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Population Dynamics and Long-Run Economic Growth[†]

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Abstract. This paper applies insights from theoretical and empirical research in economic growth to analyze the impacts of policies affecting fertility, migration and human capital accumulation on growth and poverty alleviation. It underlines the tradeoff between having more children and investing more resources in the human capital of each child as a critical force in devising policies that will alleviate hardship and generate long-term prosperity. In developing countries, policies increasing the return to education would trigger a virtuous cycle of fertility control, investment in education, poverty alleviation, and economic growth. Moreover, permitting migration of high skilled individuals to developed countries would mitigate the issues associated with aging populations in those societies, while encouraging human capital formation in developing countries.

Keywords: Fertility, Demographic Structure, Unified Growth Theory, Migration

JEL Classifications: J13, J16, J24, O15, O40

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I. Introduction

Demography exerts a tremendous influence over most aspects of economic development. The *Report of the Global Thematic Consultation on Population Dynamics* (UNFPA *et al.*, 2013; hereafter, the GTC-PD Report) from the United Nations and the *Post-2015 Consensus* project from the Copenhagen Consensus Center present an exciting opportunity to discuss these important issues. This essay applies insights from theoretical and empirical research in economic growth to analyze the long-run impacts of policies affecting fertility, migration and human capital accumulation. While an imperfect measure of wellbeing, the wealth of an economy shapes the degree to which individuals and governments can utilize resources to alleviate poverty and encourage human flourishing. An assessment of policy effectiveness, therefore, must include implications for long-run economic growth, even when the benefits may not be immediate or easily measured.¹

In all facets of life, people must make decisions about how to allocate scarce resource. Potential parents must decide how many children to have and how much to invest in the future of each child. This decision is known as the ‘quantity-quality’ tradeoff.² Many factors influence these decisions and the ability of individuals to realize their desired choices. Particularly important determinants of fertility include income levels, the return to human capital investment, and cultural norms – especially those related to gender equality. At the most fundamental level, when individuals invest more in the human capital of each child and have fewer children, they raise the future per capita earnings power of the next generation. This force has been essential in the intertwined processes of rising economic growth and falling fertility occurring in currently developed countries over the last two and a half centuries.

In developing countries, policies aimed at inducing parents to substitute child quality for child quantity will have positive effects beyond those captured by short-run cost-benefit analysis. By lessening the fiscal burden on cash-strapped governments and international aid agencies, lower fertility directly addresses issues of poverty and deprivation. At the same time, higher human capital will raise the earnings power of each individual, further improving material wellbeing. Increased reliance on human capital also raises the relative wages of women, pushing society towards greater gender equality. As more women become economically active, they will have fewer children and parents will have higher incentive to invest in the human capital of young girls, reinforcing the entire process mentioned above. Thus, raising the return to investments in human capital should be a central priority moving forward. Of the usual policy levers, lowering the direct cost of education or raising the return by easing intra-country migration present the most promising avenues to achieve this goal.

Rich countries face an opposite problem. The process of rising growth and falling fertility has led to population aging and increased stress on government programs catering to the elderly. It is important to note, however, that age ratios are an incomplete characterization of the ability of workers to support the retired, especially in periods of rising human capital accumulation. Naturally, any attempt to remedy the negative effects of an aging population should not undermine the benefits created by rising human capital investment and falling fertility. To avoid counteracting the positive effects of low fertility, countries can make up for a shortfall in public revenue by encouraging high skill immigration. Given that the possibility

¹ Of course, this does not imply that economic growth should be the sole measure of policy effectiveness.

² It should be noted that these are biological terms reflecting a fundamental tradeoff faced by all species, and they do not imply any sort of judgment regarding the inherent value of different people.

of emigration raises the return to human capital accumulation, this process will likely have positive impacts on the sending, as well as receiving, country. Thus, increasing the flow of skilled migrants is another important policy priority.

II. The Demographic Transition

For much of human history, differences in income per capita across the globe were negligible. Increases in productivity were used to support larger populations, rather than increase consumption per person (Ashraf and Galor, 2011). This feedback loop between productivity and population characterizes the ‘Malthusian Era,’ which is named after Thomas Malthus (1798) who famously examined the pattern in *An Essay on the Principle of Population*. Around the time of Malthus’ writing, however, this negative feedback loop started to unravel in parts of Western Europe. Over the next two centuries, the world witnessed a dramatic transformation of living standards in Western Europe and its offshoots and a corresponding increase in the degree of inequality across the globe. At first, population growth lagged behind productivity growth, leading to simultaneous increases in income per capita and population. Eventually, fertility rates in growing economies began to fall and income per capita grew even more rapidly (Maddison, 2001). This process of falling fertility is part of the phenomenon known as the demographic transition. Today, income and population growth display a strong negative correlation. Understanding the historical demographic transition provides insights needed to devise policies that will help developing countries move out of Malthusian stagnation.

Existing evidence suggests that the quantity-quality tradeoff drove the changing relationship between population growth and income per capita (Galor, 2012).³ The quantity-quality tradeoff simply reflects the fact that parents face a choice between having more children and investing more in the human capital of each child. As economies develop, the return to education rises, causing parents to invest more in human capital and have fewer children. When these children enter the labor force, they are able to produce more output per capita, increasing living standards. More educated workers also drive increases in technological progress, continuing the positive cycle.

Several mechanisms reinforced this effect during the demographic transition. For example, the rising importance of human capital lowered the return child labor, which caused parents to substitute away from child quantity and led industrialists to support educational reforms and child labor laws (e.g., Hazan and Berdugo, 2002; Doepke and Zilibotti, 2005; Galor and Moav, 2006).⁴ The rise in the demand for human capital also increased the relative earnings power of women. Given traditional gender roles, increased female earning power meant a higher opportunity cost to raising children, resulting in a further decline in fertility (Galor and Weil, 1996). Together, the quantity-quality tradeoff and these reinforcing mechanisms explain how developed countries emerged from a period of Malthusian stagnation and experienced rapid increases in income per capita.

The relationship between demography and economic growth is the focus of Unified Growth Theory, which uses the quality-quantity tradeoff to examine the historical evolution of economies from the

³ See also Schultz (1985), Becker, Cinnirella, and Woessmann (2010), Murin, (2009), Murphy (2010), Klemp and Weisdorf (2012), and Galor and Klemp (2014). A longer review is available in Galor (2011, chapter 4).

⁴ See also, Galor, Moav, and Vollrath (2009).

Malthusian Era, through the post-Malthusian era – where income per capita and fertility simultaneously increased – and into the modern growth regime, which is characterized by low fertility and rapid economic growth (Galor and Weil, 2000; Galor and Moav, 2002; Galor, 2011). The core theory focuses on the relationship between educational investment and technological progress. Human capital helps workers cope with changes in economic structure. Thus, technological progress induces substitution towards child quality. On the other hand, human capital investment and higher population levels lead to more rapid innovation. Also, minimum consumption requirements imply that parents need to devote a certain level of resources to their own consumption before they can invest in quantity or quality of children.

Due to low population and human capital levels characterizing early human existence, technological progress was slow and population levels were stable. Slow technological progress yielded low returns to human capital. As a result, parents devoted new resources to supporting a higher number of children rather than increasing human capital per child. Eventually, a growing population led to faster technological progress, which induced human capital investment. Initially, this growing productivity relaxed the subsistence constraint and led to higher fertility and educational investment. Once this constraint was relaxed, however, fertility fell while human capital continued to increase. Thus, income per capital rose because increased productivity was being devoted to higher human capital per person, rather than more people.⁵

This fundamental relationship between fertility and growth shaped the process of development in currently rich countries and the vast inequality across the globe. The theory and historical evidence also have important lessons for developing countries hoping to experience similar increases in material well-being.⁶ The remainder of this essay discusses how history should inform assessments of policy effectiveness in both developing and developed economies.

III. Developing Countries

For developing countries to become rich, resources need to be devoted to increasing income per person rather than supporting larger and larger populations. At the simplest level, fertility decisions can be viewed as a generic investment problem, implying that parents will allocate greater resources towards human capital accumulation when the relative return increases. Thus, the quantity-quality tradeoff has two main policy implications. On the one hand, policies that lower the cost or raise the benefits of investing in child quality relative to having more children will generate a positive feedback cycle between higher levels of human capital and further economic development. On the other hand, policies that lower the cost of having children may have unintended adverse consequences on long-run economic growth.

Policies aimed at reducing the cost of human capital can take many forms. Subsidizing education provides the most obvious example. Education is a crucial determinant of worker productivity and generates many positive externalities. Of particular relevance to discussions of demography is the fact that greater

⁵ Galor (2005) and Galor (2011) provide more detailed discussion of Unified Growth Theory. Galor and Weil (1996), Doepke and Zilibotti (2005), and Galor and Moav (2006) provide theoretical examinations of the complementary mechanisms discussed above.

⁶ Evidence for the quantity-quality tradeoff in developing countries can be found in Rosenzweig and Wolpin (1980), Joshi and Schultz (2007), and Rosenzweig and Zhang (2009). Summaries of the evidence can be found in Schultz (1997, 2008).

education raises the relative earnings power of women – who face a disadvantage in brawn-based societies – and raises the opportunity cost of having children, which lowers fertility. Greater earnings power for women also improves their intra-household bargaining power, leading to broader improvements in gender equality. Of course, lowering the cost of education is a commonly suggested policy option. Short-run cost-benefit calculations, however, will underestimate the total benefits to these policies, which will unfold slowly as fertility and economic structure adapt.

An often overlooked facet of education policy is the direct market return to educated individuals. Expanding educational infrastructure, through building more schools or hiring more teachers, or lowering the direct cost of education may not be sufficient to spur greater child investment and lower fertility if there is limited economic benefit to being educated. In this case, policies that foster urbanization and rural-urban migration can spur human capital investment by raising the return to education for individuals in rural communities who face low returns locally.

Both Kohler and Behrman (2014) and the GTC-PD Report place heavy emphasis on access to contraceptives in response to estimates of large unmet demand in developing countries. Such policies make considerable sense in the context of the quantity-quality tradeoff. Given technological and bargaining power constraints, women may not be able to attain desired levels of relative investment in child quantity and quality. Hence, access to contraceptive methods can yield beneficial reallocation of resources. This does not imply, however, that access to contraceptives alone will lead developed and developing country fertility rates to converge. The cost-benefit calculation for quantity and quality investments differs for many reasons between societies, implying that education policies will be necessary complements to increased access to contraceptives in spurring long-run economic growth.

Existing empirical studies estimate a large effect of decreased fertility on subsequent economic growth in currently developing countries (e.g., Bloom and Canning, 2008; Ashraf, Weil and Wilde, 2013).⁷ These studies, however, focus on the effects of exogenous changes in fertility or demographic structure and do not investigate the feedback loop between education and fertility. Thus, they likely underestimate the benefits of incentivizing lower fertility and do not address the possibility of using education policy to induce quantity-quality substitution. Such policy-oriented research presents an important avenue for better understanding how to drive demographic and economic change.

IV. Developed Countries

As highlighted by Kohler and Behrman (2014) and the GTC-PD Report, developed countries face an opposite problem. As a result of the demographic transition, these economies have aging populations. An increasing proportion of retired people raises the tax burden on the working-age population needed to support pensions and social programs. Of course, the ability to finance such programs increases with the human capital of the working generation, implying that the age structure of society is not a complete measure of the ability of society to support the elderly.

To the degree that increasing average age does financially burden society, developed countries need to increase the relative size and the earning capacity of the labor force. This can be achieved through higher

⁷ Kohler and Behrman (2014) provide an overview of this literature.

fertility – though, there is a long lag before changes in fertility will boost the size of the workforce – or increased immigration. In attempting to boost fertility, developed economies risk undoing the positive effects that increased child quality investment and female labor force participation have had on economic growth. In contrast, increased immigration of high-skilled individuals represents an immediate way to alter the age structure of society. Immigrant workers make immediate contributions to public revenues, and workers with higher incomes make larger contributions.

High skill immigration often raises concerns of ‘brain drain’ in developing countries. The potential for skilled emigration, however, does not imply that the total supply of skilled labor in developing countries will decrease. As discussed above, investments in human capital depend on their relative return. As the possibility of emigration increases, the return to investing in human capital rises. This can increase the net supply of human capital, especially when skilled individuals can only migrate with relatively low probability (Mountford, 1997; Mountford and Rapoport, 2011). Return migration among skilled migrants is also high. Thus, the net effect of increased emigration on the aggregate supply of skilled individuals depends on the specific magnitudes involved. A recent review of the evidence by Docquier and Rapoport (2012) suggests that the effect on net supply varies by country. Temporary programs for skilled migration may have additional positive effects by incentivizing human capital accumulation while lessening negative effects of the ‘brain drain’. Regardless of changes in the net supply of human capital, which have been the focus of the existing literature, rising human capital attainment will come at the expense of population growth, lessening the problems associated with high rates of fertility. Remittances from skilled workers will also help to alleviate these issues.

V. Conclusion

Examining the connection between demography and economic growth reveals important lessons for policymakers. The various aspects of development identified by the reports for the Copenhagen Consensus Center and GTC-PD Report interact in complex ways. In developing countries, policies aimed at increasing the return to education will help lower fertility rates, while increasing access to contraceptives will help increase schooling investments made by parents. The reinforcing pattern of lower fertility and higher schooling will also have a positive impact on gender equality, which can influence future schooling and fertility decisions. Considering each development priority separately yields an incomplete picture of the relative effectiveness of each concrete policy objective.

Taking these long-run feedback loops into account, policies that raise the return to education in developing countries have positive implications well beyond the already substantial effects identified by standard cost-benefit calculations (e.g., Psacharopoulos, 2014). These extra benefits should be taken into account when setting the development agenda. Developed countries must take care not to undo the positive impacts of low fertility and high education as they try to address aging populations. Increasing high skill migration presents an effective way to address this problem. Increased potential for skilled emigration raises the return to education, leading to lower fertility and potentially greater supplies of high skill individuals in the sending country. For these reasons, increased skilled migration should also be prioritized in the agenda setting process.

While this essay focuses on policies usually associated with demography, the quantity-quality tradeoff has broader implications. Macroeconomic policies can help spur economic growth and demographic change by pushing the economy away from low-skill intensive activities, such as agriculture, and towards activities that place a greater premium on education. For example, trade between countries may lead developing countries to specialize in low-skill activities that generate negative feedback loops through demography (Galor and Mountford, 2008). Trade policy aimed at shifting the economy towards more skill-intensive production is likely to have substantial long-run benefits. Similarly, developed countries can use conditionality and directed aid to incentivize structural transformation that will raise the return to education. Thus, these macroeconomic policies deserve a role in demographic policy discussions and academic research.

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