Mobility and Fertility

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ABSTRACT. The gap in recent fertility rates between the United States and Western European countries is puzzling. This paper proposes an explanation for this gap: the difference in beliefs regarding intergenerational economic mobility. In the United States, a higher proportion of people believe that hard work, rather than one's birthright, produces economic success. This may cause them to invest differently in their children, and also to have more children than European couples. A model is presented to demonstrate the link between mobility and fertility. Individual level data from three different surveys are examined for support of the argument.

1. MOTIVATION

This paper presents and examines the argument that the difference in beliefs regarding intergenerational socioeconomic mobility between the United States and Western Europe is related to the cross-sectional difference in fertility between the two regions.

The total fertility rate in the United States has generally been higher than that of Western European countries for the period[1] since 1950. Current Western European fertility rates are between 1.22 and 1.8 (see Table 1), while the United States' fertility rate in 2000 was 2.05[2],[3].

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[1]The period where some southern European countries have higher fertility than the U.S. corresods to a period where U.S. fertility was declining after the baby boom and before 1980. The baby boom in Europe is generally viewed to have taken place later than in the U.S., if at all.

[2]Sources used for these fertility data are the European Commission (Costello [8]) and RAND (DaVanzo and Adamson [9]).

[3]Fertility rates vary among different ethnic groups in the United States, as well as across native born and non-native born women. The fertility rates of white non-Hispanic and native born women are lower than for other groups. Even so, the implied number of children per women ages 40-44 according to the 2000 U.S. census is still about 1.87, compared to 1.91 for all races. That rate is still higher than that of Western European countries.

Both regions have native fertility below the replacement rate of 2.1.

The notion that the United States' society is exceptional in its values and beliefs, including those regarding mobility, is well-known. Further, it has been proposed by others that this American exceptionalism translates into differences in social and economic outcomes[4]. A simplified view of this exceptionalism is the following: America is the land of opportunity, in which it is believed that anyone can achieve socioeconomic success through hard work. On the other hand, in Europe there is a belief that one is born into one's lot in life, and that socioeconomic mobility is not the norm.

In Section 2 a formal model demonstrates the mechanism whereby differences in individuals' mobility beliefs would lead to a difference in fertility choices. An empirical examination follows, of the model's implications for the relationship between mobility beliefs and fertility. In Section 3 the data to be used, from three different surveys, are described. The empirical strategy is presented in Section 4, while in Section 5, the findings are discussed. Section 6 concludes.

2. THE LINK BETWEEN MOBILITY BELIEFS AND FERTILITY CHOICE

The mechanism linking mobility beliefs and fertility choice is first briefly summarized, and then formalized.

Assume that parents are altruistic, in that they care about the future income of their offspring. They will spend income to raise their children, but they may also invest in order to provide a future source of income for their children. Investment may occur in one of two ways: either they may invest in a physical capital market, or they may invest in human capital accumulation.

Regarding the latter type of investment, it will be assumed that human capital accumulation for each child is determined by the quality of the neighborhood in which parents choose to live, and that the value of a house is increasing in equilibrium in the neighborhood quality. The reduced form version of these relationships specifies that human capital accumulation is increasing in the level of investment in housing[5]. To the extent that there is a possibility of mobility, human capital accumulation allows a child to move up (or down) the socioeconomic ladder via the children's future wages. Mobility and mobility

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[4]See Lipset [18] and Alesina, Glaeser and Sacerdote [1].

[5]The house price that parents can afford is assumed to be a function of their lifetime income. In this way, human capital accumulation will be dependent upon parents' lifetime income. A simplified version of the model by Epple and Platt [12] suggests such a link.

beliefs will be defined precisely, using the model presented below.

Models in which the value of a house is increasing in its neighborhood quality in equilibrium include those of Benabou [6] and Epple and Platt [12]. Neighborhood quality includes educational quality of local public schools, and neighborhood effects that will determine the level of accumulation of human capital for their children (see Benabou [6], [7] and Durlauf [10]). An appropriate motivation is that public education is provided for free to all children, but that neighborhood effects interact with education to determine the quality of that education, and human capital accumulation is thus determined by parents' housing location choice[6]. The default is that parents accept housing with the lowest neighborhood quality possible. However, they may choose to pay a premium in order to improve their neighborhood quality.

The question of neighborhood choice and human capital accumulation has been most extensively studied using the U.S. experience. Recent evidence from the United Kingdom[7] also finds correlation between housing prices and local school quality, suggesting some neighborhood quality investment behavior (Leech and Campos [17] and Rosenthal [23]).

The critical difference between the two types of investment, in human or physical capital, is as follows. Increasing the number of children will decrease the contribution to each child's income if parents invest in a physical capital market to provide their children with interest income. However, investment in housing, in order to provide a level of educational quality and neighborhood effects commensurate with the housing value, is assumed to provide the same level of human capital accumulation to each child, no matter how many children one has[8].

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[6]In Western Europe and the United States, the vast majority of children receive primary and secondary education in the public system.

[7]Because of the evidence regarding the United Kingdom, it would be of interest to use the British Social Attitudes Survey (BSAS). However, the questions in that survey do not appear sufficient to determine the number of children each respondent has. The International Social Survey Programme data suffers from the same problem for most years and countries, including the British data that is derived from the BSAS.

[8]This assumption seems strong because it implies increasing returns in housing investment's effect on children's human capital. However, for the purposes of formalizing the difference between the two types of investment, it is not necessary that there will be no decrease in human capital accumulation as one has more children under the housing investment case. It is only necessary that the effect of the decrease be less severe than in the physical capital investment case. To put it another way, it is necessary that there be some fixed cost aspect to neighborhood quality, so that at least part of neighborhood quality is

In this setting under standard assumptions, if a parent's beliefs about the possibility of mobility are sufficiently high that he chooses human capital accumulation for his children, then the number of children chosen will be larger than if the parent were to invest in a physical capital market to provide income for his children. Because beliefs about mobility differ across countries, the choice between these two types of investment may differ across countries, with resulting variations in fertility.

The model presented next does not capture every important fact regarding fertility trends; it is constructed to demonstrate how beliefs about mobility can affect fertility at a point in time. The model is based on that of Becker and Tomes [5] and Becker and Lewis [4].

Assume each household has a utility function of the form:

$$u = u\left(n, w, y\right)$$

where n is the number of children the household raises, w is the future income of each child, and y is the consumption of a composite good. Children within a household are assumed homogenous. This utility function includes quantity and quality of children, as understood by Becker and Lewis [4] and Becker and Tomes [5].

Parents can choose between two types of investment in the future income of each child. The first is to purchase physical capital, in order to provide capital income q to each child. The second option is to invest in housing, to provide a wage income via human capital investment s. Human capital is accumlated through public schooling and neighborhood effects. These two options are assumed mutually exclusive. Relaxing this assumption introduces complication without significant new insight[9].

If physical capital investment is chosen, then $w = q$. If public schooling investment is chosen, then $w = \alpha\left(s + e\right)$. The parameter e, called an endowment, captures the

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paid for per house rather than per square foot.

[9]Another option not described here is that of private education. One could, with trivial alteration, interpret the capital investment choice as one of private schooling. A more substantive treatment of private schooling is possible, but is left beyond the scope of this paper for the following reasons.

The matter of private school is of some interest in the US, where private school enrollment constitutes about 10% of all primary and secondary school enrollment. In the Western Europe, private school attendance is typically less than 2%. Even schools that are called private are actually largely publicly funded. Therefore, the matter of private school choice is viewed to be of second order importance in terms of fertility choice.

child's characteristics not determined by parental investment in schooling that affect the child's future wage income. These characteristics include the child's effort, motivation, and innate ability, and are assumed exogenous to parental household choices[10]. The parameter $\alpha \in (0, \bar{\alpha}]$ represents the degree to which parents perceive that a child's future income is responsive to her characteristics and parental investment in human capital[11]. If $\alpha = \bar{\alpha}$ then parents perceive that these characteristics determine future income to the fullest extent possible. As α decreases, parents perceive that a given investment and .endowment has a smaller effect on future income. A high α is interpreted as a strong belief in mobility, and a smaller α is interpreted as a weaker belief in mobility.

If the household chooses to purchase physical capital for each child, then the household's budget constraint is

$$p_y y + p_n n + p_q q n = I \tag{1}$$

where I is the household's income, p_y is the price of y, p_n is the price of raising a child[12], and p_q is price of capital purchased to provide a future income for each child. Thus, $p_q q n$ is the total amount spent on capital for all children.

If the household chooses to purchase housing that determines s, then the household's budget constraint is

$$p_y y + p_n n + p_s s = I \tag{2}$$

where p_s is the price per unit of human capital attained via schooling and neighborhood effects.

The specific utility function to be used for the analysis to follow is:

$$u = \varepsilon \ln y + \beta \ln w + \lambda \ln n$$

where $\varepsilon > 0$, $\beta > 0$, and $\lambda > 0$.

From inspection it is clear that for λ sufficiently low or ε sufficiently large, having no children may always be best, even in comparison with the neighborhood investment

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[10]The parameter e is left out of the w expression when capital investment is chosen, because its interpretation there is not clear, and for simplicity. The results of interest are not dependent on this exclusion.

[11]Note that it is the parent's belief that matter here, for it is based on that belief that his investment and number of children choices will be made. However, there is no distinction made between is believed and what is; there is no reason to think that beliefs about mobility do not reflect actual conditions faced.

[12]This consumption includes food, clothing, physical housing space, and related items needed to raise a child.

choice. The way we proceed to determine the number of children is to first ask, taking as given the choice to invest in the physical capital market, what is the optimal number of children? It is straightforward to show this is

$$n^* = \frac{(\lambda - \beta) I}{(\varepsilon p_y + \lambda) p_n}. \tag{3}$$

The optimal level of capital per child is

$$q^* = \frac{\beta}{(\lambda - \beta)} \frac{p_n}{p_q}. \tag{4}$$

Next, taking as given the choice to invest in human capital, the optimal number of children is

$$n^{**} = \frac{\lambda e p_s}{p_n (\varepsilon p_y + \lambda + \beta)} + \frac{\lambda}{p_n (\varepsilon p_y + \lambda + \beta)} I. \tag{5}$$

The optimal level of human capital is

$$s^{**} = \frac{1}{(\varepsilon p_y + \beta)} \left[\frac{\beta}{p_s (\varepsilon p_y + \lambda + \beta)} [I (\varepsilon p_y + \beta) - \lambda e p_s] - e \varepsilon p_y \right]. \tag{6}$$

It is clear by examination of (3) and (5) that $n^{**} > n^*$. Given a level of income I, the optimal number of children, assuming the choice to invest in schooling, exceeds the optimal number of children assuming the choice to invest in capital.

An aside: as Becker and Tomes [5] demonstrate, this model can be interpreted as consistent with evidence that the income elasticity of the number of children is negative. They show this is true in their model over some range of incomes, for an appropriate definition of income and holding shadow (rather than observed) prices fixed. Galor and Weil [13] provide discussion of the evidence. While the literature on the demographic transition focuses on the change in fertility over time in Western economies, this paper focuses on cross-sectional differences in fertility in recent years. Becker [3] states that while in the nineteenth century a negative relationship developed between the number of children and wealth in Western economies, in the twentieth century the evidence is mixed. Recent evidence of a negative cross-sectional relationship is found in U.S. 2000 census data (Bachu and O'Connell [2]). This matter is not the focus of this paper, and has received extensive attention elsewhere, but will be discussed briefly below with the empirical results.

The next step is to describe conditions under which physical capital or human capital investment is chosen. Clearly, human capital investment is chosen if

$$u\left(n^{**}, \alpha\left(s^{**} + e\right), y^{**}\right) > u\left(n^{*}, q^{*}, y^{*}\right) \tag{7}$$

where

$$y^{**} = \frac{I - p_n n^{**} + p_s s^{**}}{p_y}$$

and

$$y^{*} = \frac{I - p_n n^{*} + p_q q^{*} n^{*}}{p_y}.$$

To repeat, $n^{**} > n^{*}$. The relative size of y^{**} and y^{*} is ambiguous, as is the relative size of $\alpha\left(s^{**} + e\right)$ and q^{*}. Crucially, for α sufficiently large, (7) can hold for a given set of parameter values and I, even if $y^{**} < y^{*}$. It is this result that forms the basis of the empirical study. The details of this argument are placed in Appendix B.

In sum, if mobility is sufficiently low, then capital market investment is chosen and n^{*} is the number of children chosen by a parent with income I. However, for α sufficiently high, then housing investment is chosen as the vehicle to provide children with human capital to generate income, and $n^{**} > n^{*}$ is the number of children chosen. That is, if mobility is perceived as low, then fertility is lower than when mobility is perceived as (sufficiently) high.

3. THE DATA

The cross-country differences in fertility and mobility beliefs are provocative, and suggestive of a microeconomic link between mobility and fertility that results in the observed aggregate data. Indeed, the model of Section 2 presents such a microeconomic relationship. A formal examination of the relationship is ideally done using individual level data across countries, using the expressions (3) and (5) as a guide for that work. This examination is pursued next. To begin, the survey data to be used are discussed in more detail.

3.1. Data on Mobility Beliefs. Before delving into the survey questions to be used, it is important to define clearly what is meant by a belief in mobility. This definition is used to choose and interpret questions that might ask about mobility. Once the concept of a belief of mobility is characterized in relation to the model of Section 2, it becomes clear that finding questions that ask about mobility requires some care.

As stated above, the parameter α in the model of Section 2 represents the return to human capital, s, and individual characteristics, e, that parents anticipate for their children. It is presumed now that parents' views on the size of the return to human capital and individual charactersitcs are informed by their views on mobility. That is, questions regarding mobility beliefs can be interpreted as questions concerning the return to s or e, or the absence of return to either. In this way, the size of α is dependent on mobility beliefs.

Mobility is characterized by a change in one's position in an income distribution. The questions about mobility in the surveys thus are couched in terms of the determination of one's position in an income distribution. The model abstracts from an entire distribution by considering one household and taking as given the rest of the distribution. This abstraction simply implies that individual households consider themselves small relative to the entire distribution of households, and allows consideration of the choice of households regarding investment in children and fertility, holding fixed views on mobility.

The factors considered that determine one's position in the income distribution will be assumed to fall into four categories[13]. First is parental choice regarding the type of investment in their children, specifically whether to provide future income for their children by investing in their children's human capital or by investing in a capital market. The second category is each child's innate ability and his choices regarding ambition and effort, controlling for parental influence (through the first category attributes) on those choices. The third category is society's institutional characteristics, such that certain groups have their income distribution position determined (at least partly) by their membership in that group, and that membership is exogenous to the individual[14]. Fourth is the level of parental assets and income, and any associated class-related attributes, such as possession of cultural capital.

Belief in mobility is indicated by views that parental investment in human capital, s, or child characteristics, e, affect one's position in the income distribution. Belief in immobility is indicated by a view that exogenous societal characteristics influence one's

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[13] These categories are not meant to be entirely exhaustive. For instance, some government policies, such as those to redistribute school financing, do not fit into these categories. Consideration of such policies is beyond the scope of this paper. Rather, a universal public education system, with the possibility of local differences in quality, is assumed.

[14] Obvious examples of exogenously determined groups are those of ethnicity and gender.

position in the income distribution. Belief in mobility need not imply that parental income, I in the model of Section 2, be viewed as not affecting future income, w. Indeed, in the model of Section 2, optimal human capital accumulation, s, is dependent on I. Thus, it is appropriate to consider mobility beleifs, indicated by α, controlling for I.

It is possible that views regarding mobility do not differ between the U.S. and Western Europe for the first three categories. It is also possible that the strength of the link between fertility and each of the categories of beliefs is not the same for each of the first three categories.

The next step is to use this concept of mobility beliefs in order to choose survey questions that ask about these views. Each survey question used is intended to proxy for beliefs regarding how one's position, or one's dynasty's position, in the income distribution is determined. Each question is placed into one of the first three categories of beliefs defined above. To repeat, a greater belief in mobility will be associated with one believing more strongly that parental investment in a child's human capital, or that a child's characteristics, affects the child's future position in the income distribution. A greater belief in mobility will be associated with one believing less strongly that exogenously-determined membership in a group affects one's position in the income distribution. These beliefs are evaluated controlling for household income, as suggested by the model of Section 2.

None of the survey questions used in this analysis will perfectly capture any one of the three aspects of mobility beliefs defined above. The questions are viewed as imperfect proxies. Thus, a conservative approach has been taken in choosing survey questions. Each question was either chosen or not chosen for a slightly different reason. In general, the questions not chosen suffered from the problem that the question is asking about mobility and another issue in the same question. This problem can manifest itself in many ways, as a few examples below will make clear. Even the questions that were chosen may confound mobility beliefs with other views, but hopefully to a lesser extent.

The surveys used are the World Values Survey (WVS) directed by Ronald Inglehart, and the International Social Survey Programme (ISSP), and the National Opinion Research Center's General Social Survey (GSS). The questions chosen are detailed in Appendix A. The question, possible responses, survey, years, and countries surveyed are described. Summary of responses for each question is given in Tables 2-5.

One example of the type of question that might be used to document mobility beliefs

is the following, taken from the World Values Survey, which asks respondents to give their view on the following statement:

In the long run, hard work usually brings a better life; or, hard work doesn't generally bring success – it's more a matter of luck and connections. (1=Agree completely with first statement; 10= Agree completely with second statement, 1-10 scale.)

The United States' responses were much more highly skewed toward the hard work end of the scale. Of the U.S. responses, 25.1% (1990) and 26.8% (1995-1997) of the responses were 1, and all but 15.3% (1990) and 19.5% (1995-1997) of the responses were less than 6. By contrast, only 11.5% (1990) and 9.3% (1995-1997) of the European[15] responses were 1, and 36.2% (1990) and 40.3% (1995-97) of the responses were greater than 5.

One question not chosen asks whether the respondent believes that people like the respondent and her family have a good chance of improving their standard of living[16]. This question, and ones similar to it, are asked in all three surveys. The problem here is one of endogeneity. A working assumption in this study is that mobility beliefs at the time the total number of children to have is chosen are not dependent upon the number of children one already has. That is, the causality is assumed to run in one direction. However, this question suggests that one's own family structure might affect actual mobility. That possibility is not inconsistent with the causality assumption, but the question is asking about something that falls outside of the model of Section 2, and the definition of mobility beliefs above.

Another question not used asks whether differences in social standing are acceptable because they reflect what people made out of opportunities they had[17]. This question implicitly asks two things: whether difference in status is acceptable, and what causes that difference. The latter is of interest to the study of mobility beliefs. However, one might believe that the difference is caused mainly by what people made out of opportunities, but not believe that such difference is acceptable if opportunities themselves differ across

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[15] The European countries that included this survey question are: Austria, Belgium, Britain (mainland), Northern Ireland, Denmark, Finland, France, West Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland. Of those countries, only Norway and Switzerland are not in the territory of the European Union. Of the EU countries, only Greece is missing.

[16] The question referred to is ISSP 1992 v17, and GSS GOODLIFE. A similar question is GSS KIDSSOL, that asks the respondent to compare her standard of living to that she believes her children will enjoy at her age.

[17] This question is GSS USCLASS7.

people. Interpretation of responses is thus difficult.

The questions chosen to proxy for views on whether parental investment in a child's human capital affects one's position in the income distribution all ask about the importance of education. A necessary caveat becomes clear in the context of the model presented in Section 2. One may think that education is important, but also believe that education is determined at least in part by parents' characteristics - namely, their assets and income. As was described above, mobility beliefs are defined to take as given parents' characteristics. The response to the questions may not suggest the respondent's belief about whether education, taken as given, affects one's income. Instead, the response may suggest whether the respondent believes that parents' characteristics affect one's position. This question may thus be asking about views on an aspect of equality of opportunity rather than mobility[18]. In light of this issue, a nice feature of the model of Section 2 is that it implies that questions about a child's characteristics, e, are just as useful as those those that ask about human capital accumualation, s, for gauging the size of mobility beliefs.

3.2. Other Data. As was stated in Section 1, questions from three different surveys are used to study the relationship between mobility beliefs and fertility choice. Data from Western economies were drawn from the ISSP and WVS surveys, while the GSS contains only United States data[19]. A variety of topics are covered in the questions, such as political activism, child-rearing, religious beliefs, and women's rights. Demographic variables such as the respondent's age, sex, income bracket, socioeconomic status, and education level are also collected. The samples are intended to be nationally representative of adults over 18, with weighting of certain groups[20]. Unfortunately, not every question was collected for each individual in each wave.

In order to examine whether there is an empirical link between mobility beliefs and fertility choice, the issue of timing must be considered carefully. Mobility beliefs are taken to be a low frequency variable, but it is not inconceivable that one's mobility beliefs at 65 may differ from those 25 years earlier. The population studied here is people at the

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[18]See Roemer [22] for a definition of equality of opportunity.

[19]Non-Western economies' data was not included in the study. This is largely because the model of Section 2 pertains to developed economies, and its wider applicability is not clear. There are also potentially serious sampling problems with some of those surveys.

[20]The oversample of blacks in the 1982 and 1987 waves of the GSS were not included.

end of the reproductive cycle. One reason to focus on this population group is that of interest here are mobility beliefs during the period in which final fertility decisions are made. Such decisions are assumed to be made toward the end of one's reproductive cycle. Also, people at their end of their reproductive cycle will report completed fertility. This gives consistency in the interpretation of the reported number of children. It is obviously more straightforward to identify females who are at the end of their reproductive cycle than males. Females between the ages of 35-44 are therefore the population studied[21]. There is another reason to use only females: they are less likely to misreport the number of children they have had than are males.

In addition, only married women are included in the analysis. The reason is two-fold. Interpreting reported household (or family) income across married people is straightforward; it can be taken to include the incomes of both spouses. Comparing that to reported household income of cohabiting adults or single adults with children is more difficult. For instance, a cohabiting woman may report only her income as her household income if she considers herself financially independent of her partner, and thus constituting her own household. Errors in the calculation and interpretation of household income are avoided by including only married women living with their spouses[22]. A downside to this restriction comes from the fact that rates of marriage are historically low and rates out-of-marriage births are historically high in the countries studied. An increasingly significant group of the population is thus excluded from the study[23].

There are three types of questions for the surveys that are of particular interest here. Questions on mobility, questions on the number of children each individual has ever had, and questions regarding income and related demographic variables. Tables 5-8 provide summaries of the responses to each non-mobility question used, in each country where

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[21]The best age range to use could be debated. This age range was available for all three surveys, and in some cases a narrower range was not constructable.

[22]This restriction also made it possible to deduce and provide a check for the number of children in the ISSP 99 survey. The questions used to calculate the number of children were two questions, one regarding the number of persons in the household and one question about the number of children in the household. It was assumed that the children in the household were the respondent's. Without the restriction to married women, that survey could not have been used.

[23]For the ISSP92 survey, 370 out of 506 females between 35 and 44 were married. For the WVS survey waves 2 and 3, 2596 out of 3199 females between 35 and 44 were married. In both surveys, the mean number of children across all females 35-44 and only the married people were similar (1.96 v. 1.83 and 2.33 v. 2.30, respectively).

the question was asked, are provided at the end of the paper.

Two waves of the ISSP are used, from 1992 and 1999. Data from each wave must be analyzed separately, since the questions used in the analysis to follow were not asked in both waves. The countries available from the 1992 survey are Austria, West Germany and the United States[24]. The countries available from the 1999 survey are Canada, West Germany, New Zealand, Norway, Portugal, Spain, Sweden, and the United States. The WVS survey waves used are from 1990 and 1995-97. The countries available are Australia, Denmark, West Germany, Norway, Spain, Sweden, Switzerland, and the United States. The GSS survey waves occur between 1972 and 2000. Different questions were asked in different waves, and thus the years available and number of observations will vary between questions (see Appendix A).

The questions used to determine the number of children are as follows. The GSS variable CHILDS asks "How many children have you ever had?" The ISSP92 survey question v171 in West Germany and Austria asks, "How many kids do you have?" In the United States the question asks for the number of children in the household[25]. The ISSP99 survey asks two questions used to construct the respondent's number of children. The first asks, "How many persons are there in your household?" with possible responses between 1 and 25 (HOMPOP). The second asks about household composition, and respondents report the number of adults and children in their household (HHCYCLE). Along with using only married females, I use only respondents reporting exactly two adults with zero or more children for HHCYCLE, in order to calculate the number of children of each respondent.

In both the ISSP99 survey, and possibly the ISSP92, United States responses, the number of children is the number of children in the household rather than the number of children the respondent has ever had. The alternative to using this variable was to not use the surveys at all. In using the surveys, the implied assumption is that married women between 35 and 44 in a two-adult household live with their children, and don't live

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[24]The constraining factor in the number of countries for this survey was that these were the only countries for which there was a question about the number of children one had. There was no reliable way to deduce the number of children for individuals from other countries.

[25]The ISSP uses the GSS as its source for the United States data. The United States questionnaire does not have the demographic questions listed. Therefore, it is possible that the codebook misreports the question asked, and that in fact CHILDS was the variable used.

with anyone else's children. The distribution of the number of children for the ISSP99 survey is similar to that of the other surveys.

The WVS survey v90 asks, "Have you had any children? If yes, how many?" The WVS survey, for reasons which I have not been able to uncover, appears to have recorded those who said they have no children as missing values. In the context of our model, this is not terribly problematic since the expressions (3) and (5) could literally apply only to those with a positive number of (optimal) children. However, this does distinguish the WVS data from that of the other surveys.

In Section 3.1 three categories were introduced to encompass different aspects of mobility beliefs. Those categories are repeated here for convenience. The first category has to do with the question: to what extent does a parent's investment in a child's human capital affect the child's future wages? The second category contains questions asking: to what extent does a person's effort, ambition, or ability affect her wages? The third category contains questions asking: to what extent does membership in an exogenously-determined group affect one's wages? As was explained, the survey questions used are imperfect proxies for each category of question, but the approach taken was to use the least imperfect questions.

The categories of questions can be interpreted in light of the parameterization of Section 2. Questions pertaining to the second, third and fourth categories about about how large α is. That is, the effect of one's characteristics and choices and society's characteristics on wages are thought of as acting via α.

4. EMPIRICAL STRATEGY

The main result of the model in Section 2 is that the number of children a parent has, holding income fixed, is increasing in mobility beliefs, but according to a threshold. In particular, if α is below some threshold α^*, then capital investment is chosen to provide future income to a household's children. The optimal number of children is

$$n^* = \frac{(\lambda - \beta) I}{(\varepsilon p_y + \lambda) p_n}.$$

Otherwise, housing investment is chosen and the optimal number of children is

$$n^{**} = \frac{\lambda e p_s}{p_n (\varepsilon p_y + \lambda + \beta)} + \frac{\lambda}{p_n (\varepsilon p_y + \lambda + \beta)} I.$$

The mobility beliefs represented by α are assumed to correspond to a specific mobility

belief question and possible responses in the following way. Considering one question at a time and each possible response $i \in [1, 2, ..., R]$ to that question, a dummy variable m_{ij} is defined for each individual j such that $m_{ij} = 1$ if individual j gives response i to the question, and $m_{ij} = 0$ otherwise. Assume that the mobility beliefs of individual j can be represented as:

$$\alpha_j = f(m_{ij}, \ i = 1, 2, ..., R).$$

Specifically, the function $f(\cdot)$ and the ordering of dummies m_{ij} is such

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\begin{aligned}
\alpha_j &= \delta_1 \text{ if } m_{1j} = 1 \\
&= \delta_2 \text{ if } m_{2j} = 1 \\
&\quad\ ... \\
&= \delta_R \text{ if } m_{Rj} = 1
\end{aligned}
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where $\delta_1 < \delta_2 < ... < \delta_R$. The size of δ_i corresponds to the strength of mobility beliefs. Define $\delta^* \equiv \alpha^*$. Then, for an individual j, the choice between the two types of investment and the number of children to is rewritten as:

$$n_j^* = \frac{(\lambda - \beta)}{(\varepsilon p_y + \lambda) p_n} I_j \text{ if } m_{ij} = 1 \text{ such that } \delta_i < \delta^*; \text{ or} \tag{8}$$

$$n_j^{**} = \frac{\lambda \bar{e} p_s}{p_n (\varepsilon p_y + \lambda + \beta)} + \frac{\lambda}{p_n (\varepsilon p_y + \lambda + \beta)} I_j \text{ if } m_{ij} = 1 \text{ such that } \delta_i \geq \delta^*. \tag{9}$$

Two necessary simplifying assumptions are implicit in the above expressions. The first is that e does not vary with j. This assumption can be justified in the following way. Assume that households cannot, at the time of their fertility decision, observe their child's level of effort will be, her will power, or her innate ability. They do, however, know the distribution of the parameter e, and specifically its mean, $\bar{e}$. Thus, parents use $\bar{e}$ as a measure of the expected endowment.

The second simplifying assumption is that α^* does not vary with I. In fact, the model in Section 2 suggests that α^* will vary with I. The threshold α^* is defined such that given I and exogenous parameter values,

$$u(n^*, q^*, y^*) \mid_{\alpha^*} = u(n^{**}, \alpha(s^{**} + e), y^*) \mid_{\alpha^*}.$$

A slightly weaker, and sufficient, assumption makes use of the discreteness of the mobility question responses, and is as follows. The threshold α^* can vary across individuals,

but lies between the same two possible responses, i' and i'', for each individual j. The model is not estimable without this assumption. The cost in terms of the clarify of our inferences is only in terms of negative results. That is, if mobility beliefs do not appear important empirically in that a threshold δ^* cannot be identified, that could be either because mobility beliefs are not an important factor in fertility choice *or* because the relevant threshold varies widely across income groups. However, if the empirical results suggest that mobility beliefs are empirically important for fertility, that implies that the assumption that δ^* does not vary widely across income groups is not costly.

The next step is to write a single estimable equation. Rewrite (8) and (9) as

$$n_j = \hat{\beta} d_j + \hat{\lambda} I_j + \left[\tilde{\lambda} - \hat{\lambda} \right] d_j I_j \tag{10}$$

where n_j is individual j's optimal number of children, $\hat{\beta} = \frac{\lambda \bar{e} p_s}{p_n(\varepsilon p_y + \lambda + \beta)}$, $\hat{\lambda} = \frac{(\lambda - \beta)}{(\varepsilon p_y + \lambda) p_n}$, $\tilde{\lambda} = \frac{\lambda}{p_n(\varepsilon p_y + \lambda + \beta)}$. The dummy variable $d_j = 1$ if $m_{ij} = 1$ such that $\delta_i \geq \delta^*$ and $d_j = 0$ otherwise. Making use of the discrete response structure, the equation (10) can be rewritten as

$$n_j = \sum_{i=1}^{R} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=1}^{R} \left[\tilde{\lambda} - \hat{\lambda} \right]_i m_{ij} I_j$$

where $\hat{\beta}_i = 0$ if $\delta_i < \delta^*$ and $\hat{\beta}_i = \hat{\beta}$ if $\delta_i \geq \delta^*$. Similarly, $\left[\tilde{\lambda} - \hat{\lambda} \right]_i = 0$ if $\delta_i < \delta^*$ and $\left[\tilde{\lambda} - \hat{\lambda} \right]_i = \left[\tilde{\lambda} - \hat{\lambda} \right]$ if $\delta_i \geq \delta^*$. This, in turn, is equivalent to the expression

$$n_j = \sum_{i=i^*}^{R} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=i^*}^{R} \left[\tilde{\lambda} - \hat{\lambda} \right]_i m_{ij} I_j \tag{11}$$

where i^* corresponds to the i such that $\delta_{i^*} = \delta^*$. Note that $\left[\tilde{\lambda} - \hat{\lambda} \right] = 0$ if $\beta = 0$, and $\left[\tilde{\lambda} - \hat{\lambda} \right]$ decreases toward zero as β decreases toward zero.

The model determines the optimal number of children chosen, which is a continuous variable. What is observed is the actual number of children, which is a discrete variable censored at zero. It is assumed that the observed number of children $\hat{n}_j$ is chosen based

on the optimal number of children in the following way:

$$\hat{n}_j = 0 \text{ if } n_j \leq \mu_1$$

$$\hat{n}_j = 1 \text{ if } \mu_1 < n_j \leq \mu_2$$

$$\hat{n}_j = 2 \text{ if } \mu_2 < n_j \leq \mu_3$$

$$....$$

$$\hat{n}_j = N \text{ if } \mu_N \leq n_j$$

where μ_n represent cutoff values that are to be estimated, and N is the maximum number of children any household has[26].

An ordered probit model is therefore a natural candidate for the estimation[27]. The results reported are based on the ordered probit formulation, which assumes that

$$n_j = \sum_{i=i^*}^{R} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=i^*}^{R} \left[\breve{\lambda} - \hat{\lambda} \right]_i m_{ij} I_j + \epsilon_j \tag{12}$$

where $\epsilon_j \sim N(0,1)$.

Other variables are controlled for in the estimation, and are assumed to enter into the fertility decision independently of the investment decision and mobility beliefs. These variables include the respondent's own education level (all surveys), a wave (WVS) or trend (GSS) variable, country dummies (ISSP and WVS), and other identifying dummies for the GSS data. The dummies used in the GSS data analysis are for self-reporting as racially black (raceblack), racially non-white and non-black (raceother) and not native born (notnative). Regional dummies were tried, but they were not found highly significant. The small number of observations (under 100), for most of the GSS mobility variables used, make parsimony particularly desirable.

Because the respondent's household income and education level are both choice variables, they needed to be instrumented. Negative binomial regressions were used to instrument both variables. The exogenous variables from the second stage regression, the mobility indices and exogenous demographic variables were used. Additionally, variables proxying for parents' socioeconomic status were also used as instrumental variables. The

---

[26]The survey questions usually allow responses up to 8 or 9 children, though for most of the regressions, the maximum number of children reported across the sample is strictly less than 8.

[27]Negative binomial and poisson models were also estimated. Those results are not reported here, as the fits of those estimations were weaker than that of the ordered probit model.

exact variables used vary between surveys, depending on availability, and are summarized in Tables 5-8.

For the ISSP92, the father's occupation, the father's education, and the mother's education were used. Father's occupation when the respondent was 15 or 16 is coded according to the ISCO 1968 classification. Father's and mother's education are given by 3 categories of level of schooling completed.

For the ISSP99, the father's occupation, the father's education, the mother's education, and the number of books at home when the respondent was 15 were used. The father's occupation when the respondent was 16 is coded according to the ISCO 1988 classification. Father's and mother's education are given by 7 categories of level of schooling completed.

For the GSS, the father's and mother's education are used. Data on father's occupation is available, but is not consistently collected across all waves. Some of the mobility questions, already with small numbers of observations, would have to be examined with a structural break that has no meaning. Father's occupation is therefore not used as a proxy for parents' socioeconomic status. Father's and mother's education are given by United States-specific measures of the level of schooling.

For the WVS, no questions about parents' occupation or education are asked. Therefore, the following two exogenous variables are used as instruments instead. One is whether the respondent was brought up religiously at home or not (v180). The second is a variable of the average occupation classification of the chief wage earner (derived from v224) of the household of females 65 and older at the time of the survey, and in the same income decile and country as the respondent. This variable is not a choice variable of the respondent but is correlated with the respondent's reported household income decile. It is therefore an appropriate instrument.

Because instruments are used for income and education, standard errors on the ordered probit regressions are not correct. Bootstrapping has been used to construct bias-constructed confidence intervals for each variable. The estimated coefficients from the original regression are reported, as they are consistent under appropriate assumptions.

The framework for the estimated threshold equation is represented as follows. The ideal number of children of an individual j, n_j^*, is determined by:

$$n_j^* = \sum_{i=1}^{R^T} \tau_i m_{ij} + \mu_2 C_I \left(\hat{Y}_j \right) + \mu_3 C_E \left(E_j \right) + \sum_{d=1}^{D} \omega_d x_{dj} + \epsilon_j$$

where R^T is the threshold response for the mobility question used; $C_I(I_j)$ is the response of individual j regarding her category of income; $C_E(E_j)$ is the category of individual j's education level; d indexes dummy variables $[1, D]$ and x_{dj} is a dummy indicating respondent's j relevant characteristic.

5. ESTIMATION RESULTS

The regression results are presented in Tables 9-20 at the end of the paper. The tables present the estimated coefficients and bias-corrected bootstrapped confidence intervals for each estimated coefficient. Both the full regression results, with mobility indices, and the threshold regression results, which just includes the mobility indices above or below the significant threshold, are presented. Where an interaction variable between income and mobility indices was used in the threshold regression, the full regression with interaction is also presented.

The threshold regression was determined through guidance from the full regression. In all cases, only one significant threshold (in terms of the confidence intervals) was identified for each mobility question. For many of the regressions, the coefficients on the interaction between mobility and income were not significant.

In an ordered probit regression, the estimated coefficients are not marginal effects. The marginal effect of a change in an independent variable on the dependent variable must be calculated separately. As a reminder how to interpret the coefficient estimates of the regressions, note that the ordered probit model implies that, for instance, based on (12) above,

$$
\begin{aligned}
\Pr(\hat{n} = 1) \;=\; & \Phi\left[\mu_2 - \left(\sum_{i=i^*}^{I} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=i^*}^{I} \left[\tilde{\lambda} - \hat{\lambda}\right]_i m_{ij} I_j\right)\right] \\
& -\Phi\left[\mu_1 - \left(\sum_{i=i^*}^{I} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=i^*}^{I} \left[\tilde{\lambda} - \hat{\lambda}\right]_i m_{ij} I_j\right)\right]
\end{aligned}
$$

and

$$
\frac{\partial \Pr(\hat{n} = 1)}{\partial m_{ij}} = \hat{\beta}_i \left\{ \begin{array}{l} \phi\left[\mu_2 - \left(\sum_{i=i^*}^{I} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=i^*}^{I} \left[\tilde{\lambda} - \hat{\lambda}\right]_i m_{ij} I_j\right)\right] \\ -\phi\left[\mu_1 - \left(\sum_{i=i^*}^{I} \hat{\beta}_i m_{ij} + \hat{\lambda} I_j + \sum_{i=i^*}^{I} \left[\tilde{\lambda} - \hat{\lambda}\right]_i m_{ij} I_j\right)\right] \end{array} \right\} \text{ such that } i \geq i^*.
$$

It is the marginal effects of a change in mobility that will be the focus of the results reported.

Because the mobility indices are dummy variables, the interpretation of the marginal effects requires explanation. All marginal effects are calculated at the means of the independent variables. Therefore, the marginal effect calculated is the change in the probability that a randomly chosen person in the population has a certain number of children, if there is a change in the proportion of the population that gives the response indicated by the mobility index dummy. For instance, for ISSP99 v6, $\frac{\partial \Pr(n=0)}{\partial v6e} = 0.05$: the change in the probability that any individual has zero children, if there is an increase in the proportion of individuals who give a response 5 to question v6 is 5.0%.

These marginal effects are given individually for each question in Tables 21-32 at the end of the paper. Additionally, the results are summarized in terms of the three categories of mobility questions described earlier. The reader is referred to that summary Table 33 for consolidated results. In general, the results are as expected and are of the following sort. The probability of zero or one child increases with a decrease in mobility beliefs, and vice versa (ISSP99 v6). The probability of a large (3 or more) number of children increases with an increase in mobility beliefs (GSS OPAMBIT). The switch in the direction of the marginal effect generally occurs between zero and one children, as in ISSP99 v6, or around three children, as in GSS OPAMBIT.

The direction of the changes are consistent with proposed link between mobility beliefs and fertility choice laid out in Section 2 of the paper. Exceptions are GSS OPEDUC and GSS RACDIF3, whose results are difficult to interpret. Both of these questions ask about the importance of education. As was discussed above, these questions are potentially problematic. Respondents may reasonably view education quality and level is partly determined by the level of parental assets, and not hold that effect constant when answering the question. If this is the case, the mixed results of these and the other two questions about education are not surprising.

It is also possible that some categories of mobility beliefs are more important than others. In particular, the questions that ask about the importance of hard work, of which there are 4, together provide consensus in favor of the importance of that type of belief in affecting fertility choice. Nevertheless, in sum, the empirical examination of the twelve questions considered, together provide support for the effect of mobility beliefs on fertility choice in Western economies.

As a side note, the confidence intervals and estimated coefficients on the instruments

for the respondent's household income and education level do not provide a uniform picture about the direction or importance of either variable on the number of children. Household income tends to have a positive effect on the probability of having zero children and a negative effect on the probability of having a large number (5 or more) children, and education tends to have the opposite effect. The interpretation of these results is not a focus of this paper, but are the sort of mixed results that Becker [3] refers to. It may be that correlation between income or education and the number of children does not provide an obvious story of causality. The interaction may be more subtle, whereby another variable (such as mobility beliefs) is responsible for at least part of the correlation.

6. CONCLUSION

This paper proposes an explanation for the recent cross-sectional differences in fertility between the United States and Western Europe. That explanation is rooted in evidence of a difference in beliefs, particularly those regarding intergenerational socioeconomic mobility. The stronger belief in mobility in the United States may account for the larger number of children American women have, relative to Western European women, because of the implications for the types of investments parents will choose in order to ensure their children's future economic well-being.

Extending the logic of this explanation to a time series dimension, one would anticipate that increases in optimism about the economic future would lead to higher fertility, and increases in pessimism would lead to lower fertility. This argument is related to, but distinct from, that of the Easterlin hypothesis put forward by Richard Easterlin [11] that has received considerable attention from sociologists (Mucunovich [19]). That argument, and other arguments put forward in the sociology literature[28] that explores the link between mobility and fertility, proposes that it is the *already experienced* mobility of the parents that affects fertility. Easterlin's hypothesis is related to a Malthusian view of the world. Malthus [20] argued that as economic conditions change for adults, so will their fertility choices. Becker [3] has modelled intergenerational mobility in a setting where it is determined by the level of investment chosen by parents, as well as some family- and period-specific stochastic luck. By contrast, this paper's argument concerns beliefs about mobility prospects for one's children. Furthermore, this paper establishes a link between mobility and fertility via a choice of the *type* of investment in one's children.

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[28]For instance, see Kasarda and Billy [16] and Stevens [24].

This study is part of a larger research program. I will compare empirical support for the hypothesis I have presented with the Easterlin hypothesis and related arguments. Further, I will extend the model presented in this paper to a dynamic setting with heterogenous agents, in order to examine how beliefs about intergenerational mobility affect not only fertility, but also temporal evolution of the income distribution, and welfare effects of income redistribution.

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7. APPENDIX A: MOBILITY BELIEF QUESTIONS

1. Importance of investment in education

    A. We have some questions about opportunities for getting ahead. How important is having a good education yourself? (ISSP92 v6)

    Responses: 1=Essential, 2=Very important, 3=Fairly important, 4=Not very important, 5=Not important at all

    Dataset: ISSP 1992Countries: Austria, West Germany, USA

    B. Please show for each these how important you think it is for getting ahead in life.... Having a good education yourself. (GSS OPEDUC)

    Responses: 1=Essential, 2=Very important, 3=Fairly important, 4=Not very important, 5=Not important at all

    Dataset: GSS 1983-1987

    Countries: USA

    C. I will list reasons some people give to explain why there are poor people in this country. Please tell me whether you feel each of these is very important, somewhat important, or not important in explaining why there are poor people in this country.... Failure of society to provide good schools for many Americans. (GSS WHYPOOR1)

    Responses: 1= Very important, 2=Somewhat important, 3= Not important

    Dataset: GSS 1988-1991

    Countries: USA

    D. On the average, African-Americans have worse jobs, income, and housing than white people. Do you think these differences are because most African-Americans don't have the chance for education that it takes to rise out of poverty? (GSS RACDIF3)

    Responses: 1=Yes, 2=No

Dataset: GSS 1972-2000

Countries: USA

2. Importance of a person's effort or hard work

A. To what extent do you agree or disagree with each statement about getting rewarded: People get rewarded for their effort (ISSP99 v6)

Responses: 1=Strongly agree, 2=Agree, 3=Neither agree nor disagree, 4=Disagree, 5=Strongly disagree

Dataset: ISSP 99

Countries: Canada, West Germany, New Zealand, Norway, Portugal, Spain, Sweden, USA

B. We have some questions about opportunities for getting ahead. How important is hard work? (ISSP 92 v9)

Responses: 1=Essential, 2=Very important, 3=Fairly important, 4=Not very important, 5=Not important at all

Dataset: ISSP 1992

Countries: Austria, West Germany, USA

C. How do you place your views on this scale? 1 means you agree completely with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between. Left statement:In the long run, hard work usually brings a better life. Right statement: Hard work doesn't generally bring success – it's more a matter of luck and connections. (WVS v129)

Dataset: WVS 1990, 1995-97

Countries: Australia, Denmark, W. Germany, Norway, Spain, Sweden, Switzerland, USA

D. I am going to read some statements that give reasons why a person's life turns out well or poorly. As I read each one, tell me whether you think it is very important, important, somewhat important, or not important at all for how someone's life turns out.... Some people use their will power and work harder than others (GSS LFEHRDWK)

Responses: 1=Very important, 2= Important, 3=Somewhat important, 4=Not im-

portant at all

Dataset: GSS 1993

Countries: USA

3. Importance of a person's ambition or motivation

A. We have some questions about opportunities for getting ahead. How important

is having ambition? (ISSP92 v7)

Responses: 1=Essential, 2=Very important, 3=Fairly important, 4=Not very important, 5=Not important at all

Dataset: ISSP 1992Countries: Austria, West Germany, USA

B. Please show for each these how important you think it is for getting ahead in

life.... Ambition

Responses: 1=Essential, 2=Very important, 3=Fairly important, 4=Not very important, 5=Not important at all (GSS OPAMBIT)

Dataset: GSS 1983-1987

Countries: USA

4. Importance of a person's ability

To what extent do you agree or disagree with each statement about getting rewarded:

People get rewarded for their intelligence and skills (ISSP99 v7)

Responses: 1=Strongly agree, 2=Agree, 3=Neither agree nor disagree, 4=Disagree, 5=Strongly disagree

Dataset: ISSP 99

Countries: Canada, West Germany, New Zealand, Norway, Portugal, Spain, Sweden, USA

5. Importance of racial discrimination

On the average, African-Americans have worse jobs, income, and housing than white people. Do you think these differences are mainly due to discrimination? (GSS RACDIF1)

Responses: 1=Yes, 2=No

Dataset: GSS 1972-2000

Countries: USA

8. APPENDIX B: THE CHOICE BETWEEN INVESTMENT TYPES

As stated in the main text, the choice between the two investment types is determined by the relative size of utility under the optimal choices of the number of children and investment level, given income and exogenous parameter values. The choice of investment in housing occurs if

$$u\left(n^{**}, \alpha\left(s^{**} + e\right), y^{**}\right) > u\left(n^*, q^*, y^*\right). \tag{13}$$

That $n^{**} > n^*$ has already been discussed. With respect to y^{**} and y^*, one can calculate their expressions with use of the expressions for the optimal number of children (3), (5); the optimal level of investment (4), (6); and given the appropriate budget constraint (1), or (2). These expressions are

$$y^* = \frac{\varepsilon}{\left(\varepsilon p_y + \lambda\right)} I$$

$$y^{**} = \frac{\varepsilon}{\left(\varepsilon p_y + \lambda + \beta\right)} I + \frac{p_s \varepsilon}{\left(\varepsilon p_y + \lambda + \beta\right)} e.$$

A necessary and sufficient for $y^{**} > y^*$ is

$$p_s e \left(\varepsilon p_y + \lambda\right) > \beta I.$$

Whether this holds depends on the levels of I and the relevant parameters.

Turning next to whether $\alpha\left(s^{**} + e\right) > q^*$, the expressions for s^{**} and q^* are given by (4) and (6). Whether the inequality holds is ambiguous, and depends on the level of I, α, and the other exogenous parameters. However, it is clear that for sufficiently large α, holding all else equal, the inequality will hold. Further, for sufficiently large α it will be the case that

$$\beta \ln\left[\alpha\left(s^{**} + e\right)\right] + \lambda \ln y^{**} > \beta \ln q^* + \lambda \ln y^* \tag{14}$$

for given I and parameter values. This condition, along with the fact that $n^{**} > n^*$, is sufficient for the condition (13) to hold. Note that it is not sufficient for (14) that I becomes large. Also, note that (14) may hold even if $y^{**} < y^*$.