



Economic geography, fertility and migration

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Received 2 February 2006; revised 30 July 2006

Available online 12 September 2006

Abstract

This paper analyzes the relationship among economic geography, fertility and migration. The empirical evidence presented reveals that persistent regional variations in fertility exist within a country and that regional total fertility rates are negatively related to regional population density. A two-period overlapping generations model of endogenous fertility, incorporating n -regions, agglomeration economies, and congestion diseconomies is constructed to explain this negative relationship. While agglomeration economies have both positive income and negative substitution effects on fertility, congestion diseconomies have a negative income effect on it. Combined with the mobility of people, interaction among these effects generates the negative relationship as a steady-state equilibrium outcome. It is also shown that net migration from regions with lower population density to regions with higher population density occurs in an equilibrium, which, in turn, maintains the regional variations in fertility.

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JEL classification: J13; J61; R10; R12; R23

Keywords: Economic geography; Fertility; Agglomeration economies; Congestion diseconomies; Migration

1. Introduction

The recent decline in the fertility rate has attracted much attention in many developed countries since it has significant implications for economic growth, public pensions, health care, and labor markets.¹ In order to examine the relationship between fertility and economic activities, the following two types of models have been considered: non-altruistic and altruistic. In the non-

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¹ In fact, during the past decade (1990–2000), the total fertility rate has declined from 1.8 to 1.6 in the United Kingdom, from 1.5 to 1.3 in Germany, and 1.5 to 1.4 in Japan (OECD [15]), for example.

altruistic model, material support during the period of old age dependence is a motive for having children, which indicates that rearing children is treated as investment. This type of model is thought to be more applicable in developing countries (e.g., Zhang and Nishimura [21]). In an altruistic model, having children is regarded as consumption. This type of model is considered to be more applicable to developed countries. In this type of model, there are two modes of inter-generational altruism. In one case, as in Eckstein and Wolpin [6] and Eckstein, Stern, and Wolpin [7], parents derive utility from the number of their children. In the other case, as in Razin and Ben-Zion [16], and Caballe [2], parents also derive utility from their children's utility.

While existing studies have intensively analyzed the determinants of fertility at a country level and, especially, its influence on economic growth (see Ehrlich and Lui [8]), analysis of the determinants of regional variations in fertility within a country has not received much attention thus far. However, looking into the data on regional fertility, we see that regional variations are not ones we can ignore. For example, in Japan, the prefectural total fertility rate in 2000 is 1.07 in Tokyo, 1.28 in Kyoto, 1.31 in Osaka, 1.62 in Tottori, 1.65 in Fukushima, and 1.67 in Saga (Vital Statistics (Ministry of Health, Labour and Welfare)).

This paper explores the determinants of regional variations in fertility within a country. This does of course not imply that analysis regarding the interactions between national fertility and economic activities is unimportant or negligible. It is certainly important and significant. Here, we want to say that regional variations in fertility are *also not negligible* (The total fertility rate in Saga is 0.6 points, or over 50 percents larger than that in Tokyo, for example.), and that it is worth analyzing how such variations and economic activities affect each other. For this purpose, this paper does not focus on the dynamics of national fertility but focuses on the regional variations in fertility within a country at one point in time. Therefore, in the model developed in this paper, it is assumed that there is no growth of total factor productivity, and only the steady state is considered.

In the analysis, we focus on regional population density as a key factor. Urban and regional economists have revealed the positive and negative roles of the geographical concentration of economic agents in an economy. The positive role is called “agglomeration economies.” Causes of agglomeration economies include knowledge spillover across firms, the presence of a more extensive division of labor, preference for variety in consumption and increasing returns owing to firm-level economies of scale, and heterogeneity of workers and firms. (See Fujita and Thisse [10], and Duranton and Puga [5] for comprehensive surveys on the micro-foundations of agglomeration economies.) Empirical studies such as Ciccone and Hall [3], Ciccone [4], and Tabuchi and Yoshida [20] showed the existence of agglomeration economies by showing that productivity and the wage rate are higher in a region with higher population density.

Traditionally, changes in wage rate have been thought to have positive and negative effects on fertility. The former is such that a rise in wage rate increases disposable income and increases the fertility rate, namely, the positive income effect. The latter is the effect that raises the opportunity cost of rearing children to reduce the fertility rate because parenting is time consuming and individuals must give up some working time in order to have children, namely, the negative substitution effect.² Shultz [18] provided, using Swedish data, empirical results indicating the existence of both effects. It showed that while a rise in male real wage rate increases the total fertility rate, an increase in female real wage relative to male real wage contributes to the decline

² These effects were fully discussed by Becker [1].

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