South Asia.

As shown in Figure 1, beyond regional differences, there is substantial cross-country variation in the share of vulnerable employment. Vulnerable employment ranges from less than 10 per cent of total employment, for both genders, in two countries of Europe and Central Asia (Belarus and Russia) to more than 85 per cent, for both genders, in four sub-Saharan countries (Burkina Faso, Niger, Nigeria, and Chad). In 81 per cent of the countries (82 out of 101), the share of vulnerable employment in total employment is larger for women than for men. The size of the gender gap increases with the prevalence of vulnerable employment in a country's labour market. The few countries where men are more likely to be vulnerably employed than women cluster at low levels of vulnerable employment (south-west region of Figure 1). Descriptively, a 10 percentage point increase in the share of vulnerable employment for men (women) is associated with a 1.3 (2.5) percentage point increase in the female–male gender gap.[17]

[17] Ordinary least squares (OLS) estimates from regressing female–male difference in vulnerable employment shares on male (female) share in vulnerable employment (and an intercept). $n = 101$ countries.

Figure 1: Vulnerable employment as a share of total employment by gender



Note: unit of analysis is the country ($n = 101$). Unweighted country means. For each country, the most recent year is selected; it ranges from 1992 to 2017.

Source: authors' calculations based on I2D2.

Not surprisingly, the share of vulnerable employment varies considerably by industry. As illustrated in Table 2, agriculture is, by a large margin, the industry where vulnerable employment is most prevalent. In the average country, 72 per cent of men and 79 per cent of women working in agriculture are vulnerable workers. In most other industries, women are also more likely to work in vulnerable employment than men. The gender gap is largest for manufacturing (16 percentage points) and commerce (10 percentage points). It can be noted, moreover, that countries where a large share of the labour force works in agriculture have large rates of vulnerable employment *and* large gender gaps in vulnerable employment: these are the sub-Saharan African countries in the north-east region of Figure 1. Because of the special role of agriculture, which is linked to patterns of subsistence and smallholder farming in poor countries, we conduct our remaining analyses for two sets of workers: (i) all industries and (ii) excluding the agricultural sector.

Table 2: Share of vulnerable employment in total employment, by gender and industry

% of industry's employment	Vulnerable	
	Male	Female
Agriculture	72	79
Mining	28	35
Manufacturing	32	48
Public utilities	16	20
Construction	27	22
Commerce	51	61
Transport & communications	35	23
Financial & business services	18	16
Public administration	8	8
Other services, unspecified	25	26

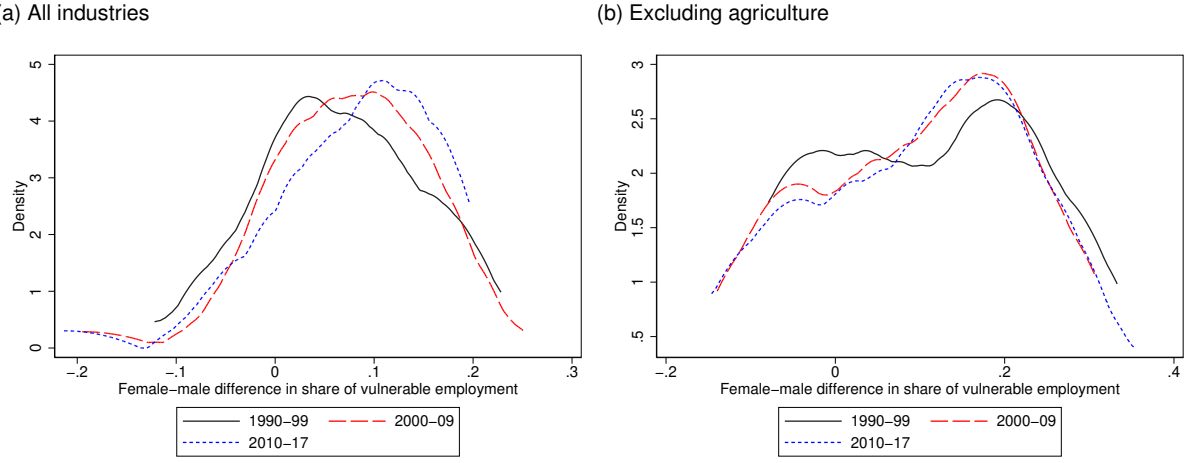
Note: unweighted means across 101 countries, using each country's most recent year.

Source: authors' calculations based on I2D2.

The distinction between on-farm and off-farm work is even more relevant when considering long-term trends in vulnerable employment. Figure 2 plots the distribution of the gender gap across decades, either

including or excluding the agricultural sector.[18] When agricultural workers are included, the average gender gap increases over time, from 6.6 percentage points in the 1990s to 7.9 percentage points in the 2010s.[19] In contrast, among non-agricultural workers, the average gender gap remained essentially constant, from 10.8 percentage points in the 1990s to 10 percentage points in the 2010s. However, the distribution of countries around the mean changed. In the 1990s, gender gaps across the globe were more dispersed and clustered around two modes: a first mode centered around zero and a second mode centered around 20 percentage points. Over time, this bimodality appears to be slowly converging towards a unimodal (and left-skewed) distribution with a mean (median) gap of 10 (11.7) percentage points. These changes can be explained in light of the process of structural transformation that took place in several South Asian and sub-Saharan countries (e.g., Ethiopia, Tanzania, Niger, Pakistan, and Sri-Lanka) which were located at the lower mode, or between the two modes, of the 1990s distribution. In these countries, the rising gender gap results from rapidly declining vulnerable employment among men, rather than increasing vulnerable employment among women.[20]

Figure 2: Gender gap in vulnerable employment as a share of total employment (1990–2017), by decade



Note: unit of analysis is the country ($n = 32$). Unweighted country means for each decade. Only countries with at least one survey per decade are included.

Source: authors' calculations based on I2D2.

3 Methods

In this section, we present the econometric methods used in the remainder of the article. First, we estimate the micro-level correlates of vulnerable employment. Second, we decompose differences in vulnerable employment shares by gender and over time.

[18] To produce these figures we compute the average vulnerable employment share by gender for each country-year and then, for each country, average across three decades: 1990–99, 2000–09, and 2010–17. To keep the number of countries per decade fixed, we only consider the 32 countries that have at least one survey per decade.

[19] The increase in the gender gap is not an artifact of the 32 country sub-sample. Across all available surveys, the average gender gap increased from 5.8 percentage points in the 1990s (n=49) to 9 percentage points in the 2010s (n=65).

[20] There are nine countries that started with gender gaps below 15 percentage points in the 1990s and had a larger gender gap by the 2010s. Their average gender gap rose from 2 to 10 percentage points over the period. Their average male share in vulnerable employment declined from 44 per cent in the 1990s to 34 per cent in the 2010s, whereas their female vulnerable share fell only slightly, from 47 to 44 per cent.

3.1 Modelling vulnerable employment

To identify the socio-economic correlates of vulnerable employment at the micro level, we estimate a parsimonious linear probability (LP) model for the employed population of age 15+:

$$P(V_{irstuo} = 1) = \beta Female_{irstuo} + \mathbf{X_{irstuo}}\gamma + \delta_{rst} + \omega_u + \theta_o + \varepsilon_{irstuo}, \quad (1)$$

where t is the most recent year available for each country. The dependent variable, V, takes value 1 if worker i is in vulnerable employment and 0 otherwise. *Female* is a female dummy and $\mathbf{X_{irstuo}}$ is a vector of individual and household characteristics. Included individual characteristics are age, age squared, whether the individual is currently married, and a set of dummies capturing educational attainment (less than primary education as the omitted group, completed primary education, completed secondary education, and any post-secondary education). Household characteristics include the household head's educational attainment and whether the head is female. In addition, to capture how the employment status of other household members may correlate with the respondent's vulnerable status, we include sex-specific dummy variables for whether any other male or female household member is a wage employee. We then include variables that flexibly account for household size and structure: number of children of ages 0–2, and 3–5, number of boys and number of girls of ages 6–14, number of adult males and number of adult females—given the richness of the data, we can precisely estimate the coefficients of these different demographic groups. Lastly, the vector $\mathbf{X_{irstuo}}$ includes an urban dummy.

Although the estimates are descriptive correlates and do not have a causal interpretation, the large sample size allows us to remove considerable heterogeneity at various levels. Observing how coefficients change between less and more restricted models could hint at the direction and magnitude of omitted variable bias. To absorb regional heterogeneity, the model includes Admin1-level dummies (δ_{rst}) for region r, in survey s and year t. To absorb sectoral and occupational heterogeneity, 1-digit industry and occupation dummies are also included (ω_u and θ_o, respectively). In the most restricted model, we rely solely on within-household variation through the inclusion of household fixed effects.

An important source of bias is selection into employment. Because female labour force participation rates vary substantially across countries, but vulnerability is only observed for the employed, selection on unobservables in the participation decision will likely correlate with vulnerable status in employment. To try to remove this bias, we include in all models a fine-grained measure of average employment shares for different demographic groups. We assign to each individual the average employment share of her/his gender, 5-year age cohort, education level, in the country-year and urban/rural area of residence. By controlling for this variable, we purge the variation in vulnerable employment that is systematically related with the employment propensity of different socio-demographic groups in different contexts.[21]

We have complete covariate data for 76 countries, which are pooled together in unweighted regressions.[22] ε_{irstuo} is the error term; standard errors are clustered at the survey-year level. The estimation sample includes about 2.94 million observations. Table A3 reports the sample mean for individual and household characteristics. The sample is 41 per cent female and 54 per cent urban, with the average respondent being 38 years old. 53 per cent of workers in the estimation sample are in vulnerable employment: 48 per cent of men and 61 per cent of women. Table A4 shows the composition of the sample by industry and occupation. The largest industry is, by far, agriculture with 35 per cent of employment in the sample, followed by commerce (18 per cent) and manufacturing (10 per cent). In terms of occu-

[21] In further specifications, we also included the squared term of the employment share, but did not find significant evidence for non-linearities.

[22] See Table A2 for a list of the 76 countries included.

pations, the three most common are skilled agricultural workers (23 per cent), elementary occupations (15 per cent), and service and market sales vendors (12 per cent).

3.2 Decomposition analyses

Men and women differ both in their individual and household characteristics and in how those characteristics affect the likelihood of vulnerable status in employment. Moreover, both characteristics and their associations with vulnerable employment change over time and differently across genders. To account for these moving parts in a unified framework and estimate their relative importance, we decompose vulnerable employment shares by gender and over time using the non-linear technique proposed by Fairlie (2005).

Consider two mutually exclusive groups, A and B. The overall gap in the average vulnerable employment share between group A and group B is:

$$\Delta_O \equiv \mathbb{E}[V_B|D_B = 1] - \mathbb{E}[V_A|D_A = 1],$$

where D_g is a dummy determining group membership, with $g = A, B$. Then, decompose the gap between the usual composition effect, Δ_X, and unexplained term, Δ_U, by plugging in a logit model, $L(.)$, of vulnerable employment and rearranging terms[23]:

$$\begin{aligned}\Delta_O &= (\mathbb{E}[L(X\beta_A)|D_B = 1] - \mathbb{E}[L(X\beta_A)|D_A = 1]) \\ &\quad + (\mathbb{E}[L(X\beta_B)|D_B = 1] - \mathbb{E}[L(X\beta_A)|D_B = 1]) \\ &= \Delta_X + \Delta_U,\end{aligned}$$

After replacing the expectations by their empirical counterparts, we obtain:

$$\overline{V}_B - \overline{V}_A = \left[\sum_{N_B} \frac{L(X_B\hat{\beta}_A)}{N_B} - \sum_{N_A} \frac{L(X_A\hat{\beta}_A)}{N_A}\right] + \left[\sum_{N_B} \frac{L(X_B\hat{\beta}_B)}{N_B} - \sum_{N_B} \frac{L(X_B\hat{\beta}_A)}{N_B}\right],$$

with N_g being the size of group g. In this case, composition effects are weighted by the coefficients of group A, $\hat{\beta}_A$, whereas the unexplained term is weighted by the covariate distribution of group B, X_B. Alternatively, $\hat{\beta}_B$ could be used to weigh the composition effects, and X_A could be used to weigh the unexplained term. Because, a priori, we have no reason to prefer one alternative over the other, we always report results based on both weighing schemes.

In a classical linear decomposition, it is straightforward to further decompose the composition effect, Δ_X, into the contributions of each covariate. In a non-linear setting, however, this step is not trivial, because the contribution of each covariate depends on the distributions of all covariates. The solution proposed by Fairlie (2005) consists of computing a series of counterfactuals through sequentially replacing the distribution of a covariate in one group with its distribution in the other group, holding the other covariates constant. The covariate's individual contribution is then given by the average difference between the observed values and each counterfactual. However, the results are not independent from the ordering of covariates in the sequence of counterfactuals. In practice, as suggested by Fairlie (2005), we draw 1,000 sequences for each decomposition with the ordering of covariates being randomly determined and then average the results over the draws.[24]

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[23] In practice, add and subtract the counterfactual quantity $\mathbb{E}[L(X\beta_A)|D_B = 1]$, i.e. the expected vulnerable employment share of group B, if it faced the coefficients (and unobservables) of group A.

[24] See Fairlie (2005) for more details.

We perform two decomposition exercises. In the first exercise, we decompose the *change* in vulnerable employment share between the 1990s and the 2010s for a selected group of countries with surveys in both periods. We run these decompositions separately for men and women. This exercise asks: to which extent are changes in vulnerable employment over the last two decades for men and women explained by changes in the distribution of covariates (*composition effect*), or, rather, by changes in coefficients and unobservables (*unexplained term*)? The composition effect is then further decomposed to assess the contribution of each group of covariates. In the second exercise, we decompose the gender *gap* in vulnerable employment for the latest year available for each country. This exercise asks: to which extent is the gender gap explained by differences in the distribution of covariates between men and women or, rather, by differences in the sex-specific returns to those covariates or to unobservables?

Our large dataset poses two limitations. First, with a large sample, Fairlie decompositions quickly become computationally intensive, both due to the fitting of non-linear (logit) models and due to the 1,000 random sequences drawn for each set of estimates. Second, sample sizes vary widely between countries and years. Countries with large samples will disproportionately influence the decomposition estimates. To deal with both limitations, for each decomposition exercise, a random sample of 1,500 men and 1,500 women is selected from each survey. For the gender gap decompositions, the random sample has 243,000 observations, equally divided between men and women, from 81 countries. For the 1990s–2010s decomposition, the random sample has 87,000 observations, also equally split by gender, from 29 countries.[25] To further alleviate computational costs, the decompositions are based on parsimonious models that include all individual and household covariates of vector X_{irstuo} in Equation (1), industry dummies (ω_u), and world region dummies. In practice, we do not include Admin1 dummies or occupational dummies. Standard errors are clustered at the country level. As usual, we run all decompositions with and without the agricultural sector.

4 Results

4.1 Drivers of vulnerable employment

We first estimate the LP model for the whole population, introducing the sets of controls sequentially. Table 3 shows the results. The gender gap in vulnerable employment is stable at around 7 percentage points for models that control for individual characteristics (columns 2–5). Strikingly, adding household fixed effects barely affects the female coefficient. In terms of economic magnitude, the conditional gap of 7 percentage points corresponds to 15 per cent of the male vulnerable employment share in the average developing country (0.48; see Table 1).

Older, married, and less educated workers are more likely to be in vulnerable employment. The effect of age is approximately linear, with 10 additional years linked to a 3–4 percentage point increase in vulnerable employment's propensity, once industry dummies are included (columns 3–5). Currently married workers are 2–3 percentage points more likely to be vulnerable. The effects of education are overall negative but concentrated at the post-secondary level. Relative to the omitted group with less than primary education, completing primary school has null effects in most specifications and is even positive and significant in the within-household model (column 5); completed secondary schooling has a negative effect of 3–5 percentage points in the most restrictive specifications (columns 3–5); post-secondary schooling has a large negative coefficient between 9 and 15 percentage points (columns 3–5). The vulnerability-reducing effects of secondary and post-secondary schooling weaken considerably (by about 60 and 50 per cent, respectively) when industry dummies are included (c.f. columns 2 and 3), suggesting that ed-

[25] See Table A2 for a list of the 29 countries included.

ucation mainly affects the likelihood of being in vulnerable employment through the sorting of workers across industries, rather than by affecting vulnerability propensities within industries.

The employment share of the worker's socio-demographic group correlates negatively with vulnerable employment: a 10 percentage point increase in the employment share is associated with a 2 percent point reduction in the likelihood of being vulnerably employed. Because, on average, male employment shares are larger than female shares, failing to include this variable would inflate the gender gap in vulnerable employment.

With respect to household characteristics, workers are at a lower risk of being vulnerable if they belong to a household headed by a more educated member or by a woman, where there are other adults working as wage employees, with fewer children and adult males, and located in urban areas. Of these correlates, we highlight the large magnitude of having at least one other household member who is a wage employee. The presence of a male (female) wage employee in the household is associated with a 15 (11) percentage point lower probability of being in vulnerable employment.

We then rerun the pooled LP models excluding the agricultural sector (see Table A5 in the Appendix). The gender gap in vulnerable employment is marginally smaller in some specifications, but remains of the same order of magnitude, between 6 and 8 percentage points for models that control for individual characteristics. Excluding agricultural workers leads to three main differences in the correlates of vulnerable employment. First, the negative effects of own education are stronger and much more linear across attainment levels. Second, the employment share coefficients, while still negative and highly significant, decline in absolute terms by around 40 per cent. Third, the positive association between the number of children and vulnerable employment becomes larger: across all age groups, most coefficients nearly double once agriculture is excluded. In short, outside of agriculture, education and number of children are stronger predictors of vulnerable employment, whereas the employment shares of different socio-demographic groups matter less.

Table 3: Correlates of vulnerable employment; pooled sample

	(1)	(2)	(3)	(4)	(5)
Female	0.0983***	0.0730***	0.0679***	0.0668***	0.0666***
	(0.0225)	(0.0153)	(0.0065)	(0.0081)	(0.0070)
Age		0.0010	0.0037**	0.0034**	0.0039*
		(0.0021)	(0.0017)	(0.0016)	(0.0020)
Age squared		3.05e-05	-6.63e-06	-2.83e-06	-3.17e-05
		(2.35e-05)	(1.98e-05)	(1.74e-05)	(2.87e-05)
Married		0.0292***	0.0195***	0.0194***	0.0275***
		(0.0040)	(0.0044)	(0.0048)	(0.0048)
Education level (Ref.: Less than primary)					
Primary		-0.0102	0.0131	0.0146	0.0228**
		(0.0134)	(0.0156)	(0.0149)	(0.0106)
Secondary		-0.1159***	-0.0476**	-0.0379*	-0.0300*
		(0.0149)	(0.0207)	(0.0218)	(0.0155)
Post-secondary		-0.3055***	-0.1535***	-0.1081***	-0.0943***
		(0.0264)	(0.0207)	(0.0268)	(0.0218)
Employment share		-0.1796***	-0.1668***	-0.1544***	-0.1843**
		(0.0335)	(0.0305)	(0.0314)	(0.0754)
Household head education (Ref.: Less than primary)					
Primary		-0.0154**	-0.0136*	-0.0128*	
		(0.0065)	(0.0071)	(0.0076)	
Secondary		-0.0340**	-0.0251	-0.0263	
		(0.0143)	(0.0168)	(0.0168)	
Post-secondary		-0.0650***	-0.0364*	-0.0347*	
		(0.0180)	(0.0195)	(0.0203)	
Missing: person is household head		-0.0917***	-0.0742***	-0.0757***	
		(0.0212)	(0.0239)	(0.0238)	
Female household head		-0.0335***	-0.0237***	-0.0256***	
		(0.0104)	(0.0077)	(0.0071)	
Other member: male wage employee		-0.1802***	-0.1492***	-0.1470***	
		(0.0132)	(0.0075)	(0.0077)	
Other member: female wage employee		-0.1413***	-0.1134***	-0.1092***	
		(0.0221)	(0.0133)	(0.0120)	
Children, 0–2		0.0040	0.0046*	0.0052*	
		(0.0026)	(0.0027)	(0.0027)	
Children, 3–5		0.0063***	0.0057**	0.0057**	
		(0.0024)	(0.0024)	(0.0024)	
Boys, 6–14		0.0060***	0.0044***	0.0042***	
		(0.0011)	(0.0011)	(0.0012)	
Girls, 6–14		0.0045***	0.0035***	0.0035***	
		(0.0009)	(0.0009)	(0.0010)	
Adult males		0.0258***	0.0213***	0.0208***	
		(0.0031)	(0.0023)	(0.0023)	
Adult females		0.0032	0.0025	0.0019	
		(0.0058)	(0.0050)	(0.0048)	
Urban		-0.1346***	-0.0518***	-0.0489***	
		(0.0159)	(0.0125)	(0.0114)	
Fixed effects:					
Admin1 region (1491)	Yes	Yes	Yes	Yes	
Industry (11)			Yes	Yes	Yes
Occupation (12)				Yes	Yes
Household (894609)					Yes
N	2943797	2943797	2943797	2943797	2251105
R^2	0.175	0.306	0.392	0.403	0.720

Note: LPM estimates reported with robust standard errors clustered at the survey-year level shown in parentheses. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 76 countries and 80 survey-years included. For each country, the most recent year is selected; it ranges from 1992 to 2017. 74 per cent of observations are from 2010 or later. Column 5: sample size is reduced due to the exclusion of singleton households. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on I2D2.

By gender

We now allow the vulnerable employment correlates to differ by gender. In practice, we re-estimate the model with fixed effects at the regional and industry levels (i.e. corresponding to column 3 of Table 3) separately for men and women. Table 4 reports the results. We emphasize two correlates that differ markedly by gender: marriage and the number of children. On average, for women, being currently married is associated with a 5–6 percentage point increase in the probability of working in vulnerable employment, but, for men, the association is statistically insignificant (and the point estimate is negative). The number of children at all ages has a vulnerability-increasing effect for both genders, but the magnitudes are always larger for women and inversely related to the child's age. The differences in the effect of children are particularly large when agricultural workers are excluded (columns 3–4); the female-specific coefficients are 2 to 3 times larger than the male-specific counterparts. For example, the presence of an additional child of age 0–2 is associated with a 1.8 percentage point increase in the vulnerable probability for women, whereas, for men, the increase is of 0.5 percentage points. In sum, a married woman with one child of age 0–2 is around 6–7 percentage points more likely to be vulnerably employed than a man of similar characteristics.

Table 4: Correlates of vulnerable employment by gender; pooled sample

	All industries		Excluding agriculture	
	(1) Men	(2) Women	(3) Men	(4) Women
Age	0.0027	0.0022	0.0016	0.0027
	(0.0017)	(0.0017)	(0.0024)	(0.0029)
Age squared	3.17e-06	1.10e-05	2.94e-05	2.25e-05
	(1.81e-05)	(1.89e-05)	(2.55e-05)	(3.15e-05)
Married	-0.0129	0.0525***	-0.0145	0.0583***
	(0.0106)	(0.0062)	(0.0117)	(0.0043)
Education level (Ref.: Less than primary)				
Primary	0.0145	0.0196	-0.0416**	-0.0400**
	(0.0167)	(0.0122)	(0.0169)	(0.0172)
Secondary	-0.0404*	-0.0506**	-0.1241***	-0.1366***
	(0.0208)	(0.0199)	(0.0206)	(0.0212)
Post-secondary	-0.1364***	-0.1713***	-0.2119***	-0.2382***
	(0.0200)	(0.0243)	(0.0232)	(0.0273)
Employment share	-0.1714***	-0.1062***	-0.1172***	-0.0778**
	(0.0248)	(0.0222)	(0.0231)	(0.0334)
Household head education (Ref.: Less than primary)				
Primary	-0.0187**	-0.0024	-0.0182	-0.0208*
	(0.0082)	(0.0056)	(0.0126)	(0.0123)
Secondary	-0.0398*	0.0040	-0.0175	-0.0150
	(0.0210)	(0.0091)	(0.0124)	(0.0123)
Post-secondary	-0.0193	-0.0104	0.0003	-0.0274**
	(0.0229)	(0.0091)	(0.0118)	(0.0121)
Missing: person is household head	-0.0672***	-0.0167	-0.0402***	-0.0283***
	(0.0239)	(0.0102)	(0.0127)	(0.0088)
Female household head	-0.0390***	-0.0233***	-0.0186**	-0.0178***
	(0.0138)	(0.0034)	(0.0078)	(0.0048)
Other member: male wage employee	-0.1675***	-0.1359***	-0.1506***	-0.1245***
	(0.0092)	(0.0113)	(0.0126)	(0.0135)
Other member: female wage employee	-0.1169***	-0.1124***	-0.0905***	-0.0927***
	(0.0180)	(0.0114)	(0.0123)	(0.0093)
Children, 0–2	0.0015	0.0089***	0.0053**	0.0183***
	(0.0037)	(0.0022)	(0.0026)	(0.0023)
Children, 3–5	0.0050*	0.0061**	0.0097***	0.0178***
	(0.0027)	(0.0024)	(0.0017)	(0.0023)
Boys, 6–14	0.0034***	0.0047***	0.0044***	0.0112***
	(0.0011)	(0.0016)	(0.0010)	(0.0019)
Girls, 6–14	0.0028**	0.0035***	0.0037***	0.0080***
	(0.0012)	(0.0011)	(0.0010)	(0.0015)
Adult males	0.0189***	0.0181***	0.0216***	0.0155***
	(0.0033)	(0.0020)	(0.0030)	(0.0024)
Adult females	0.0169***	0.0011	0.0115***	-0.0042
	(0.0048)	(0.0026)	(0.0035)	(0.0026)
Urban	-0.0420***	-0.0573***	-0.0382**	-0.0532***
	(0.0139)	(0.0138)	(0.0156)	(0.0153)
Fixed effects:				
Admin1 region	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	1724758	1219039	1141240	781459
R^2	0.342	0.473	0.237	0.377

Note: LPM estimates reported with robust standard errors clustered at the survey-year level shown in parentheses. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 76 countries and 80 survey-years included. For each country, the most recent year is selected; it ranges from 1992 to 2017. More than 71 per cent of observations are from 2010 or later. $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

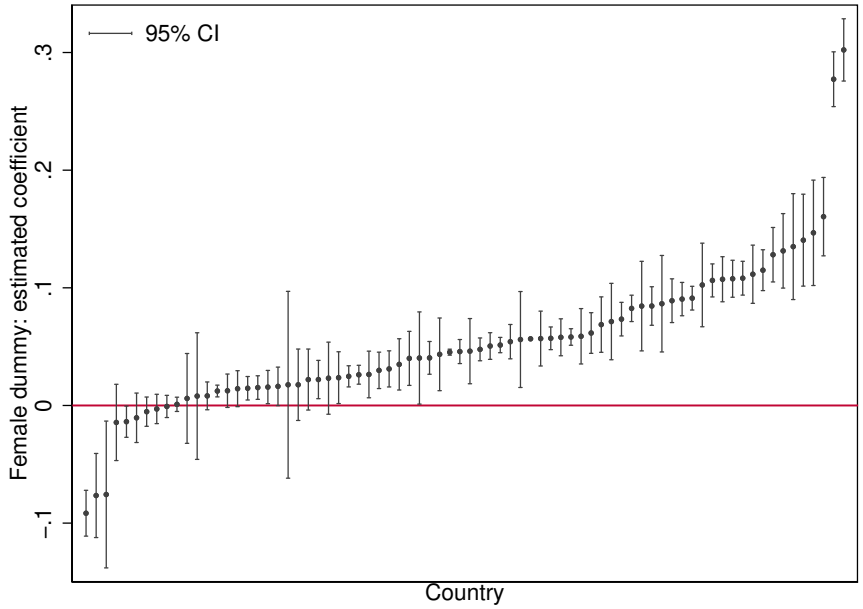
Source: authors' calculations based on I2D2.

4.2 Exploring and understanding cross-country variation in gender differences in vulnerable employment

How heterogeneous are the vulnerable employment correlates across countries? To provide an answer, we re-estimate the three LP models (whole population, men, women) separately for each country. As in Table 4, the specifications include regional (Admin1-level) and industry fixed effects, and are estimated with and without the agricultural sector. We focus on the heterogeneity of three coefficients: the female dummy in the whole population model, and the married dummy and the number of young children (0–2) in the gender-specific models.

Figure 3 plots, in ascending order, the country-specific estimates of the female dummy for the model that includes all industries. The estimates range from –9 percentage points in Namibia (2002) to 30 percentage points in Egypt (2004). The average estimate is 5 percentage points, which is below but still comparable to the female dummy coefficient in the pooled model with all countries (6.8 percentage points; see Table 3, column 3). In 67 out of 76 countries (88 per cent), the female dummy estimate is positive. When agriculture is excluded, the average estimate increases to 7 percentage points, and it is positive in 71 out of 76 countries.

Figure 3: Conditional gender gap in vulnerable employment propensity: country-specific estimates, all industries included



Note: female dummy coefficient, conditional on controls, reported with 95 per cent confidence intervals, based on robust standard errors clustered at the survey-year level. 76 countries included. For each country, the most recent year is selected; it ranges from 1992 to 2017. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise.

Source: authors' calculations based on I2D2.

For women, marriage is positively associated with vulnerable employment in virtually all countries (72 out of 75).[26] Average estimates for women across countries are similar with or without the agricultural sector: 4 and 5 percentage points, respectively. For men, the average estimate is approximately zero in both cases. Figure 4a shows regional box plots for the estimates of being married by gender (all industries included). The median is above 5 percentage points in the Middle East and North Africa, Latin America and the Caribbean, and East Asia and the Pacific; the median is lower, between 2 to 3.6 percentage points, in sub-Saharan Africa, South Asia, and Europe and Central Asia. For men, the

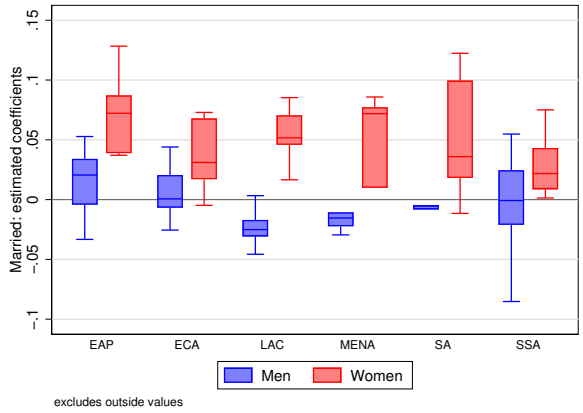
[26] Married estimates are not available for West Bank and Gaza (2009).

estimates are much smaller. In fact, in Latin America and the Caribbean, the Middle East and North Africa, and South Asia, the male median is negative.

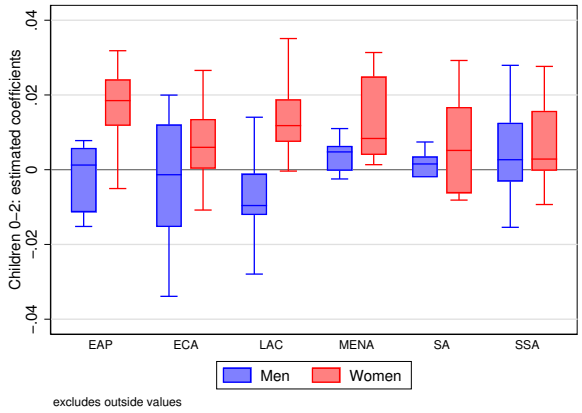
Young children (ages 0–2) increase the probability of vulnerable employment for women in 60 out of 76 countries. In contrast, the effect is positive for men in 41 countries. For models including all industries, the average estimate across countries is 1.2 percentage points for women and approximately 0 for men. Excluding agriculture, the average rises to 1.7 percentage points for women and 0.3 percentage points for men. Figure 4b shows regional box plots for the estimates when all industries are included. Everywhere, the female median is positive and larger than the male median. In East Asia, Europe and Central Asia, and Latin America, these gender gaps are large. In East Asia and Europe and Central Asia, the median for men is close to zero, whereas in Latin America the male median is negative. In sub-Saharan Africa, South Asia, and Middle East and North Africa, the median estimates are more similar across genders, although always slightly larger for women than for men.

Figure 4: Estimated effect of selected covariates in vulnerable employment's propensity: distribution of country-specific estimates, by gender and world region (all industries included)

(a) Currently married



(b) Number of children (0–2)



Note: the outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. All box plots exclude outside values. For each country, the most recent year is selected; it ranges from 1992 to 2017. (a) Box plot of currently-married dummy coefficient, conditional on controls. 75 countries included. (b) Box plot of coefficient for number of children (0–2) in the household, conditional on controls. 76 countries included. World regions follow the World Bank's classification and are East Asia and the Pacific (EAP), Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), Middle East and North Africa (MENA), South Asia (SA), and sub-Saharan Africa (SSA).

Source: authors' calculations based on I2D2.

What explains heterogeneity in the correlates of vulnerable employment? In particular, why is the conditional gender gap larger in some countries than in others? To shed light on this issue, we correlate the estimated female coefficient with country-level structural characteristics. We create two groups of structural characteristics. The first covers the economic and demographic structure of the country and consists of seven indicators, selected from the World Bank's World Development Indicators (WDI) database (World Bank 2021): (1) log of GDP per capita (PPP-adjusted), (2) Gini coefficient of income inequality, (3) log of population, (4) total fertility rate, (5) young-age dependency ratio, (6) old-age dependency ratio, and (7) vulnerable employment as a percentage of total employment, estimated by the ILO. The second group of characteristics covers the extent of legal discrimination against women as measured in the World Bank's Women, Business, and the Law (WBL) database (Hyland et al. 2020). We select the global index (WBL index), as well as the eight sub-indexes: Mobility, Workplace, Pay, Marriage, Parenthood, Entrepreneurship, Assets, and Pension. Higher values reflect more gender equality in a country's legislation.

We match each country-level indicator to the year of the I2D2 survey from which the conditional female coefficient is estimated. Given the relatively small sample size of 76 countries, we run simple bivariate

regressions of the estimated gender gap (in percentage points) on each of the country-level indicators. These correlations are purely descriptive and have, of course, no causal interpretation. Moreover, because the dependent variable is itself estimated from microdata, the coefficients' standard errors are underestimated and should be interpreted with caution.

Table 5 reports the correlates of economic and demographic characteristics. In panel A, the dependent variable is the estimated gender gap in country-specific models that include all industries. None of the economic and demographic factors correlate strongly with the gender gap: all coefficients are relatively small and statistically indistinguishable from zero at the 5 per cent level. However, in panel B, when agriculture is excluded, several correlations become sizable and significant. Descriptively, the gender gap in vulnerable employment outside of agriculture correlates negatively with per capita income and the old-age dependency ratio. In turn, the gender gap correlates positively with total fertility rate, the young-age dependency ratio, and the overall prevalence of vulnerable employment.

Table 5: Conditional gender gap in vulnerable employment propensity: association with countries' demographic and economic characteristics.

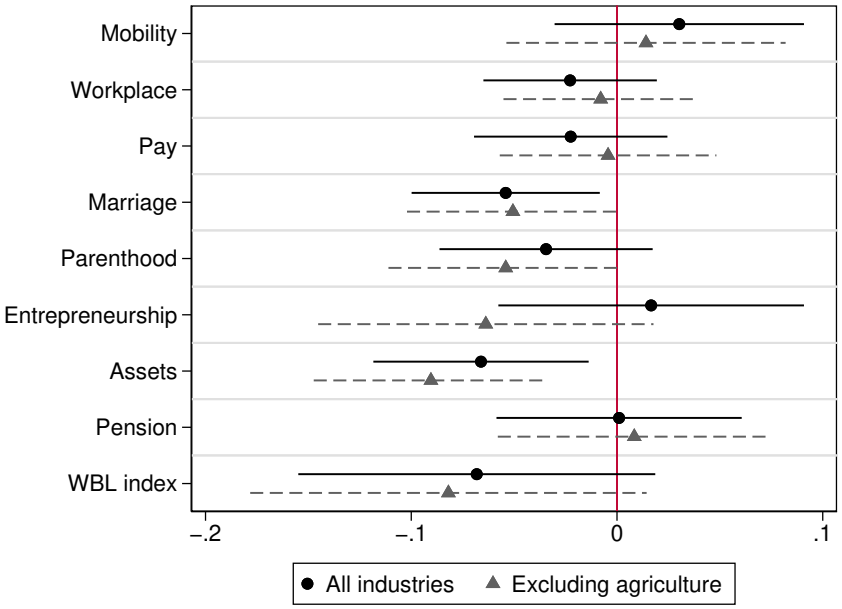
Panel A: All industries					Age dependency ratio		
	(1) log GDP p.c.	(2) Gini	(3) log Population	(4) Total fertility rate	(5) Young	(6) Old	(7) Vulnerable emp (ILO)
Female coeff. $\times$ 100	-0.2723	-0.0934	0.1982	0.4224	0.0364	-0.2516*	0.0068
	(0.7981)	(0.1151)	(0.4527)	(0.4901)	(0.0329)	(0.1407)	(0.0314)
N	74	58	76	76	76	76	76
R^2	0.002	0.012	0.003	0.010	0.016	0.041	0.001
Panel B: Excluding agriculture							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female coeff. $\times$ 100	-2.8216***	0.1483	0.2544	2.1606***	0.1517***	-0.5488***	0.1233***
	(0.8555)	(0.1165)	(0.5039)	(0.4877)	(0.0325)	(0.1467)	(0.0319)
N	74	58	76	76	76	76	76
R^2	0.131	0.028	0.003	0.210	0.227	0.159	0.168

Note: OLS estimates reported with standard errors shown in parentheses. Each cell reports the coefficient of a separate bivariate regression. The outcome variable is the row variable; the regressor is shown in each column. All models include a constant. 76 countries and 80 survey-years included. For each country, the most recent year is selected; it ranges from 1992 to 2017.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on I2D2 and WDI data.

Countries with more gender-egalitarian laws exhibit smaller conditional gender gaps in vulnerable employment. Figure 5 plots bivariate regression coefficients, with 95 per cent confidence intervals, of the indexes of legal gender equality in different dimensions. For the overall index and most sub-indexes, the correlation is negative. The correlations are very similar whether or not agriculture is included in the estimation of the gender gap, with the exception of the Entrepreneurship sub-index, whose coefficient is only negative for the gender gap outside of agriculture.

Figure 5: Conditional gender gap in vulnerable employment propensity: association with Women, Business, and the Law data



Note: bivariate regression coefficients reported with 95 per cent confidence intervals. Solid black lines: models that include all industries. Dash grey line: models that exclude agricultural sector. Dependent variable is the female dummy coefficient $\times 100$, conditional on controls. Each regression includes a constant and one of the variables shown in the figure. 76 countries included. For each country, the most recent year is selected; it ranges from 1992 to 2017.

Source: authors' calculations based on I2D2 and Women, Business, and the Law.

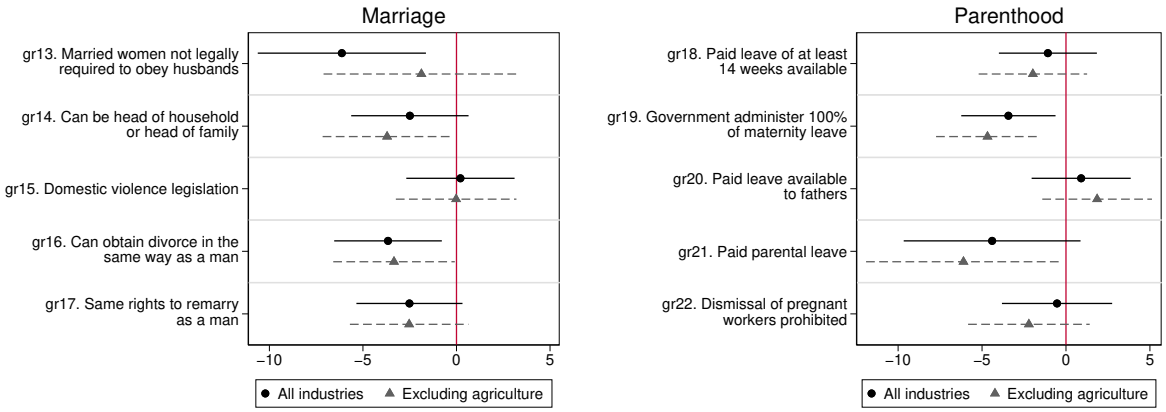
Negative correlations are particularly strong (in absolute terms) for the Marriage, Parenthood, Assets, and Entrepreneurship (excluding agriculture) sub-indexes. For these four dimensions, we further report the correlations between gender gaps in vulnerable employment and each of the sub-indexes' constitutive indicators, which take the form of a yes/no dummy answering a specific legal question.[27] Figure 6 plots the coefficients. In the marriage dimension (Figure 6a), all indicators except domestic violence legislation are associated with smaller gender gaps in vulnerable employment. Where women are not required by law to obey their husbands, can be the head of the household, and have the same access to divorce and rights to remarry as men, the gender gap in vulnerable employment is smaller. With respect to parenthood, gender gaps are around 5 percentage points smaller in countries with paid parental leave or where the government administers 100 per cent of maternity leave benefits (Figure 6b). When agriculture is excluded, constraints in women's ability to start and run businesses matter. Countries where women can register a business and open a bank account in the same way as a man have, on average, smaller gender gaps (Figure 6c). With respect to the Assets dimension, equal rights to inheritance of parental or spousal assets and the legal valuation of non-monetary contributions are associated with smaller gender gaps in vulnerable employment (Figure 6d).

[27] For completeness, in Figure A1, reported in the Appendix, we report correlations for all remaining WBL indicators, sorted by dimension: Mobility, Workplace, Pay, and Pension.

Figure 6: Conditional gender gap in vulnerable employment propensity: association with Marriage, Parenthood, Entrepreneurship, and Assets indicators of Women, Business, and the Law data

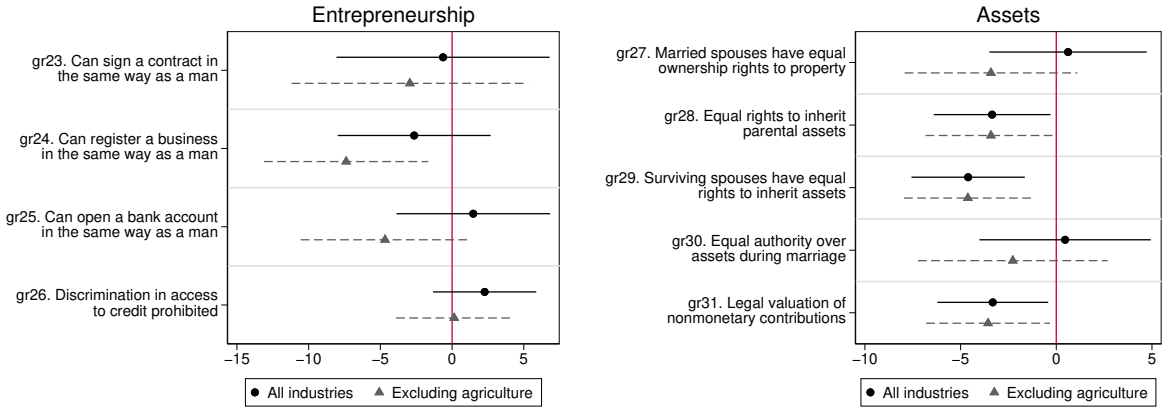
(a) Marriage

(b) Parenthood



(c) Entrepreneurship

(d) Assets



Note: bivariate regression coefficients reported with 95 per cent confidence intervals. Solid black lines: models that include all industries. Dash grey line: models that exclude agricultural sector. Dependent variable is the female dummy coefficient $\times 100$, conditional on controls. Each regression includes a constant and one of the variables shown in the figure. 76 countries included. For each country, the most recent year is selected; it ranges from 1992 to 2017.

Source: authors' calculations based on I2D2 and Women, Business, and the Law.

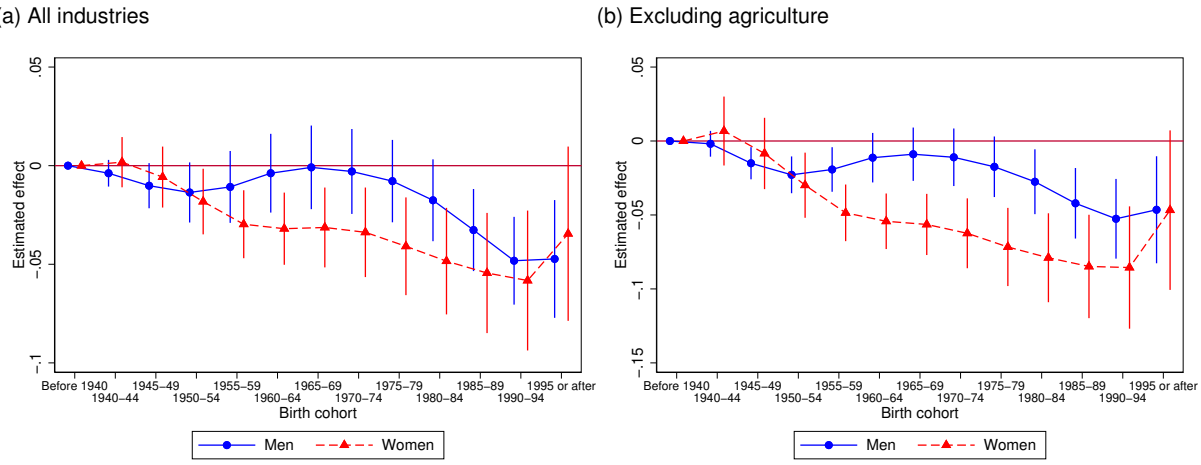
4.3 Changes in vulnerable employment over time: cohort effects

So far, our analysis has focused on the most recent I2D2 survey available for each country. In contrast, we now leverage all surveys to describe how the likelihood of vulnerable status in employment has evolved across birth cohorts. The sample of roughly 19.2 million individuals includes 531 surveys between 1991 and 2017 from 95 countries. For each gender, we run an LP model of vulnerable employment on the usual set of individual and household characteristics, industry, occupation, and survey-year fixed effects.[28] To flexibly purge out age effects, an age polynomial of degree four is included. In addition, we estimate birth-cohort coefficients, with dummies for each 5-year birth cohort, ranging from 1940–44 up to 1990–94. There are two residual cohorts: those born before 1940 (the omitted group) and those born after 1994. As usual, models are estimated with and without the agricultural sector, and standard errors are clustered at the survey-year level.

[28] In the models up to now, only 76 countries were included, because several surveys do not have information on Admin1 regions. For the cohort regressions, we do not include Admin1 fixed effects, because the regional codes are not harmonized over time in the I2D2. As a result, 95 countries have complete covariate data.

Figure 7 plots the birth-cohort estimates for men and women with 95 per cent confidence intervals. For men, cohort effects are small and mostly insignificant until birth year 1980. For those born between 1980 and 1994, the probability of being vulnerable decreases substantially and then stabilizes around 5 percentage points below the level of the omitted group (born before 1940). For women, cohort effects start declining much earlier, from birth year 1950 onwards. For those born after 1950, the negative female coefficient is always stronger than the male coefficient for all cohorts except the most recent one (1995 or after). The cohort effects are larger (in absolute terms) and more precisely estimated when agriculture is excluded (Figure 7b). Overall, cohort effects are limited. Over a 50 birth-year period, roughly two generations, the decline in vulnerable employment propensity is around 5 percentage points, which is comparable to the conditional difference in propensity between currently married and non-married women.

Figure 7: Estimated birth-cohort effects by gender



Note: birth-cohort coefficients (reference group: cohort born before 1940), conditional on controls. 95 countries and 531 survey-years included. The earliest survey year is 1991 and the latest is 2017. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise.

Source: authors' calculations based on I2D2.

4.4 Decomposing changes and gender gaps in vulnerable employment

To complement the birth-cohort analysis above, we now decompose changes in vulnerable employment over time by gender, using Fairlie's (2005) method. Because cohort effects are of modest size, we expect most of the change over time to be explained by composition effects—i.e. by changes in individuals' (and their households') labour supply characteristics.

Indeed, changes in female and male vulnerable employment between the 1990s and the 2010s are almost entirely explained by composition effects (Figure 8a).[29] The effect of these changes contributed to a similar reduction of female (4.1 percentage points) and male (4.7 percentage points) vulnerable employment shares. However, among workers outside the agricultural sector (see Table A7 and Figure A2a), the reduction in vulnerable employment was more than twice as large for women (7.6 percentage points) than for men (3.2 percentage points).

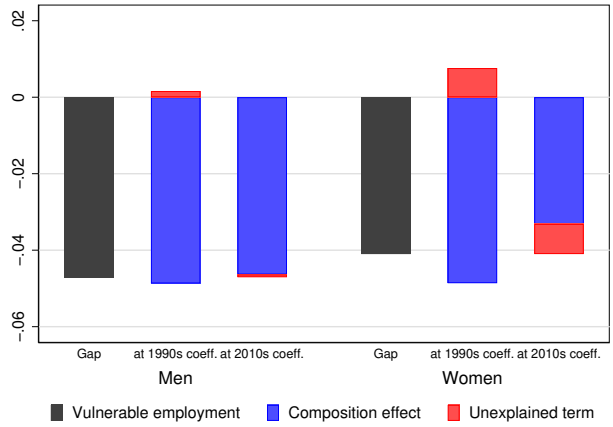
Over time, the evolution of most covariates reduced vulnerable employment for both genders: changing industry composition, rising education attainment and urbanization, declining family sizes (both as number of adults and children), increasing wage employment among other household members, and rising numbers of female household heads (Figures 8b and 8c). The only significant countervailing

[29] Point estimates and standard errors are shown in Table A6.

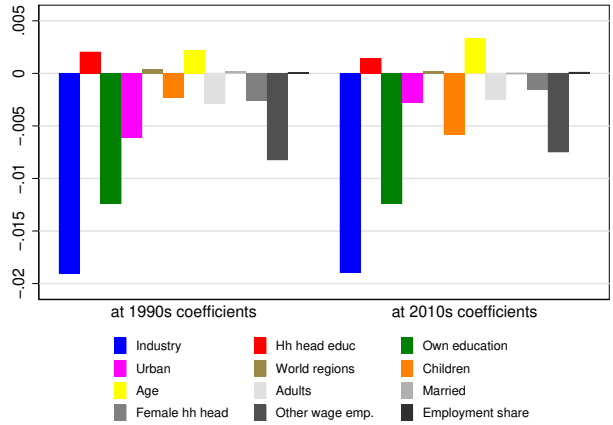
force is ageing of the workforce, which increased the likelihood of vulnerable employment by 0.2 to 0.6 percentage points over the two decades.

Across genders, education and fertility played a larger role in pulling women away from vulnerable employment than men. Between the 1990s and 2010s, rising education and fewer children account for a 2.8 percentage point reduction in vulnerable employment among women and for a 1.4 percentage point reduction among men (at 1990s coefficients).[30]

Figure 8: Decompositions over time (all industries included)
(a) Composition effect and unexplained term

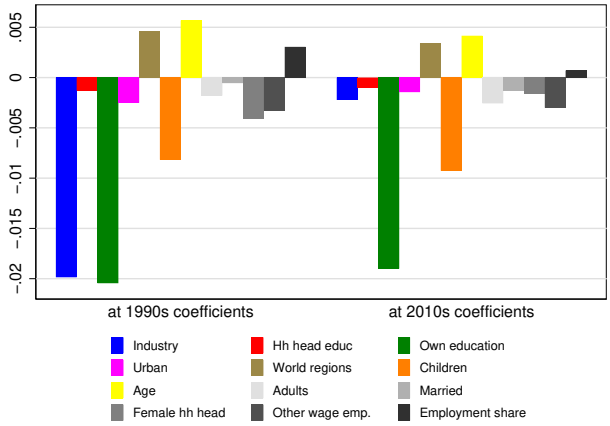


(b) Detailed composition effects: male sample



[30] When the agricultural sector is excluded, the difference is even larger: over time, rising education and fewer children reduce female vulnerable employment by 3.9 percentage points, and male vulnerable employment by 1.6 (at 1990s coefficients; see Table A7).

Figure 8: Decompositions over time (all industries included)—*continued*
(c) Detailed composition effects: female sample



Note: Fairlie (2005) decompositions. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 29 countries included. For each country, the earliest survey in 1990–99 and the latest survey in 2010–17 are selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. See Table A6 for point estimates and standard errors.

Source: authors' calculations based on I2D2.

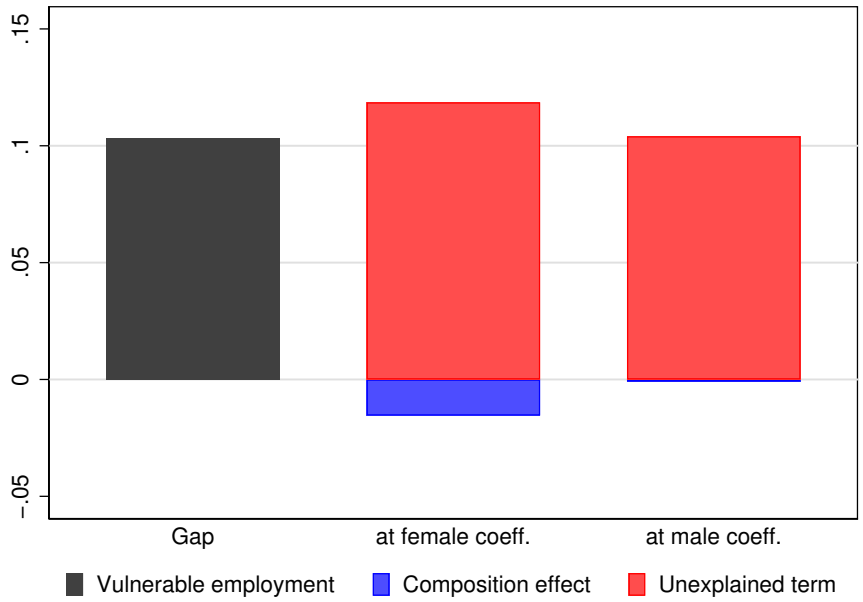
In the future, it is likely that trends of structural change (e.g. away from agriculture), urbanization, rising education, and declining fertility will continue and, consequently, will help reduce vulnerable employment for both genders. However, it is doubtful that, on their own, these structural trends will substantially reduce the *gap* in vulnerable employment between men and women. First, if past decades are a good guide, these trends tend to (overall) affect male and female vulnerable employment by a similar magnitude. Second, with the narrowing of gender differences in education and number of children—key variables that disproportionately lifted women from vulnerable employment in the past—there is fewer room for further reducing the gender gap through supply-side characteristics alone.

To ground the argument above, we decompose current levels of the gender gap in vulnerable employment, using the last available year for each country. The entire gender gap in vulnerable employment is left unexplained (Figure 9a). Composition effects are close to zero at male coefficients and even negative, at minus 1.5 percentage points, at female coefficients. In other words, the current gap in vulnerable employment is not driven by gender differences in standard supply-side characteristics. For example, existing gender differences in education attainment explain only 0.4 percentage points (or 4 per cent) of the 10 percentage point gap in vulnerable employment (Figure 9b).[31]

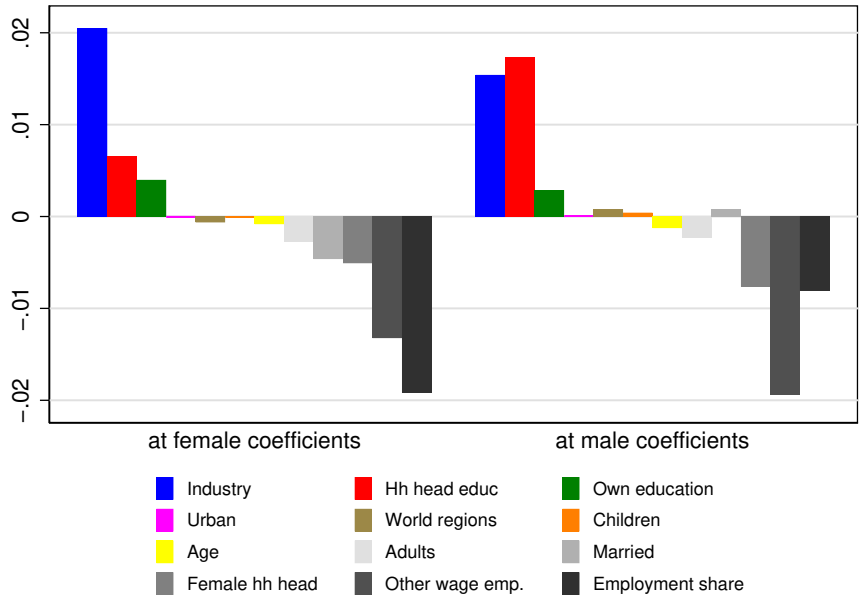
The only covariate with a sizable positive contribution to the gender gap is industry of employment. In decompositions with or without the agricultural sector, eliminating gendered sectoral segregation would reduce the vulnerable employment gender gap by 2–3 percentage points. However, gendered sectoral segregation is remarkably persistent and unlikely to decrease substantially in the near future. In fact, since 1980, sectoral segregation has *increased* in many developing countries (Borrowman and Klasen 2020).

[31] Point estimates and standard errors are shown in Table A8. Similar patterns emerge when agriculture is excluded; see Figure A3.

Figure 9: Decompositions by gender (all industries included)
(a) Composition effect and unexplained term



(b) Detailed composition effects



Note: Fairlie (2005) decompositions. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 81 countries included. For each country, the latest survey is selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. See Table A8 for point estimates and standard errors.

Source: authors' calculations based on I2D2.

In sum, while the share of workers in vulnerable employment is likely to decrease in the future, as the developing world's workforce becomes more educated, urbanized, and with less dependent household members, the *gap* between men and women will probably not be very responsive to these supply-side forces. In contrast, all of the current gender gap stems from gender differences in the returns to supply-side factors and other unobservables, which likely include gendered-patterns of labour demand, labour market discrimination, and gender-biased norms.

5 Conclusion

Ever since the Millennium Declaration and the adoption of the Global Employment Agenda, the promotion of women's empowerment and access to decent work has been a primary goal of development policy. Beyond direct welfare and empowerment gains for women, coupling rising female labour force participation with increasing access to high-quality jobs can generate sizable aggregate economic gains through a variety of positive externalities, such as lower fertility, improved child health, and better allocation of talent (see Santos Silva and Klasen 2021, for a review).

However, little progress has occurred in ensuring equitable access to decent work for women. In this paper we ask whether and to what extent are working women over-represented in vulnerable employment. Using a large and rich collection of household and labour force surveys, we show that women have a higher probability of being in vulnerable employment than men of similar characteristics in many comparative dimensions: within countries, sub-national regions, industries, occupations, and even within households.

The experiences of marriage and parenthood appear to generate the decisive wedge between male and female vulnerable employment propensities. Marriage increases the probability of being in vulnerable employment for women, but not for men. Likewise, the vulnerability-increasing effect of the number of children (at all age-groups) is substantially larger for women than for men.

We also show that cross-country differences in the gender gap in vulnerable employment correlate with differences in economic development, fertility, the age dependency ratio of the young, and the extent of legal discrimination against women, particularly in laws regulating marriage, parenthood, access to assets, and access to entrepreneurship.

Further results from decomposition analyses suggest that, between 1990 and 2010, the narrowing of the gender gap in educational attainment and rapidly falling fertility substantially contributed to reducing the share of female vulnerable workers. However, current levels of the gender gap in vulnerable employment remain almost entirely unexplained by standard labour supply factors at the individual or household levels. Instead, the current gap is likely attributable to gender-biased norms and institutions that continue to constraint women to the role of secondary earners, who disproportionately bear the brunt of domestic responsibilities.

Policies that address these female-specific constraints or that, overall, boost labour demand in female-intensive segments of the wage employment sector are promising avenues to closing the gender gap in vulnerable employment. However, in the short and medium term, only a small share of vulnerable workers will be absorbed by wage employment (Beegle and Bundervoet 2019). As a result, complementary policies should target the welfare of women working *within* the vulnerable categories of own-account work and contributing family work.

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Appendix: additional tables and figures

Table A1: Vulnerable employment: ILO's definition

ICSE-93	I2D2	Vulnerable
Paid employees	Paid employees	No
Employers	Employers	No
Own-account workers	Own-account workers	Yes
Contributing family workers	Unpaid employees	Yes
Members of producers' cooperatives		n.d.
Workers not classifiable by status		n.d.

Note: n.d.—Not defined. ICSE-93—International Classification of Status in Employment, 1993. I2D2—International Income Distribution Database.

Source: authors' elaboration.

Table A2: List of 101 countries included in the analysis

Country (101)	Last year	Regressions (76)	Decompositions (26)	Decomposition period
Albania	2008			
Angola	2008	Yes		
Armenia	2016	Yes	Yes	1998–2016
Azerbaijan	2015			
Bangladesh	2015	Yes	Yes	1999–2015
Belarus	2016			
Belize	1999			
Benin	2015			
Bhutan	2012	Yes		
Bolivia	2015	Yes	Yes	1997–2015
Bosnia and Herzegovina	2007	Yes		
Botswana	2009	Yes		
Brazil	2015	Yes		
Bulgaria	2007	Yes		
Burkina Faso	2014	Yes	Yes	1998–2014
Burundi	2013	Yes		
Cabo Verde	2007	Yes		
Cambodia	2009			
Cameroon	2014	Yes		
Central African Republic	2008			
Chad	2011			
China	2002	Yes		
Colombia	2017	Yes	Yes	1999–2017
Comoros	2013			
Congo, Dem. Rep.	2012	Yes		
Congo, Rep.	2011	Yes		
Costa Rica	2015		Yes	1991–2015
Cote d'Ivoire	2008	Yes		
Djibouti	2002	Yes		
Dominican Republic	2015	Yes	Yes	1996–2015
Ecuador	2015	Yes	Yes	1994–2015
Egypt, Arab Rep.	2004	Yes		
El Salvador	2014	Yes	Yes	1991–2014
Eswatini	2009	Yes		
Ethiopia	2015	Yes	Yes	1995–2015
Fiji	1996			
Gabon	2005			
Gambia, The	2015	Yes	Yes	1998–2015
Georgia	2013	Yes		
Ghana	2012	Yes		
Guatemala	2011	Yes		
Guinea	2012	Yes		
Guinea-Bissau	2010	Yes	Yes	1993–2010

Guyana	1992	Yes		
Haiti	2001	Yes		
Honduras	2016	Yes	Yes	1991–2016
Indonesia	2002	Yes		
Jamaica	2002	Yes		
Jordan	2016	Yes		
Kenya	2005	Yes		
Kyrgyz Republic	2011	Yes		
Lesotho	2010	Yes		
Liberia	2014	Yes		
Madagascar	2012	Yes	Yes	1993–2012
Maldives	2009	Yes		
Mali	2010	Yes		
Mauritania	2014	Yes		
Mauritius	2012			
Mexico	2012	Yes	Yes	1996–2012
Moldova	2015			
Mongolia	2009			
Montenegro	2011			
Morocco	2009	Yes		
Mozambique	2012	Yes	Yes	1996–2012
Myanmar	2010	Yes		
Namibia	2009	Yes		
Nepal	2008	Yes		
Nicaragua	2014		Yes	1993–2014
Niger	2014	Yes	Yes	1995–2014
Nigeria	1993			
North Macedonia	2006			
Pakistan	2014	Yes	Yes	1992–2014
Paraguay	2017	Yes	Yes	1995–2017
Peru	2015		Yes	1997–2015
Philippines	2014	Yes	Yes	1997–2014
Romania	2013	Yes	Yes	1999–2013
Russian Federation	2016	Yes		
Rwanda	2013	Yes		
Senegal	2011	Yes		
Serbia	2013	Yes		
Sierra Leone	2014	Yes		
South Africa	2017	Yes		
Sri Lanka	2016	Yes	Yes	1992–2016
Sudan	2009	Yes		
Suriname	1999			
Syrian Arab Republic	2003	Yes		
Tajikistan	2009	Yes		
Tanzania	2014	Yes	Yes	1991–2014
Thailand	2011	Yes	Yes	1991–2011
Timor-Leste	2010	Yes		
Togo	2011	Yes		
Tonga	1996			
Tunisia	2010		Yes	1997–2010
Turkey	2014			
Uganda	2016	Yes	Yes	1999–2016
Ukraine	2002	Yes		
Venezuela, RB	2006			
Vietnam	2010	Yes		
West Bank and Gaza	2009	Yes		
Zambia	2015	Yes	Yes	1998–2015
Zimbabwe	2011	Yes		

Source: authors' elaboration.

Table A3: Estimation sample: means of individual and household characteristics

	All	Men	Women
Vulnerable employment	0.53	0.48	0.61
Female	0.41		
Age	38.21	38.35	38.02
Married	0.68	0.70	0.64
Employment share	0.74	0.82	0.63
Education level:			
Less than primary	0.15	0.13	0.18
Primary	0.35	0.37	0.33
Secondary	0.36	0.38	0.33
Post-secondary	0.14	0.13	0.16
Household head education:			
Less than primary	0.11	0.08	0.14
Primary	0.21	0.15	0.30
Secondary	0.16	0.10	0.25
Post-secondary	0.05	0.03	0.09
Missing: person is household head	0.47	0.64	0.22
Female household head	0.21	0.13	0.32
Other member: male wage employee	0.24	0.18	0.33
Other member: female wage employee	0.17	0.20	0.12
Children, 0–2	0.29	0.29	0.28
Children, 3–5	0.31	0.31	0.31
Boys, 6–14	0.47	0.47	0.47
Girls, 6–14	0.45	0.44	0.45
Adult males	1.54	1.72	1.28
Adult females	1.58	1.45	1.77
Urban	0.54	0.54	0.54
N	2943797	1724758	1219039

Note: estimation sample: unweighted means of individual and household characteristics. 76 countries and 80 survey-years included. For each country, the most recent year is selected; it ranges from 1992 to 2017. 74 per cent of observations are from 2010 or later.

Source: authors' calculations based on I2D2.

Table A4: Estimation sample: industry and occupation composition

	All	Men	Women
Industry:			
Agriculture	0.35	0.34	0.36
Mining	0.01	0.01	0.00
Manufacturing	0.10	0.10	0.10
Public utilities	0.01	0.01	0.00
Construction	0.05	0.09	0.01
Commerce	0.18	0.15	0.23
Transport & communications	0.05	0.08	0.02
Financial & business services	0.03	0.03	0.03
Public administration	0.07	0.08	0.06
Other services, unspecified	0.09	0.06	0.14
Missing	0.05	0.06	0.04
Occupation:			
Senior officials	0.03	0.03	0.02
Professionals	0.05	0.04	0.05
Technicians	0.04	0.05	0.04
Clerks	0.05	0.04	0.05
Service and market sales workers	0.12	0.10	0.16
Skilled agricultural	0.23	0.23	0.23
Craft workers	0.09	0.11	0.06
Machine operators	0.04	0.06	0.02
Elementary occupations	0.15	0.15	0.15
Armed forces	0.00	0.01	0.00
Others	0.00	0.00	0.00
Missing	0.19	0.18	0.21
N	2943797	1724758	1219039

Note: estimation sample: unweighted means of industry and occupation dummies. 76 countries and 80 survey-years included. For each country, the most recent year is selected; it ranges from 1992 to 2017. 74 per cent of observations are from 2010 or later.

Source: authors' calculations based on I2D2.

Table A5: Correlates of vulnerable employment, excluding agriculture (pooled sample)

	(1)	(2)	(3)	(4)	(5)
Female	0.0824***	0.0845***	0.0726***	0.0681***	0.0575***
	(0.0264)	(0.0276)	(0.0117)	(0.0130)	(0.0095)
Age		0.0005	0.0025	0.0024	0.0030**
		(0.0025)	(0.0021)	(0.0018)	(0.0014)
Age squared		4.40e-05*	2.27e-05	2.38e-05	-2.90e-06
		(2.59e-05)	(2.23e-05)	(1.92e-05)	(1.83e-05)
Married		0.0332***	0.0233***	0.0240***	0.0310***
		(0.0068)	(0.0065)	(0.0070)	(0.0058)
Education level (Ref.: Less than primary)					
Primary		-0.0586***	-0.0503***	-0.0476***	-0.0164*
		(0.0163)	(0.0158)	(0.0122)	(0.0098)
Secondary		-0.1646***	-0.1400***	-0.1290***	-0.0834***
		(0.0202)	(0.0187)	(0.0162)	(0.0118)
Post-secondary		-0.3273***	-0.2347***	-0.1938***	-0.1437***
		(0.0218)	(0.0223)	(0.0228)	(0.0175)
Employment share		-0.1157***	-0.1073***	-0.0988***	-0.1068***
		(0.0273)	(0.0209)	(0.0224)	(0.0337)
Household head education (Ref.: Less than primary)					
Primary		-0.0196	-0.0272*	-0.0271**	
		(0.0143)	(0.0138)	(0.0132)	
Secondary		-0.0180	-0.0263**	-0.0257*	
		(0.0140)	(0.0132)	(0.0133)	
Post-secondary		-0.0471***	-0.0355***	-0.0315**	
		(0.0138)	(0.0133)	(0.0135)	
Missing: person is household head		-0.0746***	-0.0718***	-0.0710***	
		(0.0132)	(0.0130)	(0.0134)	
Female household head		-0.0135**	-0.0142***	-0.0130***	
		(0.0056)	(0.0049)	(0.0046)	
Other member: male wage employee		-0.1572***	-0.1352***	-0.1314***	
		(0.0161)	(0.0101)	(0.0086)	
Other member: female wage employee		-0.1062***	-0.0884***	-0.0847***	
		(0.0144)	(0.0097)	(0.0074)	
Children, 0–2		0.0092***	0.0097***	0.0101***	
		(0.0020)	(0.0020)	(0.0021)	
Children, 3–5		0.0124***	0.0124***	0.0124***	
		(0.0013)	(0.0014)	(0.0015)	
Boys, 6–14		0.0072***	0.0073***	0.0072***	
		(0.0013)	(0.0010)	(0.0012)	
Girls, 6–14		0.0057***	0.0059***	0.0058***	
		(0.0011)	(0.0009)	(0.0009)	
Adult males		0.0265***	0.0225***	0.0216***	
		(0.0035)	(0.0026)	(0.0022)	
Adult females		-0.0032	-0.0037	-0.0042	
		(0.0033)	(0.0031)	(0.0028)	
Urban		-0.0258	-0.0462***	-0.0430***	
		(0.0179)	(0.0159)	(0.0131)	
Fixed effects:					
Admin1 region (1491)	Yes	Yes	Yes	Yes	
Industry (10)			Yes	Yes	Yes
Occupation (12)				Yes	Yes
Household (531857)					Yes
N	1922705	1922705	1922705	1922705	1272177
R^2	0.114	0.210	0.289	0.302	0.680

Note: LPM estimates reported with robust standard errors clustered at the survey-year level shown in parentheses. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 76 countries and 80 survey-years included. For each country, the most recent year is selected; it ranges from 1992 to 2017. 75 per cent of observations are from 2010 or later. Column 5: sample size is reduced due to the exclusion of singleton households. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on I2D2.

Table A6: Decompositions over time: 1990s–2010s

	Men		Women	
Pr(Vulnerable employment) 2010s	0.499		0.597	
Pr(Vulnerable employment) 1990s	0.546		0.638	
Difference	-0.047		-0.041	
	At 1990s coeff. (1)	At 2010s coeff. (2)	At 1990s coeff. (3)	At 2010s coeff. (4)
Age	0.002***	0.003***	0.006***	0.004***
	(0.001)	(0.001)	(0.002)	(0.001)
Own education	-0.012***	-0.012***	-0.020***	-0.019***
	(0.003)	(0.002)	(0.002)	(0.003)
Married	0.000	-0.000	-0.001	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Employment share	0.000	0.000	0.003**	0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Urban	-0.006***	-0.003***	-0.003**	-0.001***
	(0.001)	(0.001)	(0.001)	(0.001)
Female household head	-0.003***	-0.002**	-0.004***	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Household head education	0.002**	0.001**	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Household wage employees	-0.008***	-0.008***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Children	-0.002**	-0.006***	-0.008***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)
Adults	-0.003***	-0.002***	-0.002***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Industry	-0.019***	-0.019	-0.020***	-0.002
	(0.007)	(0.017)	(0.006)	(0.011)
World regions	0.000	0.000	0.005**	0.003*
	(0.001)	(0.001)	(0.002)	(0.002)
Composition	-0.049	-0.046	-0.049	-0.033
Unexplained	0.002	-0.001	0.008	-0.008
N	87000	87000	87000	87000

Note: Fairlie (2005) decompositions with robust standard errors clustered at the country level shown in parentheses. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 29 countries included. For each country, the earliest survey in 1990–99 and the latest survey in 2010–17 are selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

Source: authors' calculations based on I2D2.

Table A7: Decompositions over time, excluding agricultural sector: 1990s–2010s

	Men		Women	
Pr(Vulnerable employment) 2010s	0.317		0.394	
Pr(Vulnerable employment) 1990s	0.348		0.470	
Difference	-0.032		-0.076	
	At 1990s coeff.	At 2010s coeff.	At 1990s coeff.	At 2010s coeff.
	(1)	(2)	(3)	(4)
Age	0.004***	0.005***	0.008***	0.008***
	(0.001)	(0.001)	(0.002)	(0.001)
Own education	-0.012***	-0.015***	-0.028***	-0.023***
	(0.002)	(0.002)	(0.003)	(0.003)
Married	0.001	0.000*	-0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
Employment share	-0.000	-0.001	0.005	-0.003
	(0.001)	(0.001)	(0.003)	(0.002)
Urban	-0.003*	-0.001	-0.006***	-0.002*
	(0.002)	(0.001)	(0.002)	(0.001)
Female household head	-0.002***	-0.001**	-0.003***	-0.002**
	(0.000)	(0.000)	(0.001)	(0.001)
Household head education	0.001	0.000	-0.002	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Household wage employees	-0.004***	-0.005***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Children	-0.004***	-0.005***	-0.011***	-0.012***
	(0.001)	(0.002)	(0.001)	(0.001)
Adults	-0.003***	-0.003***	-0.001	-0.001**
	(0.001)	(0.001)	(0.001)	(0.000)
Industry	-0.013	-0.017	-0.024***	-0.018**
	(0.010)	(0.016)	(0.007)	(0.007)
World regions	-0.000	0.005*	0.005	0.011***
	(0.003)	(0.003)	(0.004)	(0.004)
Composition	-0.036	-0.036	-0.060	-0.046
Unexplained	0.004	0.004	-0.017	-0.030
N	69000	69000	69000	69000

Note: Fairlie (2005) decompositions with robust standard errors clustered at the country level shown in parentheses. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 23 countries included. For each country, the earliest survey in 1990–99 and the latest survey in 2010–17 are selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on I2D2.

Table A8: Decompositions by gender: latest year available

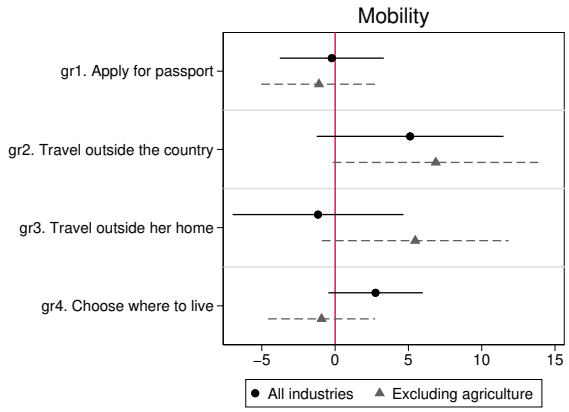
	All industries		Excluding agriculture	
Pr(Vulnerable employment) Women	0.600		0.439	
Pr(Vulnerable employment) Men	0.497		0.336	
Difference	0.103		0.104	
	At male coeff. (1)	At female coeff. (2)	At male coeff. (3)	At female coeff. (4)
Age	-0.001***	-0.001*	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Own education	0.003**	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.001	-0.005***	0.001	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Employment share	-0.008	-0.019**	-0.003	-0.013
	(0.009)	(0.010)	(0.011)	(0.013)
Urban	0.000	-0.000	-0.001***	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
Female household head	-0.008***	-0.005**	-0.008***	-0.008***
	(0.001)	(0.002)	(0.002)	(0.002)
Household head education	0.017***	0.007**	0.014***	0.007*
	(0.004)	(0.003)	(0.004)	(0.004)
Household wage employees	-0.019***	-0.013***	-0.023***	-0.017***
	(0.001)	(0.001)	(0.002)	(0.002)
Children	0.000*	-0.000	0.001***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Adults	-0.002*	-0.003*	-0.003*	-0.003*
	(0.001)	(0.002)	(0.002)	(0.002)
Industry	0.015***	0.021***	0.021***	0.026*
	(0.003)	(0.007)	(0.004)	(0.014)
World regions	0.001	-0.001	0.003**	0.001
	(0.001)	(0.001)	(0.001)	(0.002)
Composition	-0.001	-0.015	0.005	-0.012
Unexplained	0.104	0.119	0.099	0.115
N	243000	243000	222000	222000

Note: Fairlie (2005) decompositions with robust standard errors clustered at the country level shown in parentheses. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 81 countries included. For each country, the latest survey is selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

Source: authors' calculations based on I2D2.

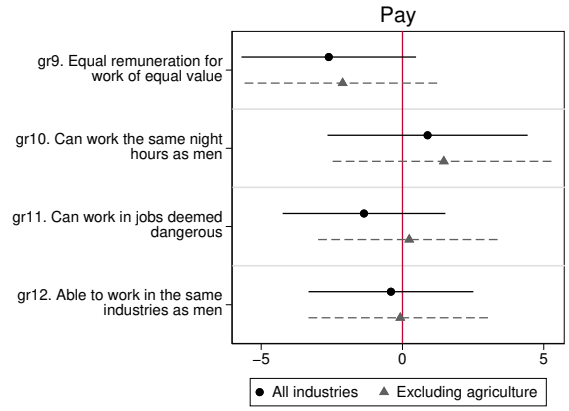
Figure A1: Conditional gender gap in vulnerable employment propensity: association with Mobility, Workplace, Pay, and Pension indicators of Women, Business, and the Law data

(a) Mobility



(b) Workplace

(c) Pay



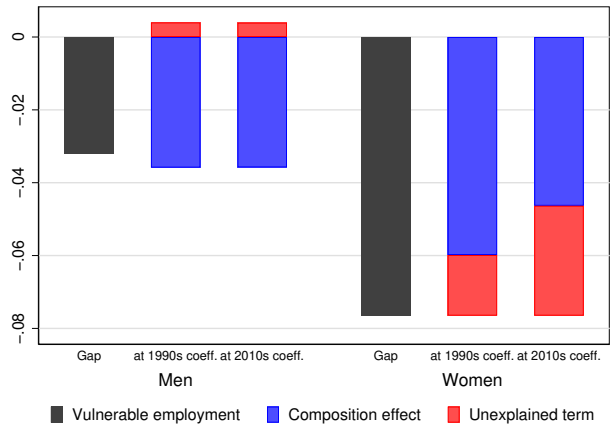
(d) Pension

Notes: bivariate regression coefficients reported with 95 per cent confidence intervals. Solid black lines: models that include all industries. Dash grey line: models that exclude agricultural sector. Dependent variable is the female dummy coefficient $\times 100$, conditional on controls. Each regression includes a constant and one of the variables shown in the figure. 76 countries included. For each country, the most recent year is selected; it ranges from 1992 to 2017.

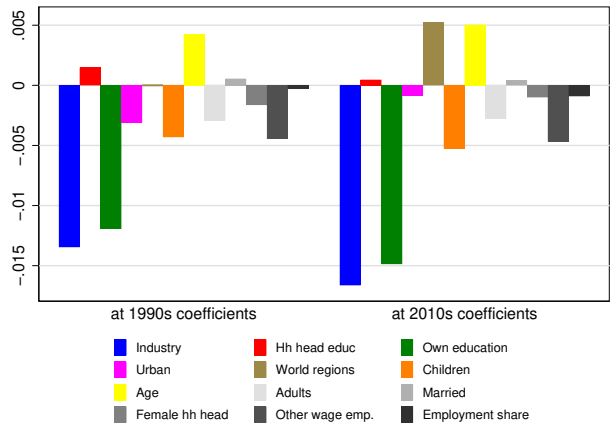
Source: authors' calculations based on I2D2 and Women, Business, and the Law.

Figure A2: Decompositions over time: excluding agriculture

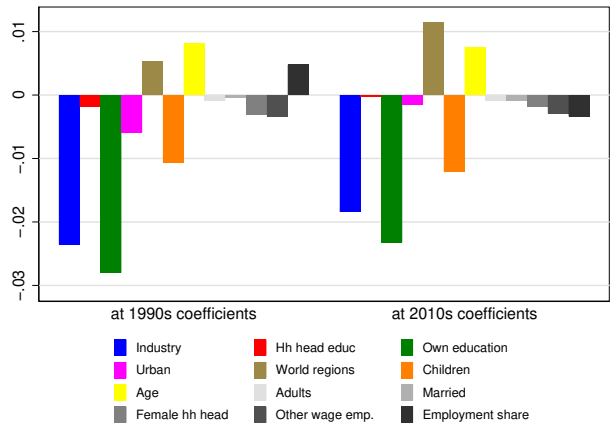
(a) Composition effect and unexplained term



(b) Detailed composition effects: male sample



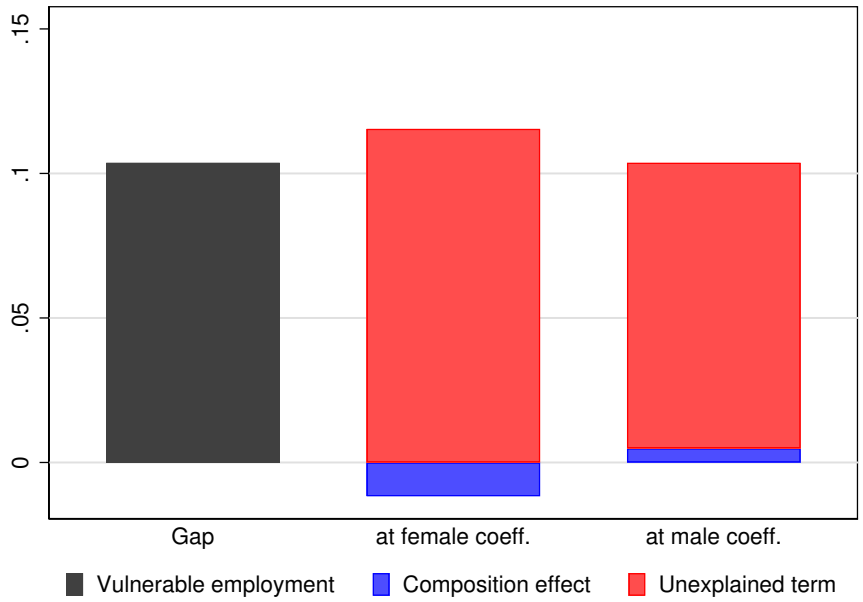
(c) Detailed composition effects: female sample



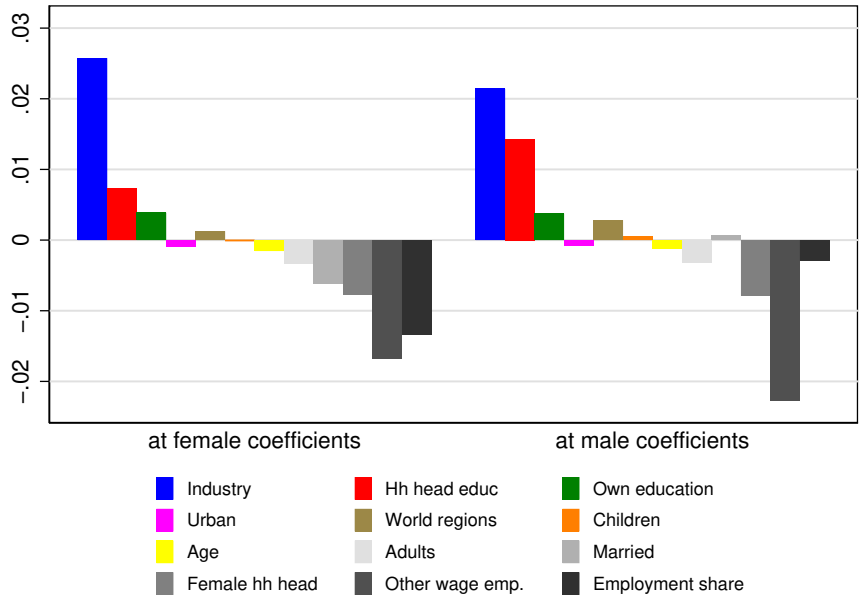
Notes: Fairlie (2005) decompositions. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 29 countries included. For each country, the earliest survey in 1990–99 and the latest survey in 2010–17 are selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. See Table A7 for point estimates and standard errors.

Source: authors' calculations based on I2D2.

Figure A3: Decompositions by gender: excluding agriculture
(a) Composition effect and unexplained term



(b) Detailed composition effects



Notes: Fairlie (2005) decompositions. The outcome variable is 1 if the worker is in vulnerable employment and 0 otherwise. 81 countries included. For each country, the latest survey is selected, conditional on having at least 1,500 male and 1,500 female observations with complete covariate data. Decompositions are performed for a random sample of 1,500 men and 1,500 women drawn from each survey. Each decomposition is the average over 1,000 sequences where the ordering of covariates is randomly determined. See Fairlie (2005) for more details. See Table A8 for point estimates and standard errors.

Source: authors' calculations based on I2D2.