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journal homepage: www.elsevier.com/locate/jmeFertility, social mobility and long run inequality[☆]Juan Carlos Córdoba^a, Xiyang Liu^b, Marla Ripoll^{c,*}^a Iowa State University, USA^b Wuhan University, China^c University of Pittsburgh, USA

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ABSTRACT

Dynastic altruistic models with endogenous fertility have been shown to be unable to generate enough intergenerational persistence. Using a Bewley model with endogenous fertility we show that it is possible to recover persistence. Key ingredients for our result include exponential child discounting, discrete number of children, diminishing costs of child rearing, and an elasticity of intergenerational substitution larger than one. Our model provides a unified framework of analysis for long-run inequality that incorporates fertility choices.

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1. Introduction

During the last two decades the study of inequality has significantly advanced thanks to the development of a fairly unified and tractable framework of analysis known as Bewley models.¹ As explained in Aiyagari (1994), these models build upon the standard growth model of Brock and Mirman (1972) by incorporating precautionary saving motives and liquidity constraints. The connection with the standard growth model is very appealing because a single unified framework can be used to study issues of long term growth or business cycles – as in Kydland and Prescott (1982) – and issues of distribution or inequality. Implicit in this framework is the idea of dynastic altruism: either individuals are infinitely lived or, more realistically, lives are finite but individuals care about the welfare of their descendants. Dynastic altruism is an important conceptual benchmark because it brings certain level of efficiency, if not full efficiency, to the resulting allocations.

This fairly unified framework, however, seems to fall apart when serious consideration is given to fertility decisions. In particular, Becker and Barro (1988) and Barro and Becker (1989) introduce optimal fertility choices within the optimal growth model and find that some of the most appealing conclusions obtained under the exogenous fertility assumption are seriously altered.² On the specific issue of inequality, the optimal fertility choice tends to eliminate any inequality and any persistence of inequality, a result highlighted by Bosi et al. (2011) in the context of a deterministic Barro–Becker model. In

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¹ Jungqvist and Sargent (2012, chapter 18) offer a pedagogical exposition. Some of the contributions in this literature include, among many, Loury (1981), Laitner (1992), Aiyagari (1994), Huggett (1996), Krusell and Smith (1998), Castañeda et al. (2003), and Restuccia and Urrutia (2004). See Cagetti and De Nardi (2008) for a comprehensive survey.

² Córdoba and Ripoll (2012) discuss some of the counterfactual predictions of the Barro–Becker model. For instance, this model predicts a negative association between individual consumption and individual income. This prediction runs counter to standard consumption theory, and a variety of evidence suggesting a positive association between lifetime income and lifetime consumption.

contrast, the version of the model with exogenous fertility predicts that any initial inequality is highly persistent, as shown by Chatterjee (1994). An analogous result is obtained using Bewley style models. While Bewley models with infinitely lived agents, as in Aiyagari (1994), or with exogenous fertility, as in Castañeda et al. (2003), predict significant and persistent inequality, an analogous version with endogenous fertility predicts lack of persistence (Alvarez, 1999). We call this class of models with altruism, endogenous fertility, precautionary savings, and liquidity constraints, the Barro–Becker–Bewley (BBB) models. Section 2 derives and discusses in more detail the lack of persistence results for a “standard” BBB model, or SBBB, one that exhibits a specific type of altruism, continuous number of children and constant costs of raising children.

The key possibility introduced into the growth model when allowing endogenous fertility is that richer individuals can use family size as a way to obtain welfare, an extensive margin, instead of providing more consumption to each descendant, the intensive margin. This turns out to be the optimal solution and, as a result, there is no inequality after the original generation. Although inequality can be recovered when markets are incomplete and shocks are idiosyncratic, Alvarez finds an implausible lack of persistence result, or lack of memory, in the SBBB model: there is no persistence in economic status after controlling for innate ability. In other words, social mobility is perfect. Hosseini et al. (2013) find an analogous result, which they call the “resetting” property, in the context of an optimal contract with private information. We derive a version of these results in Section 2 below.

Due to some arguably unrealistic predictions of existing altruistic models with endogenous fertility – namely lack of inequality, lack of persistence and/or a positive response of fertility to income – most of the existing literature on inequality either: (i) abstracts from endogenous fertility decisions; or (ii) departs from the assumption that parents are purely altruistic and exhibit instead certain type of warm glow altruism (e.g., De la Croix and Doepke, 2003; Sholz and Seshadri, 2007). Both approaches are convenient for multiple purposes but unsatisfactory for others. For example, by ignoring issues of fertility the recent literature on inequality is silent about the documented strong association between fertility, inequality and poverty, an association that has been used to support family planning programs around the world (e.g., Chu and Koo, 1990). Furthermore, warm glow altruism is unsatisfactory when addressing issues of policy evaluation and optimal policy design because it introduces, by assumption, inefficiencies at the household level (Kaplow and Shavell, 2001).

An older literature on the topic of inequality and fertility, one that mostly abstracts from savings, inter vivos transfers and bequests, shows that systematic differences in fertility rates among income groups affect the observed distribution of incomes. This literature includes authors such as Lam (1986, 1997), and Chu and Koo (1990). A parallel literature focuses on the relationship between fertility and wealth. In an early paper, Menchik (1979) examines the relationship between the material wealth held by parents and that held by their children in the US by using probate records from Connecticut. He finds that this relationship significantly varies with family size, in particular the “median child–parent [terminal] wealth ratio in one-child families was 1.84; the median in families with three or more children was between 0.6 and 0.9; and the median in two-child families was exactly 1.” (p. 351). More recently, Sholz and Seshadri (2007) use the Health and Retirement Survey to provide suggestive evidence that children may have an effect on wealth accumulation and dispersion. They show that net worth as a percentage of lifetime earnings is declining with children once a family has two children. In particular, the median is 11% for families with two children, while it is about 9.5% for families with three to four children, and below 8% with five children.

This paper revisits the relationship between fertility, savings, long run inequality and social mobility in economies populated by altruistic individuals. Since pure altruism is at the core of modern macroeconomics, a field that builds extensively on the dynastic model, it is natural to wonder if pure altruism is ultimately inconsistent with key stylized facts regarding social mobility, the distribution of earnings, income, and wealth, as well as evidence of fertility declining with income (Jones and Tertilt, 2008).³ We consider various ways to recover inequality and persistence in BBB models, as well as conditions to replicate a negative fertility–income relationship. We are able to show that, under very natural conditions, pure altruism can generate the degree of inequality and persistence as well as the negative fertility income relationship suggested by the data. To the extent of our knowledge, our BBB model is the first altruistic model to get these predictions right.⁴ Our analysis implies that altruism is ultimately consistent with empirical evidence of fertility and inequality, and it provides tools for researchers and policy makers to fully incorporate considerations of fertility and family size into the analysis of inequality.

The model we analyze features individuals who live for two periods: as a child and as an adult. Individuals start adulthood with a level of earnings ability and a level of transfers they receive from their parents. We refer to these transfers as “bequests” although more precisely they represent the present value of all the resources individuals receive from their parents during adulthood. We also refer to these bequests as “wealth” as they represent a measure of dynastic wealth. Adults in the model consume and decide on the number of children. Raising children involves a time cost and a “goods cost” given by the bequests. Earning abilities are random and persistent, drawn from a first order Markov process. The labor supplied by an individual is determined by the number of children.

We derive some theoretical results and calibrate the model. We rely on the Panel Study of Income Dynamics (PSID) in order to compute a number of calibration targets regarding intergenerational persistence and inequality. We also use

³ In Córdoba and Ripoll (2014) we address other issues of altruistic models of endogenous fertility besides inequality.

⁴ Alvarez (1999) considers some of these possibilities in theory. His main focus is on the intergenerational persistence of wealth. Our contribution is to provide a quantitative exercise. We uncover additional issues with the persistence of earnings, which have not been previously documented.

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