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Gender Inequality and Economic Development: Fertility, Education and Norms

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We document the evolution of gender inequality in labour market outcomes—earnings, labour supply and wage rates—over the path of economic development, and present evidence on the potential reasons for this evolution. To this end, we have created a micro database that compiles 248 surveys from 53 countries between 1967 and 2014, covering a wide range of per capita income levels. There is large convergence in the earnings of men and women over the path of development, driven by female labour force participation and wage rates. We argue that the single most important factor behind this convergence is demographic transition: the effects of children on gender gaps ('child penalties') are large at both low and high levels of development, but fertility declines drastically over the growth process and thus reduces the aggregate implications of children. We also document gender convergence in educational attainment and consider its effects on earnings inequality, arguing that these are significant but less dramatic than the effects of fertility. Finally, we document striking changes in the values or norms surrounding the role of women with children, implying that such changes could serve as a reinforcing mechanism for gender convergence.

Introduction

Despite substantial gender convergence over the last century, there is still considerable gender inequality in labour market outcomes in all developed countries. Evidence from different high-income countries suggests that most of the remaining gender inequality can be explained by the unequal impacts of parenthood on men and women (e.g. Waldfogel 1998; Paull 2008; Bertrand *et al*. 2010; Goldin 2014; Angelov *et al*. 2016; Kleven *et al*. 2016). For example, Kleven *et al*. (2016) show that 80% of the remaining earnings inequality between men and women in Denmark results from 'child penalties' faced by mothers, but not fathers. A variety of underlying mechanisms may be at play—from traditional stories focusing on comparative advantage and the gains from specialization to more behavioural stories focusing on social norms—but the evidence suggests that these mechanisms operate primarily through the impacts of children.

The aforementioned studies analyse gender inequality in countries that have already experienced the demographic transition, which reduced the fertility rate per woman from around 5–6 to around 2. The large child penalties observed in these countries—about 10% of female earnings per child in Denmark—naturally place the demographic transition at centre stage of the historical gender convergence in industrialized nations. Indeed, theories of economic growth and fertility highlight the demographic transition as a key transmission mechanism for gender convergence (e.g. Galor and Weil 1996; Galor 2012). In these theories, technological progress and capital accumulation complement mentally-intensive tasks more than physically-intensive tasks in production, thus favouring the skill in which women have a comparative advantage. This increases the labour market productivity of women and therefore the opportunity cost of raising children—the child penalty—inducing women to have fewer children and increase their labour supply and earnings. An additional mechanism is that technological growth directly increases the returns to human capital investments, leading parents to substitute

from child quantity to child quality, and further spurring the demographic transition and bringing women to the labour market. These theories have two implications: (i) children and education are the key factors in gender convergence, and (ii) the female penalty per child can be high in advanced countries due to the large investments in child quality.

In this descriptive paper we bring new evidence to bear on these questions. The contribution of our paper lies partly in the data gathering exercise: we have assembled micro datasets containing information on gender, earnings, labour supply, age, children, education and gender attitudes for a large set of countries over time. Our analysis is based on a collection of 248 surveys between 1967 and 2014, covering 53 countries across a wide range of income levels. This allows us to document how gender inequality evolves across levels of economic development and explore potential causes for this evolution. Our paper complements a voluminous literature on gender gaps in the labour market, which provides evidence from specific countries or from across high-income countries. Reviews of this literature have been provided by, for example, Altonji and Blank (1999), Bertrand (2011), Blau and Kahn (2016), and Olivetti and Petrongolo (2016).

We begin by documenting the evolution of gender inequality in earnings over the development path, and then decompose these changes into the three underlying components: labour force participation, hours worked, and wage rates. Gender inequality in earnings falls substantially with development, from a gender gap of around 65% at low income levels to a gender gap of around 35% at high income levels. We show that the convergence of earnings is driven by participation and wage rates, but not hours. In particular, female labour force participation increases dramatically with development, and as a result the participation gap falls from 50% to 5–10% as GDP per capita rises. At the same time, gender differences in hours worked (conditional on working) are relatively small and very stable, thus contributing very little to changes in earnings inequality.

Turning to the potential causes of these changes, we first focus on the role of children and the implications of demographic transition. Considering women of childbearing age (16–40 years), there is a very large difference between those who have children and those who do not. For women without children, the gender gap in earnings is about 25% and stable across levels of development. For women with children, the gender gap is much larger and falls with development, from about 70% to about 50%. While the difference in levels between these two series is directly suggestive of the importance of children, the within-series changes are also informative. In particular, the within-group changes in gender inequality are much smaller than the aggregate change, which implies that the observed decline in aggregate gender inequality can be explained largely by a compositional change from those with children to those without children. Indeed, the fraction of women of childbearing age who have children falls strongly over the development path, both because more women do not have any children and because women have children later.[1]

We also consider the role of education. As has been documented elsewhere, there has been an enormous increase in female education, to the point where more women than men take college degrees in a number of countries (Goldin *et al.* 2006; Becker *et al.* 2010). In our sample of 53 countries, we show that women are now more college educated than men in the vast majority of high- and middle-income countries. Across levels of development, the gender gap in the fraction with college degrees falls from + 5 percentage points to − 8 percentage points, and turns negative at a per capita GDP level of about $25,000. While these education changes can explain some of the decline in earnings inequality between men and women, they explain much less than children. We argue that there are two reasons for this. The first is that the variation in relative education between men and women across development levels is small compared to the

variation in fertility. The second is that the impact of education is dampened by children, because even highly educated women face large child penalties when they become parents (see also Bertrand *et al*. 2010; Wilde *et al*. 2010; Kleven *et al*. 2016).

Finally, we present evidence on gender attitudes over the path of development, focusing in particular on the attitudes towards working women with children. As GDP per capita increases, these attitudes change quite dramatically. For example, there is a strong decline in the fraction of people who believe that children are negatively affected by having working mothers. Similarly, there is a strong decline in the fraction of people who believe that women with young children ought to stay at home rather than working part-time or full-time, whereas at the same time the views on women without children or women whose children have left home are relatively stable across levels of development. Of course, the fact that these norms change with development does not necessarily mean that they are causally affecting the patterns described above, although a recent and growing literature suggests that social norms may in fact impact gender differences in labour market outcomes (for a review, see Bertrand 2011). The most intriguing aspect of our descriptive findings is perhaps the differential evolution of attitudes towards women with and without children. Consistent with our other findings, this suggests that the evolution of gender inequality should be analysed and interpreted to a large degree through the prism of motherhood and fertility.

The paper is organized as follows. Section I describes the data and empirical approach, Section II documents some basic facts on gender inequality and development, Section III explores some possible causes for the observed patterns, and Section IV concludes.

I. Data and Methods

Data

To document the evolution of gender inequality over the path of development, we have assembled micro datasets with information on gender, earnings, labour supply, age, children and education for a large set of countries over time. Our final database combines 248 micro surveys across 53 countries over the period 1967–2014. This is an unbalanced panel as the different country-level surveys are not available in every year. The countries and years in the data cover a wide range of development levels, with real GDP per capita between \$1450 and \$58,000.[2]

Table A1 in the Appendix lists the primary data sources for each country–year cell in our database. A majority of the surveys come from harmonized meta-databases with global or specific geographic coverage. Our main sources are the Luxembourg Income Studies (LIS), the Socio-Economic Database for Latin America (SEDLAC), the Inter-university Consortium for Political and Social Research (ICPSR), the World Bank Living Standards Measurement Study (LSMS) and the Economic Research Forum (ERF), which covers Arab countries, Iran and Turkey. Additional surveys were collected directly from National Statistics offices.

In order to measure gender inequality in the broadest possible sense and to capture a large set of margins through which inequality may operate (including labour supply, human capital, occupational choice, discrimination, and so on), our main focus will be on gender inequality in total earnings. We define total earnings as the sum of all wages, profits, bonuses, benefits, and in-kind remuneration from the exercise of any type of commercial activity for individuals who are employed or self-employed, permanently or occasionally, during the reference period (usually one year). Our focus is on gross earnings, that is, before taxes and transfers.

Our data allow us to observe individual labour supply. We decompose labour supply into labour force participation and hours worked (when available). An individual is considered to participate in the labour market if she currently holds a job (or is an entrepreneur), or if she has worked for income during the reference period (usually one week). For 216 out of the 248 country–year surveys, we also have individual information on the highest education level reached at the time of the survey. To guarantee consistency across countries and over time, we group educational attainment into three categories: pre-primary or primary education, secondary education, and tertiary education (college or higher).

To investigate the role of children or parenthood, we create a measure for the presence of children in the household that is consistent across surveys. This measure is a dummy equal to 1 whenever the household includes at least one child below the age of 18 who can be identified as a natural child, adopted child, or stepchild of the head of household. In the event that the head of household has a spouse, the children are assigned to the spouse as well. A limitation of our data is that in general we cannot identify children living out of their parents' home. This implies that for older men and women, our measure will understate the prevalence of parenthood, as the likelihood that their children have left home is relatively high. To mitigate the issue, the analysis of the effects of children in Section III will focus on individuals aged 40 or below.

Because our indicator variable for the presence of children captures only the extensive margin of fertility, we complement our dataset with information on the intensive margin of fertility using lifetime fertility rates at the country–year level from the World Bank.[3]

We finally complement our database with microdata on gender attitudes, with a particular focus on attitudes towards working women and parenthood/children. Our data come from three surveys for which we have consistent information about these attitudes: the European Values Survey (EVS), the World Values Survey (WVS) and the International Social Survey Programme (ISSP). Across these surveys, we have 223 country–year cells, covering 82 countries between 1981 and 2014, and spanning a GDP per capita range between $700 and $72,000. One of our main variables of interest is an indicator for agreeing with the statement that 'a pre-school child suffers if the mother is working'. One reason for focusing on this question is that it was included using the exact same wording in the EVS waves 1–4 (1981, 1990, 1999, 2008), the WVS waves 1–6 (covering 1981–2014), and the ISSP across several waves (1988, 1994, 2002, 2012). We also complement our data with variables from the 2002 wave of the ISSP that further capture attitudes towards working women with and without children for a smaller set of countries.

Methods

We will document the evolution of gender gaps in different outcomes across levels of developments and over time. From the individual-level data, we compute the gender gap in outcome Y at the country–year level as

$$\Delta^{Y}_{c,t} = \frac{\overline{Y}^{m}_{c,t} - \overline{Y}^{w}_{c,t}}{\overline{Y}^{m}_{c,t}},$$

where $\overline{Y}^{m}_{c,t}$ and $\overline{Y}^{w}_{c,t}$ denote the average levels of the outcome among men and women, respectively, in country c and year t.

To analyse the evolution of gender gaps across levels of development, we non-parametrically estimate the relationship between gender gaps and GDP per capita. To reduce the noise introduced by the differential selection of countries across the distribution

of GDP per capita in our data, and to better capture the within-country effect of moving up the development ladder, we always report the relationship between gender gaps and GDP per capita after controlling for country fixed effects. Concretely, we group countries in 20 bins of GDP per capita, where each bin contains an equal number of country–year observations. We then regress gender gaps $\Delta^{Y}_{c,t}$ on a set of dummy variables for belonging to each of the 20 bins of GDP per capita and on a set of country fixed effects, that is,

$$\Delta^{Y}_{c,t} = \sum_{k=1}^{20} \gamma_k \cdot \mathbf{I}[\text{GDP}_{c,t} \in k] + \sum_{c} \alpha_c + v_{c,t}.$$

We will then plot the predicted value of the gender gap in each bin of GDP per capita, having absorbed the country fixed effects. To be precise, the predicted value of the gender gap in each bin k is defined as $\widehat{\Delta}^{Y}_{k} = \widehat{\gamma}_k + \widehat{C}$, where $\widehat{C} = \sum_c \widehat{\alpha}_c / N$ is the average value of the estimated country fixed effects across all N countries. In other words, we plot the profile of the gender gap with respect to GDP per capita for the average country in our sample.

To investigate the evolution of gender gaps over time, we focus on five-year intervals, starting in 1985, and restrict attention to a balanced panel of 11 countries that we observe in each of these five-year intervals. Due to the balanced panel restriction, the sample for this exercise consists only of high-income countries: Australia, Denmark, Canada, Finland, France, Germany, Italy, the Netherlands, Norway, the UK and the USA. We then follow an approach similar to that above by showing non-parametrically the relationship between gender gaps and time, controlling for country fixed effects. That is, we regress gender gaps $\Delta^{Y}_{c,t}$ on a set of dummy variables for each five-year interval and on a set of country fixed effects:

$$\Delta^{Y}_{c,t} = \sum_{j=1}^{6} \eta_j \cdot \mathbf{I}[j = t] + \sum_{c} \alpha_c + v_{c,t}.$$

We will plot the predicted value of the gender gap in each time period j, controlling for country fixed effects; that is, we plot $\hat{\Delta}^{Y}_{j} = \hat{\eta}_j + \widehat{C}$. In other words, we plot the value of the gender gap in each time period for the average country in our balanced panel of 11 countries.

II. Gender Inequality Across Levels of Development: Basic Facts

We start by documenting a set of basic facts about the evolution of gender gaps over the course of development and over time. In Panel A of Figure 1, we show the relationship between the gender gap in total earnings and GDP per capita following the methodology described in the second subsection of Section I. The gender gap is based on all men and women aged 16–64. The graph shows a clear negative relationship between earnings inequality and GDP per capita. At low levels of development—i.e. in countries with GDP per capita of around $5000—the average earnings of women is about 65% below that of men. At high levels of development—i.e. countries with GDP per capita around $50,000—the difference in the average earnings of men and women has dropped to roughly 35%. Moreover, the graph suggests that the relationship between gender inequality and development is non-linear: gender convergence is much faster in the early stages of development than in the later stages. In fact, the decline in the gender gap in the $5000–$25,000 range of GDP per capita is twice as high as the decline in the $25,000–$45,000 range.

The slowdown of gender convergence at high levels of development is consistent with the findings of Blau and Kahn (2016) for the USA. They show that gender convergence in the earnings of full-time workers in the US has plateaued over the past 20 years,

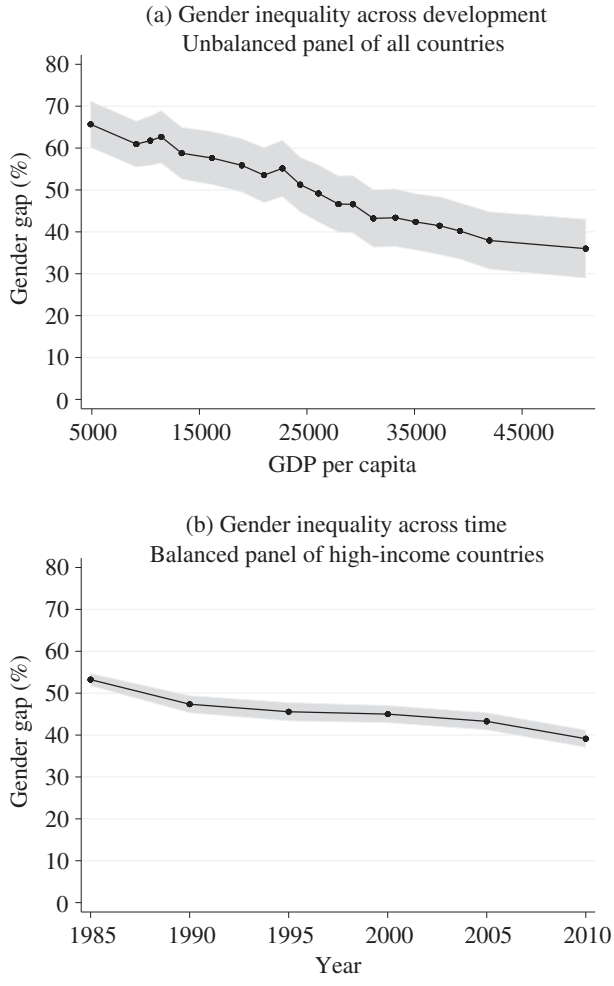

FIGURE 1. Gender inequality in earnings.

Notes: Panel A displays the relationship between gender gaps in total earnings among the 16–64-year-olds and PPP-adjusted real GDP per capita for our 248 country–years. Observations are divided in 20 bins of GDP per capita, with similar numbers of observations per bin. We report the average gender gap in each bin controlling for country fixed effects, along with the robust 95% confidence interval, following the methodology described in the second subsection of Section I. Panel B displays the evolution over time of gender gaps in total earnings among the 16–64-year-olds in our balanced panel of 11 high-income countries. See text for details.

following a period of strong convergence around the 1980s. To further explore this issue, Panel B of Figure 1 considers a balanced panel of 11 high-income countries and documents the evolution of gender gaps in earnings over the past 30 years using the methodology described in the second subsection of Section I. The graph shows that across high-income countries, the decline in earnings inequality between men and women has been limited since the 1980s, decreasing from about 50% to about 40% on average.[4] Moreover, most of this convergence happened in the 1980s, with very little additional convergence since the beginning of the 1990s.

Total earnings are the product of labour supply and wage rates. To investigate the relative importance of the two in explaining the evolution of gender inequality in earnings, we first turn to the evolution of gender gaps in labour supply. We split labour

supply into the extensive margin (labour force participation) and the intensive margin (hours worked conditional on participation). In Panel A of Figure 2, we show the relationship between the gender gap in participation and GDP per capita for all men and women aged 16–64. The graph shows that development is associated with very large increases in the labour force participation of women relative to men. As GDP per capita grows from \$5000 to \$50,000, the gender gap in participation falls dramatically from 50% to 5–10%. This graph also suggests a non-linear effect of development—the decline in the participation gap is smaller at high levels of per capita GDP—although this phenomenon is not as strong as for earnings. We confirm the slowdown of gender

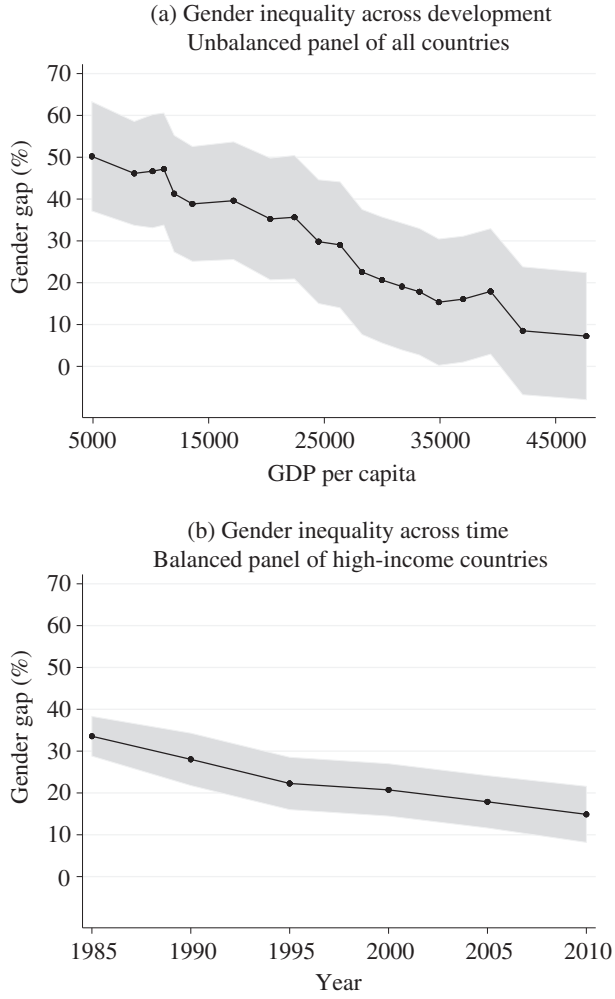

FIGURE 2. Gender inequality in labour force participation.
Notes: Panel A displays the relationship between gender gaps in labour force participation among the 16–64-year-olds and PPP-adjusted real GDP per capita for our 248 country–years. Observations are divided in 20 bins of GDP per capita, with similar numbers of observations per bin. We report the average gender gap in each bin controlling for country fixed effects, along with the robust 95% confidence interval, following the methodology described in the second subsection of Section I. Panel B displays the evolution over time of gender gaps in labour force participation among the 16–64-year-olds in our balanced panel of 11 high-income countries. See text for details.

convergence in participation using our balanced panel of high-income countries in Panel B of Figure 2. While there has been clear convergence in participation over the past 30 years, most of it happened before the mid-1990s. This finding is again consistent with the findings of Blau and Kahn (2016) for the USA.

While labour force participation thus features strong gender convergence over the path of development, Figure 3 shows that there is close to zero convergence in hours worked among those who are working. As shown in Panel A, the gender gap in hours worked remains constant around 20% across all levels of GDP per capita. It should be noted, especially considering the large changes in participation documented above, that the gap in average hours worked includes effects from selection into work. In particular,

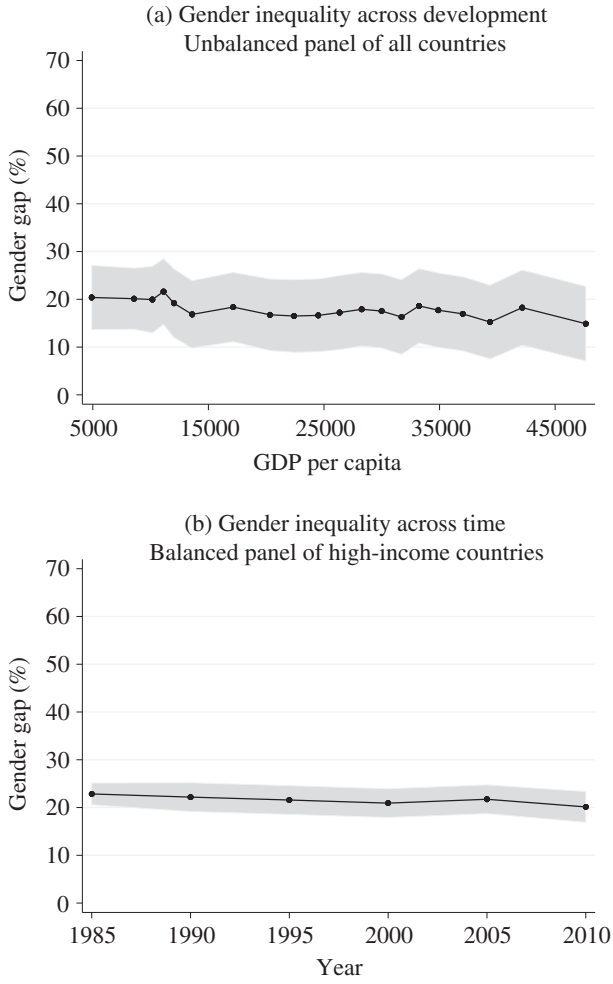

FIGURE 3. Gender inequality in hours worked.
Notes: Panel A displays the relationship between gender gaps in hours worked conditional on participation (intensive margin) among the 16–64-year-olds and PPP-adjusted real GDP per capita for our 248 country–years. Observations are divided in 20 bins of GDP per capita, with similar numbers of observations per bin. We report the average gender gap in each bin controlling for country fixed effects, along with the robust 95% confidence interval, following the methodology described in the second subsection of Section I. Panel B displays the evolution over time of gender gaps in hours worked conditional on participation among the 16–64-year-olds in our balanced panel of 11 high-income countries. See text for details.

it is natural to expect that the 'new' female entrants over the path of development have lower hours than the 'old' entrants, which by itself increases the hours gap. In other words, the flat profile observed in the figure may reflect the offsetting effects of existing participants closing the gap and new participants opening it up. It is nevertheless remarkable that the average hours gap is so stable across the wide range of GDP per capita that we consider. Considering the evolution over time in our balanced panel of high-income countries tells the same story. As shown in Panel B of Figure 3, there has been no gender convergence in the average hours worked in the past 30 years. The gender gap remains stubbornly flat at roughly 20%.

Finally, we will decompose the earnings gap across development levels into the contribution coming from labour supply and the contribution coming from wage rates. To this end, we first note that the average earnings of gender g can be written as $\overline{Y}^g = \overline{w}^g \cdot \overline{h}^g \cdot P^g$, where $\overline{w}^g$ denotes the average wage rate per hour worked, $\overline{h}^g$ denotes average hours worked conditional on working, and P^g denotes the labour force participation rate. For this expression to hold, $\overline{w}^g$ must be an *hours-weighted* average wage rate, that is,

$$\overline{w}^g = \frac{\sum w_i^g \cdot h_i^g d_i^g}{\sum h_i^g d_i^g},$$

where d_i^g is a dummy equal to 1 if individual i participates. Hence changes in the average wage rate $\overline{w}^g$ will reflect both changes in individual wage rates w_i^g and changes in the distribution of hours on different wage rate types. We come back to this selection issue below.

We denote the gender gap in total earnings by $\Delta^Y = (\overline{Y}^m - \overline{Y}^w)/\overline{Y}^m$, and similarly the gender gaps in its underlying components by $\Delta^W = (\overline{w}^m - \overline{w}^w)/\overline{w}^m$, $\Delta^H = (\overline{h}^m - \overline{h}^w)/\overline{h}^m$, $\Delta^P = (\overline{P}^m - \overline{P}^w)/\overline{P}^m$.

With these definitions, we have the exact decomposition

$$\Delta^Y = G^W + G^H + G^P,$$

where

$$G^W \equiv \Delta^W,$$
$$G^H \equiv \Delta^H \times \frac{\overline{w}^w}{\overline{w}^m},$$
$$G^P \equiv \Delta^P \times \frac{\overline{w}^w \overline{h}^w}{\overline{w}^m \overline{h}^m}.$$

The first term, G^W, captures the contribution from the gender gap in wage rates; the second term, G^H, captures the contribution from the gender gap in hours worked; and the third term, G^P, captures the contribution from the gender gap in participation.

This decomposition is implemented separately in each country–year sample, thus yielding observations of G^W, G^H and G^P for each country c and year t in our database. We regress the total earnings gap $\Delta^Y_{c,t}$ and each of its components $G^W_{c,t}$, $G^H_{c,t}$ and $G^P_{c,t}$ on GDP bin dummies and country fixed effects. We then calculate the predicted value of each variable in each bin of GDP per capita, omitting the contribution of the country fixed effect. The resulting decomposition is shown in Figure 4.

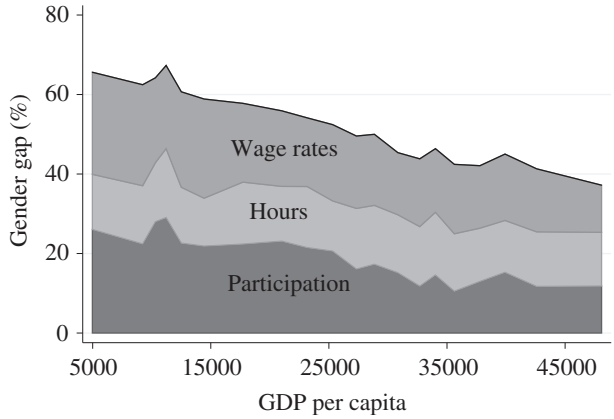

FIGURE 4. Decomposing earnings inequality across levels of development—participation, hours and wage rates.

Notes: The figure decomposes the gender gap in total earnings shown in Panel A of Figure 1 into the respective contributions of gender gaps in participation, conditional hours and wage rates, following the exact decomposition of equation (1). The decomposition is performed on each country–year subsample. Each component of the decomposition is then regressed on GDP bin dummies and country fixed effects, and we report the coefficients for each GDP bin dummy, following the methodology described in the second subsection of Section I. See text for details.

The decomposition shows that the decline of gender inequality in earnings is driven by labour force participation and wage rates, but not hours. At low levels of development, the participation gap and the wage rate gap each contribute about 25 percentage points to overall earnings inequality. At high levels of development, on the other hand, each of them contribute only around 10 percentage points to earnings inequality. At the same time, the contribution of the hours gap is very stable and therefore does not play a role for the observed gender convergence in earnings. The combination of the stable hours gap and the narrowing participation and wage rate gaps implies that, at high levels of development, each of the three margins is responsible for about one-third of earnings inequality. This last finding is consistent with the findings for Denmark by Kleven *et al*. (2016), who use a quasi-experimental research design to identify the different margins.

Our exact decomposition exercise does not attempt to control for the endogenous relationship between labour supply and wage rates, in the cross-section or over the path of development. In particular, the contribution from the gap in average (labour supply weighted) wage rates, Δ^W, depends on the selection of labour force participants. This may be important here due to the large increase in labour force participation over the path of development. If late entrants in the development process are negatively selected on wage rates, then our decomposition exercise would understate convergence in (unconditional) wage rates across the path of development.

III. Gender Inequality Across Levels of Development: Proximate Causes

Fertility

A sizeable literature on gender differences in the labour markets of developed countries points to an important role of children, or parenthood.[5] While this literature provides evidence on the impact of parenthood for a range of North-American and European

countries, we broaden the analysis to include a much larger set of developed and developing countries using our cross-country micro database. Rather than providing carefully identified estimates of the impact of children on gender gaps—something that is possible to do only for a subset of developed countries with sufficiently good data—our objective is to provide descriptive evidence on fertility and gender inequality across levels of development. The long-run development view naturally makes our evidence suggestive in nature. Still, in combination with the recent quasi-experimental evidence on the impacts of children from specific developed countries, the evidence presented here arguably paints a quite persuasive picture of the pivotal role played by demographic transition for gender convergence.

We entitle this section 'proximate causes' because, of course, fertility choices are themselves endogenous over the development path and depend on factors such as technological progress and capital accumulation (which determines the absolute and relative wage rates of men and women), the demand for human capital, medical advances and mortality rates, social security, and social norms. A large literature studies the determinants of fertility (dating back to Becker 1960; Mincer 1963; Becker and Lewis 1973), while the macro growth literature provides models of the joint determination of fertility and growth (see, for example, Becker and Barro 1988; Barro and Becker 1989; Becker *et al*. 1990; Galor and Weil 1996; Galor 2012).

To explore the role of fertility for gender inequality over the development path, we will repeat the type of exercise considered in the previous section, but splitting the sample between those with children and those without children. For this exercise, a limitation of our database is that the information about children that we observe across all countries and years is the presence of children below 18 years of age living in the household. We do not observe the presence of children older than 18 or children who have left home, implying that older workers may be recorded as childless even though they are in fact parents. For this reason, we will focus on the age range 16–40 in which this measurement problem is minimal. Focusing on the early part of the lifecycle is likely to understate the importance of children, because we know from the gender literature that child-driven earnings differences between men and women tend to expand over the middle part of the lifecycle (Bertrand *et al*. 2010; Goldin 2014; Kleven *et al*. 2016).

To set the scene, Panel A of Figure 5 shows the demographic transition across levels of development using our measure of children. That is, the panel shows the fraction of 16–40-year-olds with children in bins of GDP per capita, controlling for country fixed effects as in the previous graphs. This fraction drops from about 60% at a GDP per capita of $5000 to about 35% at a GDP per capita of $50,000. The drop happens partly because more women do not have any children and partly because women have children later in the lifecycle. Panel B of Figure 5 shows the evolution of lifetime fertility per woman (using World Bank data) across the same range of GDP per capita. We see that average fertility falls dramatically from more than 6 to less than 2.

Figure 6 shows gender inequality in earnings among all 16–40-year-olds in Panel A, those without children in Panel B, and those with children in Panel C. As before, we show gender gaps across bins of GDP per capita having absorbed country fixed effects. The results for all 16–40-year-olds are qualitatively consistent with the results for 16–64-year-olds presented earlier, except that gender gaps are about 10 percentage points lower in the younger sample. When we split the sample by children, we see the following. First, the earnings gap among those with children is much larger than among those without children. In the early phases of development, the gender gap for parents is about 70%, while the gender gap for non-parents is only about 25%. Second, the earnings gap for non-parents is completely flat across levels of development, so this group does not

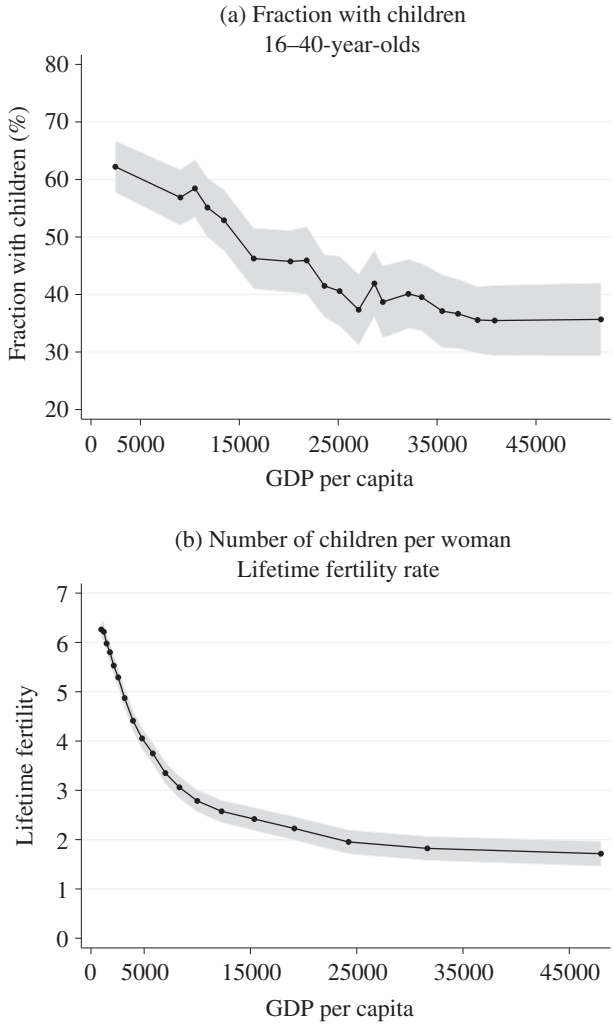

FIGURE 5. Demographic transition.

Notes: Panel A displays the relationship between the probability to have at least one child among the 16–40-year-olds and PPP-adjusted real GDP per capita for our 248 country–years. Observations are divided in 20 bins of GDP per capita, with similar numbers of observations per bin. We report the average probability in each bin controlling for country fixed effects, along with the robust 95% confidence interval, following the methodology described in the second subsection of Section I. To capture fertility along the intensive margin, Panel B displays the relationship between PPP-adjusted real GDP per capita and lifetime fertility rates available from the World Bank, following a similar method. See text for details.

contribute to the observed aggregate gender convergence in earnings. Third, there is convergence in the earnings gap for parents, from about 70% to about 50% as we move from low to high levels of development. One possible reason for this is that, conditional on having children, families have fewer children as income per capita increases.

Both the child and no-child subsamples feature gender gap profiles that are much flatter than the aggregate profile. This implies that if the fraction of households with children had stayed constant over the development path, then the aggregate gender gap might have fallen by much less. To see the potential role of fertility, Figure 7 illustrates a

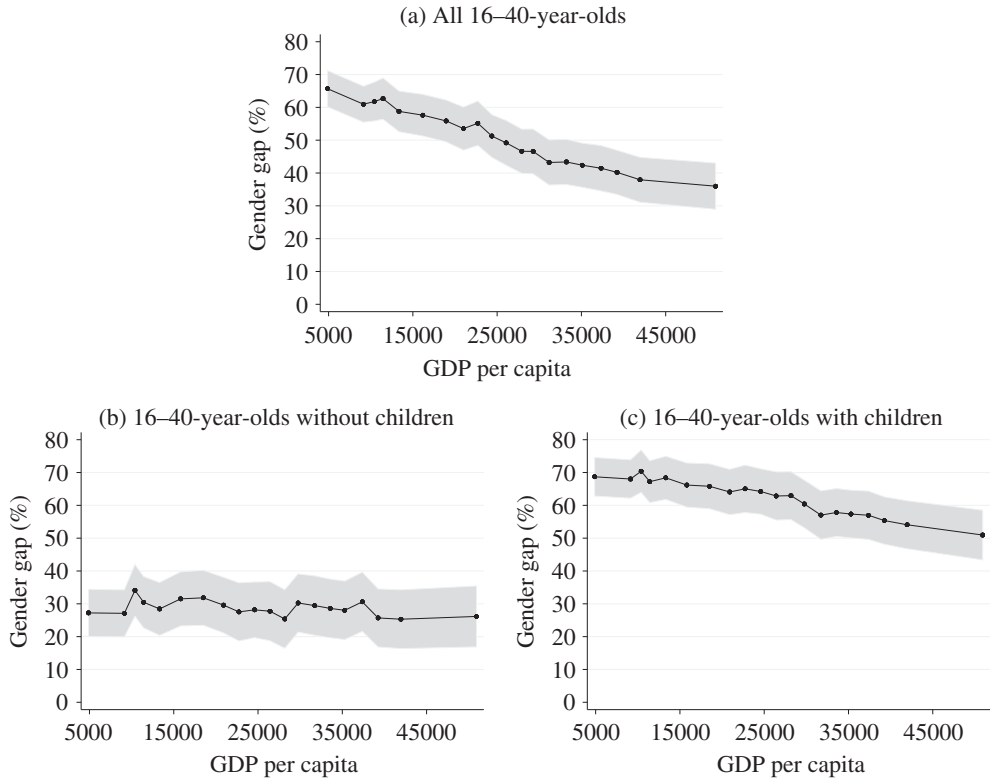

FIGURE 6. Gender inequality in earnings: the role of children.
Notes: The figure decomposes the overall gender gap in earnings for individuals with and without children. Note that we do not observe the presence of children older than 18 or children who have left home, implying that older workers may be recorded as childless even though they are in fact parents. For this reason, we focus on the age range 16–40 in which this measurement problem is minimal. Panel A reproduces Panel A of Figure 1 for the sample of 16–40-year-olds. Panel B (respectively Panel C) follows the same methodology, restricting the sample to the 16–40-year-olds without children (respectively with children).

simple mechanical exercise. It compares the actual predicted gender gap to a hypothetical predicted gender gap, where the latter assumes a constant fraction of 16–40-year-olds with children at different levels of development. That is, the hypothetical series is a weighted average of the child and no-child series in Figure 6, using the average fraction of 16–40-year-olds with children across all countries and all years (equal to 44%) as the weight. This is a mechanical rather than counterfactual construct, because in a world where fertility stayed constant over the development path, the child and no-child series would likely evolve differently. Nevertheless, it is striking that the decline in the earnings gap in the constant-fertility scenario of Figure 7 is only about one-quarter of the actual decline over the development path. Therefore in a mechanical sense at least, the observed convergence between men and women is the result of two factors: (i) a reduction in the fraction who have any children; (ii) a reduction in the gender gap among those who have children, which may itself be driven by changes in the number of children conditional on having children.

Finally, we turn from earnings gaps to participation gaps in Figure 8, which is constructed in the same way as Figure 6. The results are broadly consistent with those for

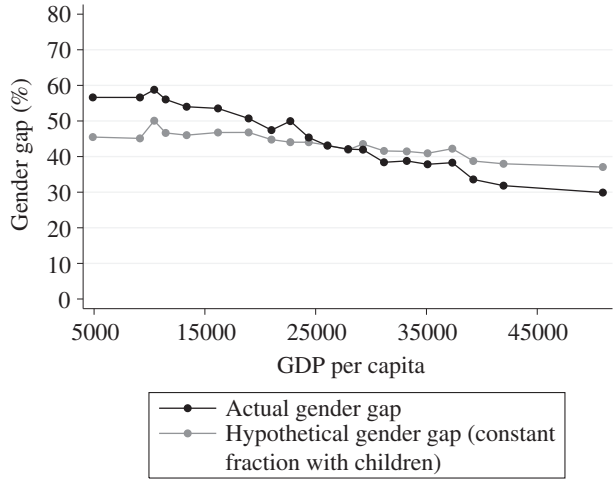

FIGURE 7. Demographic transition and gender inequality in earnings—actual gender gap vs. hypothetical gender gap under constant fraction with children.

Notes: The figure compares the actual gender gap in earnings to the predicted gender gap assuming that the fraction of individuals with children had remained constant throughout the development path. The black curve reproduces the actual gender gap in earnings for the 16–40-year-olds from Panel A of Figure 6. The grey curve is the hypothetical gender gap assuming that the fraction ω of 16–40-year-olds with children across all GDP per capita levels had remained constant at its average level in our 248 country–years. The grey curve is therefore a weighted average of the two curves in Panels B and C of Figure 6, with weights equal to $1 - \omega$ and ω, respectively.

earnings: the gap is much larger for those with children, the gap declines more strongly for parents than for non-parents (although here there is a decline for both groups), and the gap in both subsamples is flatter than in the full sample. Hence again we see that the compositional change from households with children to households without children is a significant part of the story behind overall gender convergence.

Education versus fertility

We now turn to gender convergence in education and its role for earnings inequality between men and women. Changes in education affect earnings by changing wage rates and potentially by changing labour supply as well. Education may also affect fertility, which we have seen is a key determinant of the gender gap in earnings. Indeed, the classic economic theory of fertility emphasizes substitution between the quantity and quality of children (Becker and Lewis 1973; Becker 1981), so that an increase in the human capital per child (quality) reduces the number of children (quantity). The reason is that the opportunity cost of children ('the child penalty') is greater when their quality is higher. Conversely, changes in fertility may feed back into human capital accumulation and the demand for education. In other words, it is very difficult to empirically separate the effects of education/human capital and fertility for the long-run evolution of gender inequality. While we will present a decomposition analysis that separates the effects of education and fertility on earnings inequality across levels of development, this analysis is correlational rather than causal due to the joint determination of education and fertility as well as their interdependence with other drivers of development.

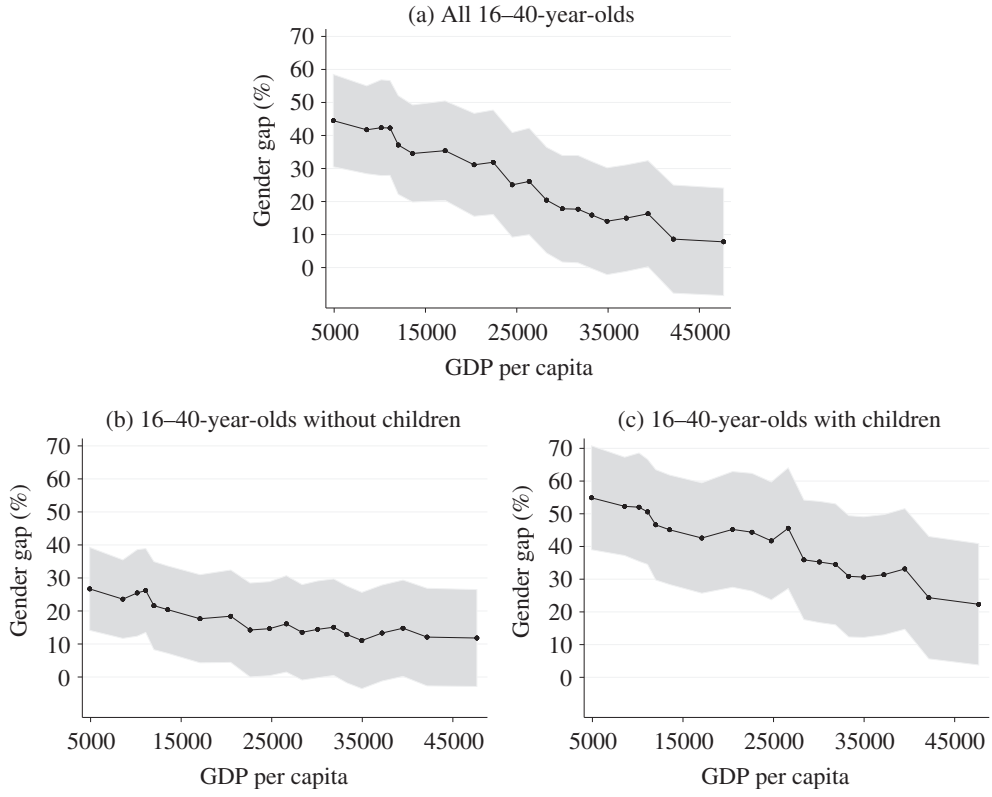

FIGURE 8. Gender inequality in labour force participation: the role of children.
Notes: This figure decomposes the overall gender gap in labour force participation for individuals with and without children. Note that we do not observe the presence of children older than 18 or children who have left home, implying that older workers may be recorded as childless even though they are in fact parents. For this reason, we will focus on the age range 16–40 in which this measurement problem is minimal. Panel A reproduces Panel A of Figure 2 for the sample of individuals who are 16–40 years old. Panel B (respectively Panel C) follows the same methodology, restricting the sample to individuals who are 16–40 years old without children (respectively with children).

We start out by describing what happens to gender gaps in education across levels of development. Specifically, Figure 9 considers gender gaps in the fractions of men and women with college degrees, and is constructed in the same way as the previous graphs for earnings and labour supply. Panel A shows that women's relative education increases strongly as GDP per capita rises: the gender gap goes from + 5 percentage points to − 8 percentage points, implying that at high levels of development, women are ahead of men in terms of college attainment. On average, women overtake men at an income level of around $25,000.[6] Panel B of Figure 9 shows the gender gap in college education over time, focusing on our balanced sample of high-income countries. Here we see that among these high-income countries, women closed the college gap around the mid-1990s and have continued to increase their relative education since then. These descriptive findings are consistent with those presented by Goldin *et al*. (2006) for the USA and by Becker *et al*. (2010) for a cross-country sample.

Having established that both education gaps and fertility decline substantially across development levels in our sample, we want to compare the two in terms of their ability to

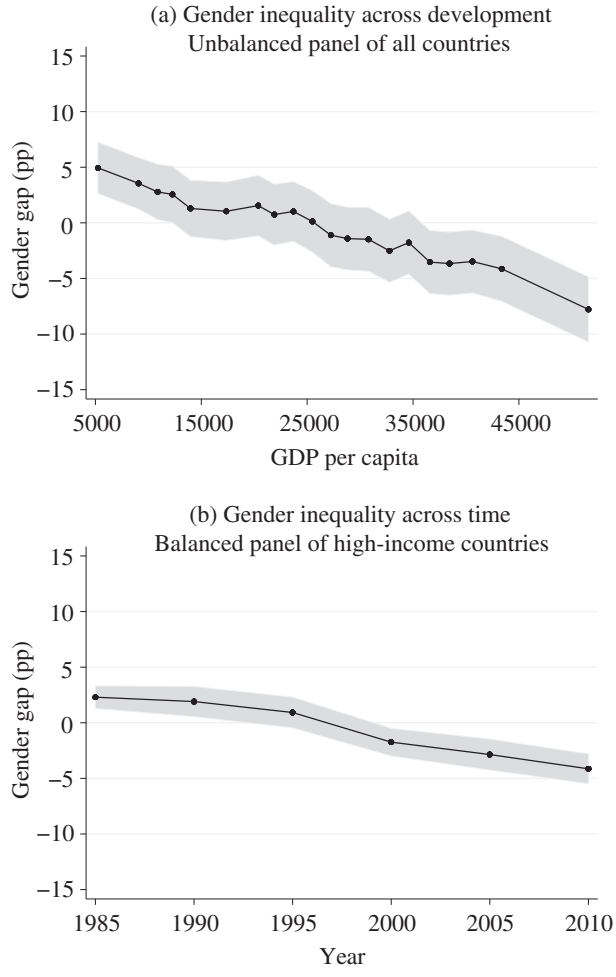

FIGURE 9. Gender inequality in college degrees.
Notes: Panel A displays the relationship between gender gaps in the probability to hold a college degree among the 16–64-year-olds and PPP-adjusted real GDP per capita for our 248 country–years. Observations are divided in 20 bins of GDP per capita, with similar numbers of observations per bin. We report the average gender gap in each bin controlling for country fixed effects, along with the robust 95% confidence interval, following the methodology described in the second subsection of Section I. Panel B displays the evolution over time of gender gaps in the probability to hold a college degree among the 16–64-year-olds in our balanced panel of 11 high-income countries. See text for details.

explain the observed gender convergence in earnings. For this purpose, we implement a version of the standard Oaxaca–Blinder decomposition (Blinder 1973; Oaxaca 1973). Specifically, for each country–year subsample, we estimate separate male and female earnings regressions as

$$Y_i^g = \beta_0^g + \beta_k^g \cdot K_i^g + \beta_s^g \cdot S_i^g + \beta_c^g \cdot C_i^g + v_i^g,$$

where Y_i^g is the earnings of individual i of gender g, K_i^g is a dummy for the presence of children, S_i^g is a dummy for having secondary school as the highest level of education,

and C_i^g is a dummy for having college or more as the highest level of education. Denoting the percentage gender gap in average earnings by $\Delta^Y = (\overline{Y}^m - \overline{Y}^w)/\overline{Y}^m$ and denoting OLS estimates with a hat, we have

$$\Delta^Y = \hat{G}_R + \hat{G}_K + \hat{G}_E,$$

where

$$\hat{G}^R = (\hat{\beta}_0^m - \hat{\beta}_0^w)/\overline{Y}^m,$$
$$\hat{G}^K = (\hat{\beta}_k^m \cdot \overline{K}^m - \hat{\beta}_k^w \cdot \overline{K}^w)/\overline{Y}^m,$$
$$\hat{G}^E = (\hat{\beta}_s^m \cdot \overline{S}^m + \hat{\beta}_c^m \cdot \overline{C}^m - \hat{\beta}_s^w \cdot \overline{S}^w - \hat{\beta}_c^w \cdot \overline{C}^w)/\overline{Y}^m.$$

Here $\hat{G}^K$ is the gender gap due to children, $\hat{G}^E$ is the gender gap due to education (both secondary and tertiary), and $\hat{G}^R$ is the residual gap. Note that $\hat{G}^K$ and $\hat{G}^E$ are *total* effects that include both the so-called 'explained' effect (differences in covariates between men and women) and the 'unexplained' effect (differences in regression coefficients between men and women). In many decomposition analyses, the main goal is to separate the explained and unexplained elements of gender differences, but our objective is instead to quantify the total contribution of fertility and education to gender inequality over the development path.[7]

The preceding analysis is implemented separately in each country–year subsample, thus yielding observations of $\hat{G}^R$, $\hat{G}^K$ and $\hat{G}^E$ for each country and year in our database. As in the approach used previously, we then regress the total earnings gap

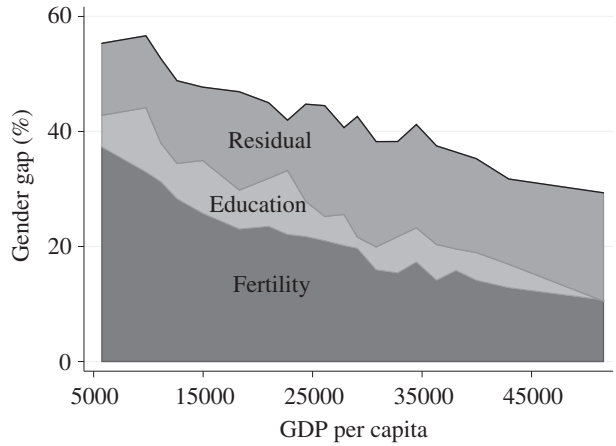

FIGURE 10. Decomposing earnings inequality across levels of development—fertility vs. education. *Notes*: The figure performs a Oaxaca–Blinder decomposition of the gender gaps in total earnings among the 16–40-year-olds displayed in Panel A of Figure 6. The Oaxaca–Blinder decomposition isolates the respective contributions of fertility, education and a residual, following the specification of equation (2). The decomposition is performed on each country–year subsample. Each component of the country–year decompositions is then regressed on GDP bin dummies and country fixed effects, and we report the coefficients for each GDP bin dummy. See the second subsection of Section III for details.

$\Delta^{Y}_{c,t}$ and its underlying components $\hat{G}^{R}_{c,t}$, $\hat{G}^{K}_{c,t}$ and $\hat{G}^{E}_{c,t}$ on GDP bin dummies and country fixed effects. We then calculate the predicted value of each variable in each bin GDP per capita, omitting the contribution of the country fixed effect. The resulting decomposition is shown in Figure 10. It is implemented on the sample of 16–40-year-olds due to the problems with observing the children of older households as discussed above.

Figure 10 shows that both education and fertility have contributed to the decline in earnings inequality between men and women, but that the effects of fertility are much larger than the effects of education. The earnings gap coming from fertility falls dramatically from about 35% to about 10% as GDP per capita rises from $5000 to $50,000. The earnings gap coming from education falls from about 5% to zero.[8] There are two natural reasons for the relatively small effect of education in this graph. The first is that the variation in relative education between men and women across development levels is small compared to the variation in fertility. The second is that the impact of education is dampened by children, because even highly educated women face large child penalties when they become parents (see also Bertrand *et al*. 2010; Wilde *et al*. 2010; Goldin 2014; Kleven *et al*. 2016).

While the role of education thus appears modest relative to the role of fertility, it is important to highlight an important qualification in the interpretation of this finding. As mentioned above, education may play an indirect role for earnings convergence by being one of the determinants of fertility choices. As the education levels for adults vary across GDP levels, the desired education levels for their offspring (which we do not measure directly) also vary, naturally leading to a substitution from child quantity to child quality. Our decomposition captures only the direct effect of education.

Two additional empirical limitations are worth highlighting. First, the fact that we consider 16–40-year-olds (as the existence of offspring is not well captured for older individuals) may lead us to underestimate the implications of both education and children. The increase in the relative education of women is likely to have a growing earnings impact over their career path. Moreover, the reduction in fertility has impacts that reach beyond the childrearing ages due to the dynamic implications of labour market choices made when the children are young. Recent work on the dynamic effects of children on gender gaps shows that the effects tend to grow over the middle part of the lifecycle (Bertrand *et al*. 2010; Goldin 2014; Kleven *et al*. 2016). Second, in the decomposition presented here, the effects of children and education are estimated from cross-sectional comparisons within each country–year cell, which is not a compelling strategy for identifying true causal effects. Using a quasi-experimental research design and Danish administrative data, Kleven *et al*. (2016) estimate that child-related earnings inequality is considerably higher than what we find for high levels of GDP per capita in Figure 10. To be clear, the ambition of the exercise presented here is not to accurately identify the impact of children—this has been done much better for specific countries with better data—but rather to provide descriptive and suggestive evidence that changing fertility is pivotal to gender convergence over the development path.

Gender norms

So far we have focused on traditional explanations for the increase in gender equality over the process of economic growth—changes in fertility and education. A potentially

reinforcing mechanism is that social norms regarding gender roles may change as economies develop. A recent literature on gender argues that factors like norms, culture and gender identity may play a significant role (for a review, see Bertrand 2011). For example, Fernandez *et al*. (2004) show that men brought up in families with working mothers are more likely to have working wives. They argue that this is because these men have developed less traditional gender role attitudes during their childhood, and that the growing number of such 'modern men' is a significant factor in the steady rise in female labour force participation. Related, Farre and Vella (2013) show that men whose mothers had more modern gender role attitudes are themselves more more likely to have modern attitudes and have wives with modern attitudes. While these studies focus on correlations between mothers and daughters-in-law, Kleven *et al*. (2016) find evidence of intergenerational transmission directly between mothers and daughters. Specifically, they show that a woman's child penalty in earnings or labour supply is strongly related to the child penalty incurred by her own mother, even after controlling for a rich set of covariates.

In all of these stories, an initial increase in the labour participation of women—perhaps triggered by traditional factors such as an increase in women's relative wages and a reduction in fertility—will change the attitudes or preferences or their sons and daughters in a way that reinforces the rise of female participation in the next generation. Hence this evidence suggests that gender norms can be an important propagation mechanism for the development patterns that we have documented above.

A necessary condition for these stories to have any traction is that gender role attitudes—and especially attitudes towards women with children—do in fact change

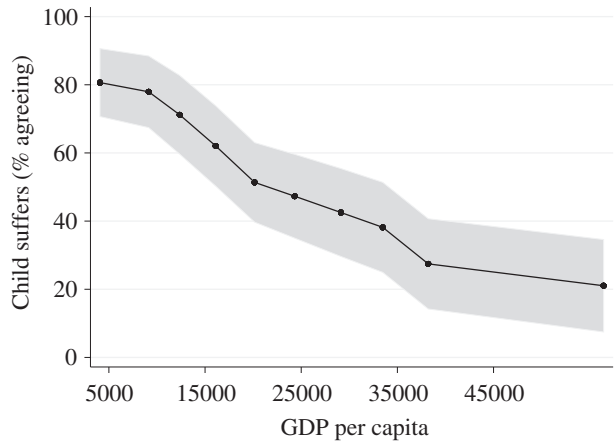

FIGURE 11. Changing views on the children of working women—do you agree with the statement 'a pre-school child suffers if the mother is working'?

Notes: The figure reports the relationship between PPP-adjusted real GDP per capita and the average probability to agree with the statement 'a pre-school child suffers if the mother is working', across our 223 country–year cells, when pooling together the EVS waves 1–4 (1981, 1990, 1999, 2008), the WVS waves 1–6 (covering 1981–2014), and the ISSP across several waves (1988, 1994, 2002, 2012). Observations are divided in 10 bins of GDP per capita, with similar numbers of observations per bin. We report the average probability in each bin controlling for country fixed effects, along with the robust 95% confidence interval. See text for details.

substantially with development. Here we present evidence that this is indeed the case. In Figure 11 we consider views on whether children are negatively impacted by having working mothers, specifically whether or not people believe that 'a pre-school child suffers if the mother is working'. The graph plots the fraction of people who believes that children suffer from having working mothers in bins of per capita GDP, having absorbed country fixed effects as in the previous analysis. The graph shows a striking, monotonic decline in the fraction of people who hold this view, from 80% to 20% as per capita GDP rises from $5000 to $50,000.

Figure 12 considers views on whether women should work outside the home (full-time or part-time) or stay at home, depending on whether or not they have children.

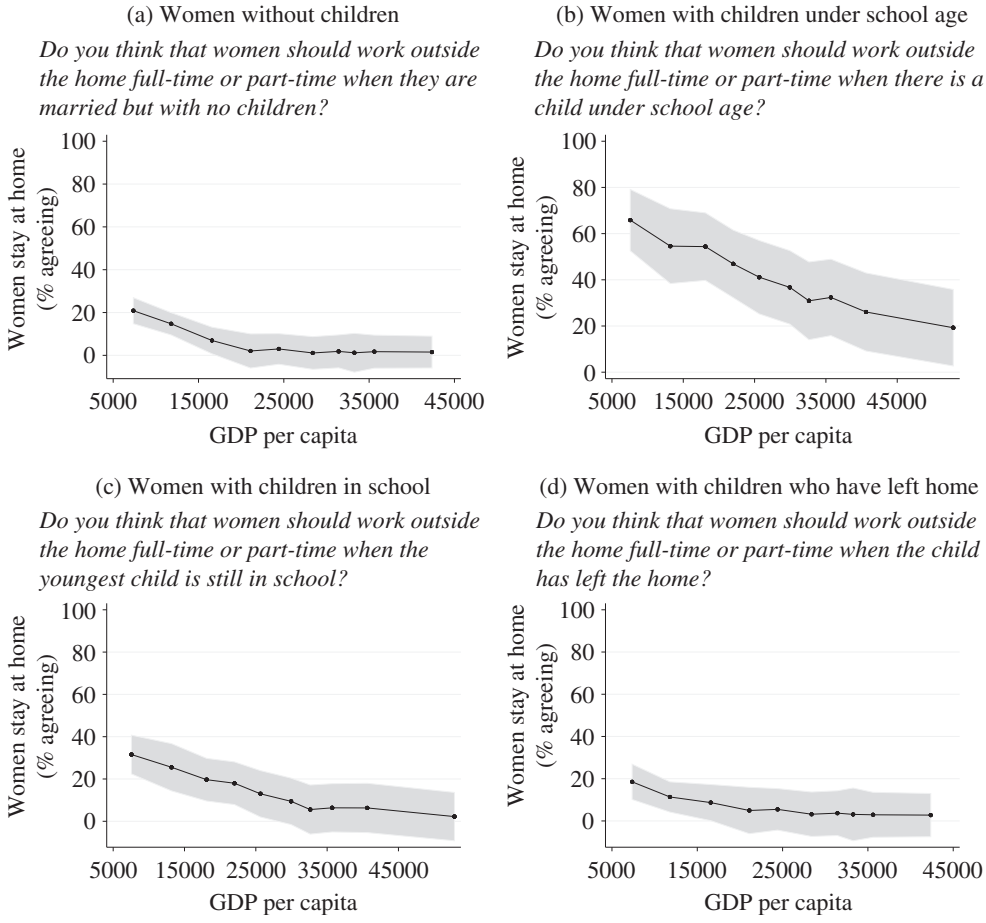

FIGURE 12. Changing views on working women.

Notes: The figure is based on data from the International Social Survey Program (ISSP) in 2002 and reports attitudes towards working women, captured in four different statements. Each panel shows the relationship between PPP-adjusted real GDP per capita and the average probability to agree with a particular statement in each country. Observations are divided in 10 bins of GDP per capita, with similar number of observations per bin. We report the average probability in each bin controlling for country fixed effects, along with the robust 95% confidence interval. See text for details.

Specifically, the question distinguishes between four situations: women without children (Panel A), women with children under school age (Panel B), women with children in school (Panel C), and women with children who have left home (Panel D). For each of these scenarios, we plot the fraction who think that women should stay at home in bins of per capita GDP, taking out country fixed effects. The figure shows striking differences between the views on women with young children (under school age and to a lesser degree school age) and the views on women without children or older children. The difference lies in both the levels and the development profile. The fraction who believe that women without children or older children should stay at home is very low *and* relatively flat across levels of development. By contrast, the fraction who believe that women with children under school age should stay at home is very high at low levels of development (close to 70%), but declines substantially with development (to about 20%). The sharp difference between the attitudes on women with (young) children and all other women again highlights that children and motherhood are key to understanding gender convergence.

These findings show that the necessary condition for norms and culture to matter for gender equalization, namely that they change over the course of development, is satisfied. Two caveats on interpretation are worth flagging. First and obviously, the descriptive findings presented here do not by themselves tell us if norms and culture have causal impacts on gender convergence, if they are simply by-products of such convergence, or if both culture and convergence are driven by other common causes. Second, while the survey questions are meant to elicit values or norms, they may also pick up perceptions about public policies, institutions or other aspects of society. For example, one is more likely to think that a mother should stay at home with her young children in a country without any publicly provided childcare, independently of any moral attitudes about the issue.

IV. Conclusion

In this paper we have documented the evolution of gender inequality in labour market outcomes over the long run of development, and we have discussed some of the factors—primarily fertility, education and norms—that may be driving the observed patterns. Our paper complements the many excellent overviews written on gender gaps in the labour market as well as on economic growth and fertility.

A key contribution of our paper lies in the data gathering effort that underlies the analysis: we have created a micro database covering 53 countries over the period 1967–2014 by assembling 248 different surveys from a variety of sources. The dataset covers a wide range of development levels, and the fact that we observe countries more than once allows us to absorb country fixed effects when studying gender convergence over the development path. This reduces the noise introduced by the differential selection of countries across GDP per capita levels, and allows us to better capture the within-country effect of moving up the development ladder.

We have shown that there is large gender convergence in total earnings across levels of development. This is driven by female labour force participation and wage rates, but not hours worked conditional on working. We have argued that the most important factor behind this convergence is the demographic transition that takes place across development levels. Lifetime fertility rates decline from more than 6 children per woman to less than 2 children per woman across the range of GDP per capita that we consider.

Given the large effects of children on gender gaps at both low and high levels of development, such large fertility declines have drastic implications for gender inequality. We also argue that education convergence plays a significant role for earnings convergence—though not as large as fertility—and highlight that it is empirically difficult to separate the implications of fertility and education (in a true causal sense) as they feed into each other over the development path, as implied by growth models with endogenous fertility. Finally, we have documented a set of striking changes in the views on gender roles, and especially those related to working women with children, that take place over the development path. We discussed these patterns in the light of recent work suggesting that norms and culture could be important propagation mechanisms for gender convergence.

APPENDIX

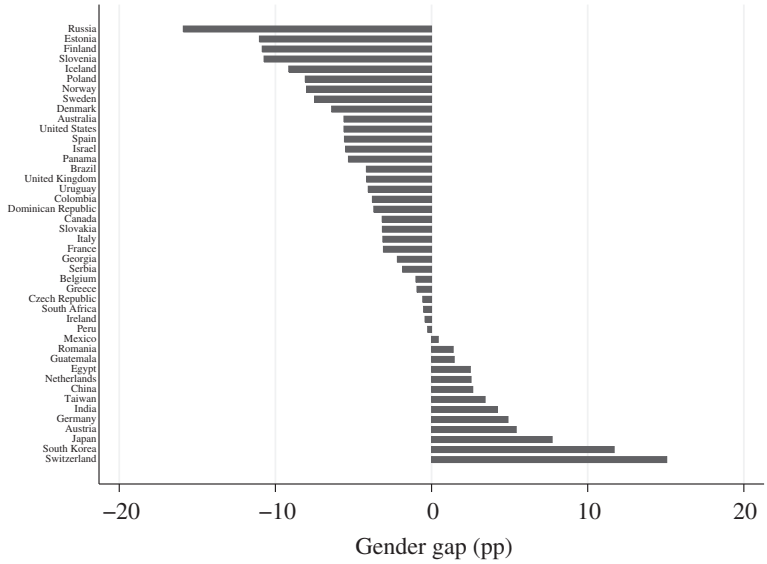

FIGURE A1. Gender inequality in college across countries today (2010–15).
Notes: The figure reports the latest gender gap in the probability to hold a college degree among the 16–64-year-olds for all countries for which we have a survey in the period 2010–15.

TABLE A1
LIST OF DATA SOURCES FOR EACH COUNTRY AND YEAR

Country	Year	Metabase	Primary survey
Panel A: Countries A–C			
Australia	1981	LIS	Survey of Income and Housing Costs
	1985	LIS	Survey of Income and Housing Costs
	1989	LIS	Survey of Income and Housing Costs
	1995	LIS	Survey of Income and Housing Costs
	2001	LIS	Survey of Income and Housing Costs
	2003	LIS	Survey of Income and Housing Costs
	2008	LIS	Survey of Income and Housing Costs
	2010	LIS	Household Expenditure Survey
Austria	1994	LIS	European Household Panel / AT ECHP
	1997	LIS	European Household Panel / AT ECHP
	2000	LIS	European Household Panel / AT ECHP
	2004	LIS	Survey on Income and Living Conditions
Belgium	1985	LIS	Socio-Economic Panel
	1988	LIS	Socio-Economic Panel
	1992	LIS	Socio-Economic Panel
	1995	LIS	Panel Study of Belgian Households
	1997	LIS	Socio-Economic Panel
	2000	LIS	Panel Study of Belgian Households
Belize	1999	SEDLAC	Labour Force Survey
Bulgaria	2001	WB LSMS	Integrated Household Survey
	2003	WB LSMS	Integrated Household Survey
	2007	WB LSMS	Integrated Household Survey
Burkina Faso	2013	WB LSMS	Enquête Multisectorielle Continue
Brazil	2006	LIS	Pesquisa Nacional por Amostra de Domicilios
Canada	2009	LIS	Pesquisa Nacional por Amostra de Domicilios
	2009	SEDLAC	Pesquisa Nacional por Amostra de Domicilios
	2011	LIS	Pesquisa Nacional por Amostra de Domicilios
	2013	LIS	Pesquisa Nacional por Amostra de Domicilios
	1981	LIS	Survey of Consumer Finances
	1987	LIS	Survey of Consumer Finances
	1991	LIS	Survey of Consumer Finances
	1994	LIS	Survey of Consumer Finances
	1997	LIS	Survey of Consumer Finances
	1998	LIS	Survey of Labour and Income Dynamics
	2000	LIS	Survey of Labour and Income Dynamics
	2004	LIS	Survey of Labour and Income Dynamics
	2007	LIS	Survey of Labour and Income Dynamics
	2010	LIS	Survey of Labour and Income Dynamics
Panel B: Countries C–F			
Chile	2009	SEDLAC	Encuesta de Caracterización Socioeconómica Nacional
China	2002	LIS	Chinese Household Income Survey Project
Colombia	2004	LIS	Encuesta Continua de Hogares
	2007	LIS	Gran Encuesta Integrada de Hogares
	2009	SEDLAC	Encuesta Nacional de Hogares
	2010	LIS	Gran Encuesta Integrada de Hogares
	2013	LIS	Gran Encuesta Integrada de Hogares

TABLE A1
CONTINUED

Country	Year	Metabase	Primary survey
Costa Rica	2009	SEDLAC	Encuesta de Hogares de Propósitos Múltiples
Czech Republic	1992	LIS	Czech Microcensus
	1996	LIS	Czech Microcensus
	2002	LIS	Czech Microcensus
	2004	LIS	Survey on Income and Living Conditions
	2007	LIS	Survey on Income and Living Conditions
	2010	LIS	Survey on Income and Living Conditions
Denmark	1987	LIS	Law Model
	1992	LIS	Law Model
	1995	LIS	Law Model
	2000	LIS	Law Model
	2004	LIS	Law Model
	2007	LIS	Law Model
	2010	LIS	Law Model
Dominican Republic	2007	LIS	Encuesta Nacional de Ingresos
Ecuador	2009	SEDLAC	Encuesta de Condiciones de Vida
Egypt	2012	LIS/ERF	Egypt Labor Market Panel Survey
Estonia	2004	LIS	Estonian Social Survey
Finland	2007	LIS	Estonian Social Survey
	2010	LIS	Estonian Social Survey
	1987	LIS	Income Distribution Survey
	1991	LIS	Income Distribution Survey
	1995	LIS	Income Distribution Survey
	2000	LIS	Income Distribution Survey
	2004	LIS	Income Distribution Survey
	2007	LIS	Survey on Income and Living Conditions
	2010	LIS	Survey on Income and Living Conditions
France	1978	LIS	Enquête Budget des Familles
	1984	LIS	Enquête Budget des Familles
	1989	LIS	Enquête Budget des Familles
	2000	LIS	Enquête Budget des Familles
	2005	LIS	Enquête Budget des Familles
	2010	LIS	Enquête Budget des Familles
Panel C: Countries G–I			
Georgia	2010	LIS	Integrated Household Survey
	2013	LIS	Integrated Household Survey
Germany	1973	LIS	Income and Consumer Survey
	1978	LIS	Income and Consumer Survey
	1983	LIS	Income and Consumer Survey
	1984	LIS	German Social Economic Panel Study
	1989	LIS	German Social Economic Panel Study
	1994	LIS	German Social Economic Panel Study
	2000	LIS	German Social Economic Panel Study
	2004	LIS	German Social Economic Panel Study
	2007	LIS	German Social Economic Panel Study
	2010	LIS	German Social Economic Panel Study

TABLE A1
CONTINUED

Country	Year	Metabase	Primary survey
Greece	1995	LIS	Household Income and Living Conditions Survey
	2000	LIS	Household Income and Living Conditions Survey
	2004	LIS	Survey on Income and Living Conditions
	2007	LIS	Survey on Income and Living Conditions
	2010	LIS	Survey on Income and Living Conditions
Guatemala	2006	LIS	Encuesta Nacional de Condiciones de Vida
Honduras	2009	SEDLAC	Encuesta Permanente de Hogares
Hungary	1991	LIS	Household Monitor Survey
	1994	LIS	Household Monitor Survey
	1999	LIS	Household Monitor Survey
	2005	LIS	Household Monitor Survey
Iceland	2004	LIS	Survey of Income and Living Conditions
	2007	LIS	Survey of Income and Living Conditions
	2010	LIS	Survey of Income and Living Conditions
India	2004	LIS	India Human Development Survey
	2011	LIS	India Human Development Survey
Ireland	1994	LIS	Living in Ireland Survey
	1995	LIS	Living in Ireland Survey
	1996	LIS	Living in Ireland Survey
	2004	LIS	Survey on Income and Living Conditions
	2007	LIS	Survey on Income and Living Conditions
	2010	LIS	Survey on Income and Living Conditions
Israel	2001	LIS	Household Expenditure Survey
	2005	LIS	Household Expenditure Survey
	2007	LIS	Household Expenditure Survey
	2010	LIS	Household Expenditure Survey
	2012	LIS	Household Expenditure Survey
Panel D: Countries I–N			
Italy	1986	LIS	Survey on Household Income and Wealth
	1987	LIS	Survey on Household Income and Wealth
	1989	LIS	Survey on Household Income and Wealth
	1991	LIS	Survey on Household Income and Wealth
	1993	LIS	Survey on Household Income and Wealth
	1995	LIS	Survey on Household Income and Wealth
	1998	LIS	Survey on Household Income and Wealth
	2000	LIS	Survey on Household Income and Wealth
	2004	LIS	Survey on Household Income and Wealth
	2008	LIS	Survey on Household Income and Wealth
	2010	LIS	Survey on Household Income and Wealth
Japan	2001	ICPSR	Japanese General Social Survey
	2002	ICPSR	Japanese General Social Survey
	2006	ICPSR	Japanese General Social Survey
	2008	LIS	Japan Household Panel Survey Data

TABLE A1
CONTINUED

Country	Year	Metabase	Primary survey
Jordan	2008	ERF	Labour Force Survey
	2009	ERF	Labour Force Survey
	2010	ERF	Labour Force Survey
	2011	ERF	Labour Force Survey
	2013	ERF	Labour Force Survey
	2014	ERF	Labour Force Survey
Mexico	1984	LIS	Household Income and Expenditure Survey
	1989	LIS	Household Income and Expenditure Survey
	1992	LIS	Household Income and Expenditure Survey
	1994	LIS	Household Income and Expenditure Survey
	1996	LIS	Household Income and Expenditure Survey
	2002	LIS	Household Income and Expenditure Survey
Netherlands	2004	LIS	Household Income and Expenditure Survey
	2008	LIS	Household Income and Expenditure Survey
	2010	LIS	Household Income and Expenditure Survey
	2012	LIS	Household Income and Expenditure Survey
	1983	LIS	Additional Enquiry on the Use of (Public) Services
	1987	LIS	Additional Enquiry on the Use of (Public) Services
	1990	LIS	Additional Enquiry on the Use of (Public) Services
	1993	LIS	Socio-Economic Panel Survey
	1999	LIS	Socio-Economic Panel Survey
	2004	LIS	Survey on Income and Living Conditions
	2007	LIS	Survey on Income and Living Conditions
	2010	LIS	Survey on Income and Living Conditions
Panel E: Countries N–S			
Norway	1979	LIS	Income Distribution Survey
	1986	LIS	Income Distribution Survey
	1991	LIS	Income Distribution Survey
	1995	LIS	Income Distribution Survey
	2000	LIS	Income Distribution Survey
	2004	LIS	Income Distribution Survey
	2007	LIS	Household Income Statistics
	2010	LIS	Household Income Statistics
Panama	2007	LIS	Encuesta Continua de Hogares
	2010	LIS	Encuesta Continua de Hogares
	2013	LIS	Encuesta Continua de Hogares
Peru	2004	LIS	Encuesta Nacional de Hogares
	2007	LIS	Encuesta Nacional de Hogares
	2010	LIS	Encuesta Nacional de Hogares
	2013	LIS	Encuesta Nacional de Hogares
Poland	1986	LIS	Household Budget Survey
	1992	LIS	Household Budget Survey
	1995	LIS	Household Budget Survey
	2007	LIS	Household Budget Survey
	2010	LIS	Household Budget Survey
	2013	LIS	Household Budget Survey

TABLE A1
CONTINUED

Country	Year	Metabase	Primary survey
Russia	2000	LIS	Russia Longitudinal Monitoring Survey
	2004	LIS	Russia Longitudinal Monitoring Survey
	2007	LIS	Russia Longitudinal Monitoring Survey
	2010	LIS	Russia Longitudinal Monitoring Survey
	2013	LIS	Russia Longitudinal Monitoring Survey
Serbia	2006	LIS	Household Budget Survey
	2010	LIS	Household Budget Survey
	2013	LIS	Household Budget Survey
Slovakia	1992	LIS	Slovak Microcensus
	2004	LIS	Statistics on Income and Living Conditions
	2007	LIS	Statistics on Income and Living Conditions
	2010	LIS	Statistics on Income and Living Conditions
Slovenia	1997	LIS	Household Budget Survey
	1999	LIS	Household Budget Survey
	2004	LIS	Household Budget Survey
	2007	LIS	Household Budget Survey
	2010	LIS	Household Budget Survey
South Africa	2008	LIS	National Income Dynamics Study
	2010	LIS	National Income Dynamics Study
	2012	LIS	National Income Dynamics Study
Panel F: Countries S–U			
South Korea	2006	LIS	Household Income and Expenditure Survey
Spain	1990	LIS	Family Expenditure Survey
	1995	LIS	Spanish European Community Household Panel
	2000	LIS	Spanish European Community Household Panel
	2004	LIS	Encuesta de Condiciones de Vida
	2007	LIS	Encuesta de Condiciones de Vida
	2010	LIS	Encuesta de Condiciones de Vida
	2013	LIS	Encuesta de Condiciones de Vida
Sweden	1975	LIS	Income Distribution Survey
	1981	LIS	Income Distribution Survey
	1987	LIS	Income Distribution Survey
	1992	LIS	Income Distribution Survey
	1995	LIS	Income Distribution Survey
	2000	LIS	Income Distribution Survey
	2005	LIS	Income Distribution Survey
Switzerland	1982	LIS	Swiss Income and Wealth Survey
	1992	LIS	Swiss Poverty Survey
Taiwan	1981	LIS	Survey of Family Income and Expenditure
	1986	LIS	Survey of Family Income and Expenditure
	1991	LIS	Survey of Family Income and Expenditure
	1997	LIS	Survey of Family Income and Expenditure
	2000	LIS	Survey of Family Income and Expenditure
	2005	LIS	Survey of Family Income and Expenditure
	2007	LIS	Survey of Family Income and Expenditure
	2010	LIS	Survey of Family Income and Expenditure
	2013	LIS	Survey of Family Income and Expenditure

TABLE A1
CONTINUED

Country	Year	Metabase	Primary survey
United Kingdom	1974	LIS	Family Expenditure Survey
	1979	LIS	Family Expenditure Survey
	1986	LIS	Family Expenditure Survey
	1991	LIS	Family Expenditure Survey
	1994	LIS	Family Expenditure Survey
	1995	LIS	Family Expenditure Survey
	1999	LIS	Family Expenditure Survey
	2004	LIS	Family Expenditure Survey
	2007	LIS	Family Expenditure Survey
	2010	LIS	Family Expenditure Survey
	2013	LIS	Family Expenditure Survey
Panel G: Countries U–V			
United States	1974	LIS	Current Population Survey
	1979	LIS	Current Population Survey
	1986	LIS	Current Population Survey
	1991	LIS	Current Population Survey
	1994	LIS	Current Population Survey
	1997	LIS	Current Population Survey
	2000	LIS	Current Population Survey
	2004	LIS	Current Population Survey
	2007	LIS	Current Population Survey
	2010	LIS	Current Population Survey
	2013	LIS	Current Population Survey
Uruguay	2004	LIS	Encuesta Continua de Hogares
	2007	LIS	Encuesta Continua de Hogares
	2010	LIS	Encuesta Continua de Hogares
	2013	LIS	Encuesta Continua de Hogares
Venezuela	2006	SEDLAC	Encuesta de Hogares Por Muestreo

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NOTES

1. While these findings suggest a strong impact of fertility—especially when viewed in tandem with the recent quasi-experimental evidence on the impact of children (such as Kleven *et al*. 2016)—a causal interpretation of fertility is difficult in this cross-country study due to the fact that fertility is endogenously selected.
2. Throughout the paper, our measure of GDP per capita is purchasing power parity (PPP) adjusted and expressed in real 2011 dollars. Our measure of GDP per capita comes from the Penn World Tables 9.0 available at http://www.rug.nl/ggdc/productivity/pwt (accessed 8 February 2017).
3. The lifetime fertility rate in these data is defined as the (hypothetical) total number of births per women given the observed age distribution of births. These data have been collected by the World Bank from various sources and are available at http://data.worldbank.org/indicator/SP.DYN.TFRT.IN? (accessed 8 February 2017).
4. We note that this decline is consistent with the evidence in Panel A of Figure 1, as the average GDP per capita in our balanced panel is $24,804 in the 1985–90 interval and $42,621 in the 2010–15 interval.

5. See, for example, Waldfogel (1998), Lundberg and Rose (2000), Correll *et al*. (2007), Sigle-Rushton and Waldfogel (2007a,b), Paull (2008), Bertrand *et al*. (2010), Wilde *et al*. (2010), Fernandez-Kranz *et al*. (2013), Fitzenberger *et al*. (2013), Goldin (2014), Adda *et al*. (2015), Angelov *et al*. (2016) and Kleven *et al*. (2016). These studies provide evidence on the implications of parenthood for gender gaps in Canada, Denmark, Finland, Germany, the Netherlands, Norway, Spain, Sweden, the UK and the USA.
6. There is considerable variation across countries, however, and a number of exceptions to the stylized fact that female education attainment surpasses that of men during the growth process (see Figure A1 in the Appendix). For example, in central European countries (Switzerland, Austria, Germany), women are still substantially less college educated than men. Conversely, in a number of low- to middle-income countries (such as several Latin American countries), women already have more college education than men.
7. For the effect of children $\hat{G}^K$, almost all of the effect is in practice the unexplained effect—the fact that men and women are affected differently by children, $\widehat{\beta}_k^m \neq \widehat{\beta}_k^w$—as the fractions of men and women with children are by nature roughly similar, $\overline{K}^m \approx \overline{K}^w$.
8. To be clear, this education gap includes not only the effect of the gender convergence in college attainment documented in Figure 9, but also changes on the primary vs. secondary school margin as well as the unexplained effects (different returns to education) of both college and secondary school.

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