Article

Gender equality in human capital and fertility in the European regions in the past

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\textbf{A B S T R A C T}

Gender inequality in human capital has been shown to be an important indicator of economic development, but has remained unexplored in a European history perspective. Using a new and large historical database on male and female literacy rates, new evidence is presented on the distribution of gender inequality in human capital in European regions in 1900 and 1960. An analysis is made of the distribution of fertility rates to determine the relationship between gender equality in education and the demographic transition. The results show a reversal of educational fortunes and regional fertility rates. Regions with lower fertility rates in the past tend to display higher rates today.

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\textbf{Iguidad de género en capital humano y fecundidad en las regiones europeas en el pasado}

\textbf{R E S U M E N}

La igualdad de género en capital humano es un indicador importante del desarrollo económico, pero no ha sido explorada en una perspectiva europea. Utilizando una nueva y extensa base de datos históricos de alfabetización masculina y femenina, mostramos nuevos resultados de la igualdad de género en capital humano en las regiones europeas en 1900 y 1960. Así, exploramos la distribución de las tasas de fecundidad para entender mejor la relación entre la igualdad de género y la transición demográfica. Los resultados muestran cambios importantes a través del tiempo.

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\textbf{1. Introduction}

Human capital theory, as originally advanced by Becker (e.g., Becker, 1960; Becker and Tomes, 1986; Becker et al., 1990) and more recently by the Unified Growth Theory (e.g., Galor and Weil, 1996; Galor, 2005, 2012), has emphasized the importance of human capital in explaining the demographic transition and economic growth. In particular, the renowned quantity-quality (QQ) trade-off between the number and the education of children has attracted the attention of many researchers during the last decades and particularly during the last years (e.g., Hanushek, 1992; Guimaraes, 2008; Bleakley and Lange, 2009; Becker et al., 2010, 2012; Diebolt et al., 2015, 2016; De la Croix and Perrin, 2016).

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The European fertility decline was a precursor for similar transitions in many continents in the world in the past and in the present. The European Fertility Project (EFP) carried out at Princeton University in the 1960s and 1970s was probably the most important endeavor in this area and had the ambition to provide answers to the major questions surrounding the European demographic transition. This major initiative significantly contributed to improve the general understanding of the phenomenon of demographic transition in Europe and its determinants.

The EFP did not place particular emphasis on the role played by human capital in Europe. Instead, human capital was considered as having only contributed to a minor extent to the fertility decline, with the exception of a few isolated cases (e.g., Switzerland, see Van de Walle, 1980). The specific role of female education was even more largely neglected by the historical literature. This left aside aspect is more than surprising as “education, particularly of girls, has been shown to be the factor most closely related to fertility decline, by delaying marriage and first births” (Kirk, 1996, p. 377).

Since the end of the EFP, the impact of human capital has remained unexplored at the European level. A few analyses have recently been conducted at the country-level for Prussia (e.g., Becker et al., 2010; Becker et al., 2012, and Becker et al., 2013 focusing more specifically on the role of women’s education) and France (Murphy, 2015; Bignon and García-Peñalosa, 2016; as well as Diebolt et al., 2015, 2016; and De la Croix and Perrin, 2016, accounting for a gender dimension in their analyses) but none yet explored the situation in a European comparative perspective.

Hippe and co-authors have recently provided a European perspective on regional human capital levels (e.g., Hippe and Baten, 2012; Hippe, 2012, 2013; Diebolt and Hippe, 2016a,b), however, their analyses do not account for gender differences and fertility. Thus, despite the important implications for the demographic transition and long-run economic growth (Diebolt and Perrin, 2013a,b), the difference between the human capital levels of men and women has remained unexplored in a European regional perspective.

Why is gender parity in education important? Gender parity in education represents the power balances between the sexes in general and between husband and spouse in particular (De Moor and van Zanden, 2010, p. 3). As shown by Diebolt and Perrin (2013a,b), changes in gender relations toward greater equality would be at the origin of the fertility transition and contributed to engage the take-off to modern economic growth. But gender equality is not only a relevant issue for history; it has also huge economic implications today. For example, a recent McKinsey Global Institute study shows that “if all [worldwide] countries were to match the progress toward gender parity of the best performer in their region, it could produce a boost to annual global GDP of as much as $12 trillion in 2025” (McKinsey Global Institute, 2016, p. 1). Such numbers emphasize once again the relevance of improving our knowledge on gender equality, and notably on the distribution of gender equality in human capital in the past and present.

Thereof, this paper aims at providing a comprehensive description of the geographical distribution of gender differences in human capital and fertility regimes in the past and present. For this purpose, we construct a new and large historical database on male and female literacy rates and match it with data on fertility and nuptiality by Coale and Watkins (1986). Our analysis focuses on literacy and fertility rates in the European regions in the past. For data availability reasons, we decide to focus on two specific years: 1900 and 1960. We separately explore the evolution and patterns of regional fertility rates and gender equality in human capital in Europe using correlation matrices and scatter plots. We also use OLS regression analyses to provide further econometric evidence. The empirical investigation of the relationships between gender equality, human capital, and fertility confirms the existence of: (i) a positive and significant association between gender equality and human capital; and (ii) a negative significant association between gender equality and fertility in 1900, which then becomes insignificant in 1960.

We also note that there is a reversal between educational fortunes and regional fertility rates in Europe. While men had mostly higher basic human capital than girls in the past, we observe the opposite situation today (i.e., on average, girls possess a higher educational background). In addition, we find that regions with higher fertility rates in 1900 tend to present lower rates nowadays.

The paper is structured as follows. Section 2 provides a summary of the literature on the European fertility transition and on its links with endowments in human capital. Section 3 presents the data and approach used to conduct our analysis. Section 4 gives an overview of the stylized facts of the fertility decline in Europe and beyond. Section 5 discusses the geographical distribution of gender inequality in human capital in the past. Next, Section 6 investigates the relationship between gender equality, human capital, and fertility in the past. Finally, Section 7 summarizes our findings and opens the discussion on future research.

2. Related literature on fertility and human capital

The concept of demographic transition is rather new and was first defined by Frank Notestein in 1945 (Notestein, 1945; Kirk, 1996). During the following decades, many researchers focused their attention on the issue and worked at describing and explaining this social phenomenon.

2.1. Theoretical background

Theorists have examined a set of plausible explanations being at the root of the demographic transition. The earliest theories on the subject were established by Leibenstein (1957), Becker (1960), but also Easterlin (1969), and Caldwell (1976), among others (Lee, 2015). Standard economic theory was then developed by economists – at about the same period by Schultz (1974) and Becker (1981). In their earliest works, the fertility behaviors of each phase, i.e. before and during the demographic transition, were supposed to be rational. Accordingly, the high fertility rates, which characterized most of European (and worldwide) history, were considered as the product of individuals’ and communities’ rational choices. However, the demand for children – a key force in the process of demographic transition – changed over time. More precisely, the demand for children was affected by changes in factors such as prices, incomes, and preferences. Lower demand for children meant lower fertility rates, which could therefore initiate the process of demographic transition. These contributions constitute the starting point of the theories of the demographic transition. Since these seminal works, various factors and theories have been suggested and developed to explain the fertility dynamics (e.g. role played by income, mortality decline, value of time, contraception, quantity-quality trade-off, among others).

The gradual rise in the demand for human capital along the process of industrialization has been seen as a prime force leading to the onset of the demographic transition (Galor, 2012), specifically during the second phase of the Industrial Revolution. Taking family

1 The main objectives of the European Fertility Project were: (i) to create a quantitative record of the European fertility transition; and (ii) to determine the social and economic circumstances that prevailed when the modern decline in fertility began in order to highlight the causal mechanisms of the fertility transition.

2 Although there have been earlier attempts in defining this phenomenon (Kirk, 1996).
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