ECONSTOR

WWW.ECONSTOR.EU

Der Open-Access-Publikationsserver der ZBW – Leibniz-Informationszentrum Wirtschaft
The Open Access Publication Server of the ZBW – Leibniz Information Centre for Economics

Berthold, Norbert; Gründler, Klaus

Working Paper

On the empirics of social mobility: A macroeconomic approach

Wirtschaftswissenschaftliche Beiträge des Lehrstuhls für Volkswirtschaftslehre, insbes. Wirtschaftsordnung und Sozialpolitik, Universität Würzburg, No. 128

Provided in Cooperation with:
Julius-Maximilians-Universität Würzburg, Lehrstuhl für Volkswirtschaftslehre, insbes. Wirtschaftsordnung und Sozialpolitik

Suggested Citation: Berthold, Norbert; Gründler, Klaus (2014) : On the empirics of social mobility: A macroeconomic approach, Wirtschaftswissenschaftliche Beiträge des Lehrstuhls für Volkswirtschaftslehre, insbes. Wirtschaftsordnung und Sozialpolitik, Universität Würzburg, No. 128

This Version is available at:
http://hdl.handle.net/10419/102662

Nutzungsbedingungen:
Die ZBW räumt Ihnen als Nutzerin/Nutzer das unentgeltliche, räumlich unbeschränkte und zeitlich auf die Dauer des Schutzrechts beschränkte einfache Recht ein, das ausgewählte Werk im Rahmen der unter
→ http://www.econstor.eu/dspace/Nutzungsbedingungen
nachzulesenden vollständigen Nutzungsbedingungen zu vervielfältigen, mit denen die Nutzerin/der Nutzer sich durch die erste Nutzung einverstanden erklärt.

Terms of use:
The ZBW grants you, the user, the non-exclusive right to use the selected work free of charge, territorially unrestricted and within the time limit of the term of the property rights according to the terms specified at
→ http://www.econstor.eu/dspace/Nutzungsbedingungen
By the first use of the selected work the user agrees and declares to comply with these terms of use.

ZBW Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Mitglied der Leibniz-Gemeinschaft

Bayerische Julius-Maximilians-Universität
Würzburg

Wirtschaftswissenschaftliche Fakultät

On the Empirics of Social Mobility:

A Macroeconomic Approach

Norbert Berthold and Klaus Gründler

Wirtschaftswissenschaftliche Beiträge
des Lehrstuhls für Volkswirtschaftslehre,
insbes. Wirtschaftsordnung und Sozialpolitik
Prof. Dr. Norbert Berthold

Nr. 128

2014

Sanderring 2 • D-97070 Würzburg

On the Empirics of Social Mobility: A Macroeconomic Approach

Norbert Berthold and Klaus Gründler

Bayerische Julius-Maximilians-Universität Würzburg

Lehrstuhl für Volkswirtschaftslehre, insbes. Wirtschaftsordnung und Sozialpolitik

Sanderring 2

D-97070 Würzburg

Tel.: 0931-31-84588

Fax: 0931-31-82774

Email:

klaus.gruendler@uni-wuerzburg.de

On The Empirics of Social Mobility: A Macroeconomic Approach

Norbert Berthold* and Klaus Gründler*

*University of Würzburg, Department of Economics, Sanderring 2, 97070 Würzburg. E-Mail: klaus.gruendler@uni-wuerzburg.de.

September 2014

Abstract

What are the causes of social mobility in a society? Whereas this question is of great interest for both researchers and policymakers, empirical studies concerning cross-country evidence usually suffer from small sample biases as intergenerational income elasticities are only available for a small number of countries.

In this paper, we provide two measures based on widely available macro data enabling the estimation of social mobility for a large number of countries. Based on these measures we empirically explore the determinants of cross-country differences in mobility. It turns out that particularly less segregation, a good family environment, inspiring cognitive brain stimulation in early childhood education, high rates of employment, good opportunities to catch up to the average human capital endowment, low variations in school quality and a high amount of social capital foster social mobility. We further find that the "Great Gatsby Curve" is much less pronounced when analyzing the relationship between inequality and mobility in a large sample of countries.

1 Introduction

Amancio Ortega, whose father was a railway employee, was born the youngest of four sons in Busdongo de Arbás in Spain. At the age of 14 Amancio began his first job as an assistant in a small local clothing company. On the other side of the Atlantic, Jim was also the youngest in his family, born in Newport to one of the richest families in the world. After having successfully completing

his studies at university, he was given a position at his father's company in an effort to continue the family legacy. According to Forbes, today both Amancio Ortega Gaona and Jim Walton are among the ten wealthiest people on earth.

Individual income patterns often differ substantially from one another. In most cases, they are strongly determined by parental income. Yet we also find examples where family income does not seem to matter at all. Corak (2011) reports an intergenerational income elasticity of about 50% for the USA. In other words, around half of the economic advantages and disadvantages experienced by a father during his lifetime are inherited by his adult son. In Germany, this effect is a bit lower at 32 %, but is nonetheless significant. Overall, we observe a large scatter of elasticity of income between generations (or vice-versa, mobility): While Scandinavian countries like Denmark (15%), Norway (17%), or Finland (18%) exhibit a low persistence of income inequality, mobility in Peru (67%), China (60%) and Brazil (58%) is relatively low. The question at hand becomes: Why do these countries differ so strongly from one another?

An observation that has gathered quite a bit of attention in the last three years is the fact that mobility and income inequality seem to be negatively correlated to one another. Mobility is observed to be very high when inequality is low and vice-versa. Not without irony did Alan Krueger name this finding, which builds on the work of Corak (2006, 2011) "the Great Gatsby Curve". While the curve involves some provocative implications for economic policy, until now there has been little empirical research on the drivers behind the differences of social mobility across countries. This is first and foremost due to the fact that for many countries, there is insufficient micro-data existent for the exact measurement of income elasticity. Thus a comparison between economies suffers from sample selection bias, where the limited degress of freedom yield inconsistency in the estimations due to omitted variables.

This paper is an attempt to close the gap in the empirical literature. After a brief overview of the theory of social mobility in Chapter 2, we propose two simple methods to estimate the degree of mobility using widely available macroeconomic data. Utilization of these measures in empirical explarations enables a more sound foundation compared to the application of traditional mobility measures. These methods are indeed a little more rough than the measurement of intergenerational income elasticity; however, they provide a comprehensive analysis of the empirical correlations. Chapter 4 presents and discusses the extent of social mobility in the world. In Chapter 5 we empirically investigate the determinants of our mobility measures and discuss our results. Chapter 6 draws

some economic and policy conclusions based on the findings. We conclude in Chapter 7.

2 Theory of Social Mobility

In the past 200 years, a fierce debate has taken place between competing theories on the relationship between social background and the level of prosperity. The literature that emerged in the 19th and 20th century can be generally be classified as being either "Libertarian" or "Marxist". A thorough overview of the main representatives of both schools of thought can be found in Erikson and Goldthorpe (1992). While libertarian theory emphasizes that the irreversible commitment of industrialized societies to economic rationality and the increasing use of technological innovations must lead to an equally high level of social mobility and opportunity, Marxist theory essentially asserts the opposite. The main focus lies on class reproduction: While a small class of super-rich dynasties passes their wealth from one generation to the next, the vast majority of the working class earns a significantly lower income without any chance of improvement in the future or in the future of their children.

As Piketty (2000) illustrates, the conflict between these opposing theories in its extreme form has now been resolved. Against the background of the enormous wealth increases and the significant improvement in the standard of living, which developed economies have experienced since the outbreak of the industrial revolution, the Marxist position has increasingly lost importance. At the same time, the sharp rise in income inequality in most developed economies with relatively low social mobility indicates that the purely Libertarian point of view was too nave in its assumptions. Over the last decades, an entirely new class of models has developed, whose main focus is to identify the determinants behind the persistence of income. The cornerstone of this new class of models was built by Becker and Tomes (1979), who use an intergenerational altruistic utility function to indicate how investment in education and genetically determined abilities and characteristics contribute to the mobility of income. The model of Solon (2004), which addresses and expands the ideas of Becker and Tomes (1979), has become the point of departure of many theoretical studies. In simple terms, this model shows how three fundamental institutions influence children's opportunities. These institutions are the family, the labor market, and the state. Since the balance between these factors in various countries is

highly heterogeneous, social mobility between countries also fluctuates. It is worthwhile to have a look on the theoretical determinants of social mobility because important insights into the cause of intergenerational elasticity can be derived and later used in the empirical examination. At the same time, this consideration fosters the revelation of causations, while empirical research mainly uncovers correlations.

Imagine a representative family i consisting of a parental unit of generation t and a child of generation $t-1$. The family shares the parents' lifetime earnings after taxes $(1-\tau)y_{i,t-1}$ between the parents' consumption $C_{i,t-1}$ and investments in the human capital of the child $I_{i,t-1}$. If the parents cannot accumulate debt, the budget constraint is $(1-\tau)y_{i,t-1} = C_{i,t-1} + I_{i,t-1}$. Becker and Tomes (1986) illustrate the effects of a removal of this restriction. The human capital endowment of the child $h_{i,t}$ is often depicted as

$$h_{i,t} = \theta \log(I_{i,t-1} + G_{i,t-1}) + e_{i,t}$$

where $G_{i,t-1}$ represents government investment, such as public education or a state-financed health care system. For $0 < \theta < 1$ equation (1) has corresponding diminishing marginal returns. The factor $e_{i,t}$ denotes the amount of human capital possessed by the child, independent of the investment decision of the parents and the state. This form of abilities refers to the combination of a variety of attributes, which are influenced by the genetic and social backgrounds of the parents and the social environment in which the child grows up. It is apparent that this parameter is correlated to a large extent to the endowment of the parents $e_{i,t-1}$. The classic formulation of this correlation can be found in Becker and Tomes (1979), in which $e_{i,t}$ follows an autoregressive process of first order, so that $e_{i,t} = \delta + \lambda e_{i,t-1} + v_{i,t}$. Here $v_{i,t}$ denotes the error term und $\lambda \in (0,1)$ the inheritance parameter.

The child's income can now be described as a function of human capital, so that the following applies

$$\log(y_{i,t}) = \mu + p h_{i,t}\,, \tag{1}$$

where p reflects a form of returns to education. Juhn, Murphy, and Pierce (1993) characterize a period which is distinguished by high income inequality as periods in which p assumes high values. Such a period is not necessarily associated with an increased level of income, since higher p can be accompanied by lower μ.

The parents share the after-tax income between their own consumption $C_{i,t-1}$ and the investment in the human capital of children $I_{i,t-1}$ according to the Cobb-Douglas utility function

$$U_i = (1-\alpha)\log(C_{i,t-1}) + \alpha\log(y_{i,t})\,. \tag{2}$$

The altruism parameter $\alpha \in (0,1)$ is of crucial importance here, since the preference of the parents regarding $y_{i,t}$, the income of the child, is depicted in relation to own consumption. Considering the correlations set forth above, (2) can be converted to

$$U_i = (1-\alpha)\log\left[(1-\tau)y_{i,t-1} - I_{i,t-1}\right] + \alpha\mu + \alpha\theta p\log(I_{i,t} + G_{i,t-1}) + \alpha p e_{i,t}\,.$$

The necessary condition of this optimization problem yields

$$\frac{\partial U_i}{\partial I_{i,t-1}} = -\frac{(1-\alpha)}{\left[(1-\tau)y_{i,t-1} - I_{i,t-1}\right]} + \alpha\theta\frac{p}{I_{i,t-1} + G_{i,t-1}} = 0\,.$$

The optimum choice of $I_{i,t-1}$ is obtained by the corresponding reforming of this condition by $I_{i,t-1}$, so that

$$I_{i,t-1} = \left[\frac{\alpha\theta p}{1-\alpha(1-\theta p)}\right](1-\tau)y_{i,t-1} - \left[\frac{1-\alpha}{1-\alpha(1-\theta p)}\right]G_{i,t-1}\,.$$

This simple result provides some intuitive implications. Firstly, parents with high incomes for given values of public investment in education invest more in the human capital of their children. Similarly, there is a crowding-out effect of state investment in education and private institutions in the human capital of children. Moreover, investments $I_{i,t-1}$ rise with increasing values of altruism parameters α and the returns to education. Thus parents invest more in the human capital of their children if the expected returns from this investment are higher.

Considering the above conditions, the relationship between $y_{i,t}$ and $y_{i,t-1}$ can be represented by

$$\log(y_{i,t}) = \mu + p\left[\theta\log(I_{i,t-1} + G_{i,t-1}) + e_{i,t}\right]\,. \tag{3}$$

Inserting the optimale choice of $I_{i,t-1}$ and re-arranging yields

$$\begin{aligned}\log(y_{i,t}) &= \mu + \theta p \log\left[\frac{\alpha\theta p}{1-\alpha(1-\theta p)}\right] \\ &\quad + \theta p \log\left\{y_{i,t-1}\left[1+\frac{G_{i,t-1}}{(1-\tau)y_{i,t-1}}\right]\right\} + pe_{i,t}\end{aligned} \tag{4}$$

The equation indicates that public investments in the human capital of a child play an important role. But what determines the rate of public investment in human capital and the parents' after tax income? Solon (2004) characterizes this quotient as

$$\frac{G_{i,t-1}}{[(1-\tau)y_{i,t-1}]} \cong \phi - \gamma \log(y_{i,t-1})\,.$$

This form of public investment very clearly displays a type of relative progressiveness. With respect to values $\gamma > 0$, no statement can be made regarding the question of whether it is rich or poor families that tend to be favored in absolute terms. However, it is apparent that the percentage of public investment in the human capital of children decreases with rising parental income. In this sense, the higher the values for γ are, the more progressive policy is. Small values for $\Omega = G_{i,t-1}/\left[(1-y_{i,t-1})\right]$ make it possible for the second term in equation (4) to become $\theta p \log(y_{i,t-1}) + \theta p\Omega + pe_{i,t}$. Inserting the assumption about public investment in human capital then yields the well-known intergenerational income elasticity[1].

$$\log(y_{i,t}) \cong \tilde{\mu} + [(1-\gamma)\theta p]\log(y_{i,t-1}) + pe_{i,t}\,,$$

in which case an endogeneity problem occurs, since the regressor $\log(y_{i,t-1})$ is apparently correlated to the error term $pe_{i,t}$. In steady state $\log(y_{i,t})$ and $\log(y_{i,t-1})$ have the same variance, which is why the correlation between the two variables is equal to the slope parameter of an OLS-regression. The slope parameter β can be presented for the following problem with the aid of previous considerations as[2]

$$\beta = \frac{(1-\gamma)\theta p + \lambda}{1+(1-\gamma)\theta p\lambda}\,.$$

This corresponds to the intergenerational income elasticity, which is often

[1] The intercept $\tilde{\mu}$ is given as $\tilde{\mu} = \mu + \phi\theta p + \theta p \log\left\{\alpha\theta p(1-\tau)/\left[1-\alpha(1-\theta p)\right]\right\}$.
[2] See Greene (2000) for the conversion in this case.

estimated in empirical studies. It has been shown, that theoretical considerations are of great advantage, since (5) provides direct conclusions regarding the occurrence of intergenerational elasticity of income. Thus β always increases in (5) whenever λ, θ, p and $(1-\gamma)$ increase. Intergenerational elasticity is always greater if (1) the inheritance parameter is greater, i.e. when more of the social environment and the parents' genes are passed along to the children, (2) the investments in human capital are more productive, (3) the returns to education on human capital are greater and (4) state investment in human capital are less progressive. Hence it seems likely that the differences between these countries are due to varying configurations of these four determinants.

Until now, the analysis has not provided a statement about the correlation between mobility and income inequality. In order to illustrate this relationship, we must remove the steady state from equation (5). Let the change of p over time be represented by $\dot{p}$. By omitting the steady state, the variance of $y_{i,t}$ and $y_{i,t-1}$ no longer correspond. Thus the intergenerational income elasticity then becomes

$$\beta_t = \frac{\mathrm{Cov}\left[\log(y_{i,t}), \log(y_{i,t-1})\right]}{\mathrm{Var}\left[\log(y_{i,t-1})\right]}.$$

In order to illustrate this elasticity with the previous equations, a larger algebraic effort is required. After some rearrangements, the final result for the case of a constant progressivity of state investment in human capital is yielded as

$$\beta_t = \frac{\dot{p}}{p}\left[\frac{(1-\gamma)\theta p + \lambda}{1 + (1-\gamma)\theta p \lambda}\right].$$

This corresponds to equation (5) inflated by the factor $\dot{p}/p$. As can be seen, an increase in the returns to education leads to a reduction of intergenerational mobility. This is intuitively very easy to understand: An increase in the returns to education increases the incentives to invest in human capital over the entire income distribution. If access to education at the upper end of distribution is easier, then increasing returns to education lead to lower mobility. Meanwhile, the rise of $\dot{p}/p$ also leads to an increase in inequality in personal income distribution, as documented by Juhn et al. (1993). Hassler, Rodriguez Mora, and Zeira (2007) come to a similar result, albeit with the aid of an entirely different model. In this model, mobility and inequality of education and returns to education are dependent as third factors. However, this leads to an interesting and

completely different interpretation of Krueger's Great Gatsby Curve. In this case there is no direct causal relationship between the two variables; instead the mobility and inequality education are influenced by education in such a way that a negative correlation between the two concepts is created.

3 Measuring Social Mobility

Intergenerational income elasticity is most often used to measure the extent of social mobility, which can be determined via[3]

$$\log(y_{i,t}) = \alpha + \beta \log(y_{i,t-1}) + \varepsilon_{i,t}\,.$$

Being analogus to the theoretical considerations of the previous chapter, t depicts the index of generations and $y_{i,t}$ and $y_{i,t-1}$gives the incomes of father and son. While this variable provides a thorough overview of the persistence of income inequality between father and son, the number of countries for which the variables can be calculated is severely limited due to limited availability of micro-data. Corak (2006, 2011) calculates the elasticity for a sample of 22 countries, which is currently the most comprehensive comparison of mobility rates between countries. This limited amount of data is disadvantageous for two reasons. First, only a very incomplete picture of the mobility across countries can be obtained, especially since the Corak-data largely consists of relatively similar industrial nations. Second, the small sample makes a thorough econometric analysis of the determinants of income elasticity difficult, since the small number of degrees of freedom leads to biases of the estimation results and the standard error.

To circumvent both problems, two indicators for mobility are derived below, which can be calculated using widely available macro-data. In contrast to the conventional method of calculation, this approach has the advantage of allowing mobility rates to be estimated for a broad sample of countries. Disadvantageous, however, is the fact that the correlation measured by the indicator is considerably less exact. Thus a careful interpretation of the resulting mobility rates is necessary. However, we will show below that the measures correlate strongly with the Corak-data. Yet there will always be a trade-off between accuracy in the measurement and accuracy and possibility of empirical estimations.

The first measure is based on the mobility of the level of education between parents and children. Let LPAREDU be the number of children whose parents

[3] See Corak (2006, 2011).

have a low level of education. Corresponding data was compiled for 39 countries by the OECD (2009) as part of the PISA Project. Parents with a low level of education are classified by the OECD as people who have attended school for less than 12 years. The influence of parents' education level on the education of their children (Π), can be estimated via

$$\Pi_i = \beta_0 + \beta_1 \text{LPAREDU}_i + \varepsilon\,.$$

Data for the average number of school years an individual has completed is compiled by Barro and Lee (2013). As expected, when estimating the equation empirically, β_1 is significantly negative. This suggests that the higher the number of parents with a low level of education, the lower the average education of children in the economies. With 54 %, the level of the parental education accounts for a large part of the variance of education levels between the economies. But when one considers the residuals of the estimation, it becomes apparent that there are significant deviations from the average effect. Individuals in economies where the level of education is higher than the estimation predicts are on average more mobile than individuals in other economies. This is due to the fact that apparently the children in countries in which the residual $\hat{\varepsilon} = \Pi_i - \hat{\beta}_0 - \hat{\beta}_1 \text{LPAREDU}_i$ is positive are able to obtain more education than children in the remaining economies on average. Thus the economy is characterized by higher social mobility. Naturally, this measure has the property $\text{E}(\hat{\varepsilon}_i) = 0$. To scale the measure to $\mathbb{R}^+$, the minimum of the residuals is subtracted, so that the first mobility measure results from $\text{MOBEDU}_i = \hat{\varepsilon}_i - \min(\hat{\varepsilon})$.

The second measure (MOBPOV) follows the same principal; however, it does not consider the level of education of the parents, but the budget constraint of the family. While the first measure includes the economic intuition that parents with a lower level of education possess either a lower preference for the education of their children or conversely, a high preference for present-consumption, this measure explicitly depicts the budget restriction from the theoretical model. A high immobility measured at this level suggests that parents cannot afford expenses required for the education of their children. The measure is determined analogously to the first parameter, where the level of education of the children is regressed on the extent of poverty in a country, measured on the basis of the size of the lowest quintile of the income distribution. Data for these variables is provided by the World Bank (2014a). Economies in which it is possible for children to obtain a higher level of education than the estimation predicts for

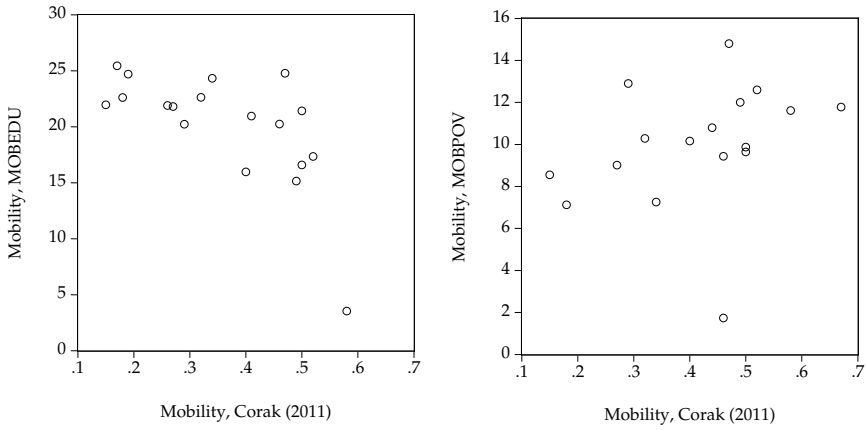

Figure 1 Correlation of the Mobility Measures and the Intergenerational Income Elasticity of Corak (2011)

the given average poverty level are generally more mobile than others. The measure is then scaled back once more to the positive real number range.

Figure 1 depicts the correlation of the derived measures with data from Corak (2011). Note that due to the nature of their calculation, MOBPOV and the intergenerational income elasticity of Corak (2011) depict a measure of immobility. This means that a high value is equivalent to a low level of mobility. MOBEDU, however, directly reflects the level of social mobility and must be interpreted inversely. For both MOBEDU and MOBPOV the correlation with the Corak (2011) mobility is high: Considering MOBPOV, Pearsons r is 54 %; regarding MOBEDU, it amounts to -65 %. This means that the inaccuracy caused by the use of the parameters on the basis of the macro-data is manageable. At the same time, the consideration allows a more comprehensive analysis of social mobility. One major outlier is Pakistan where Corak (2011) predicts a medium level of mobility. However, when consulting the influence of poverty on education, Pakistan does not outperform comparable nations.

4 Status Quo: Income Mobility in the World

How high is the level of social mobility in the world? Figure 2 illustrates the intergenerational income elasticity for the Corak (2011) countries and the connection to the GINI coefficients of income, which is often referred to as the

"Great Gatsby Curve". The data on income inequality is taken from the SWIID database, a standardization of different databases for income inequality, which is documented in Solt (2009).

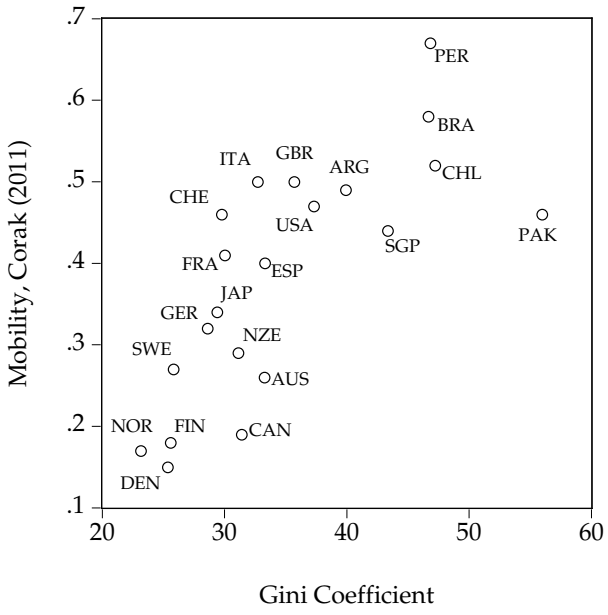

Figure 2 The original Great Gatsby Curve using Data from Corak (2011.)

Figure 2 makes it clear that income inequality and intergenerational income elasticity are positively correlated. This means that in countries with higher levels of income inequality, there is generally also a low level of social mobility and vice-versa. The Scandinavian countries in particular are characterized by a very high mobility: In Denmark (15%), Norway (17%) and Finland (18%) a father's economic conditions play a minor role in the son's income. Even in Canada (19%) and Australia (26%) income persistence is comparatively low. Germany (32%), Japan (34%), Spain (40%), and France (41%) land in the lower-middle range of the Corak-countries. The highest intergenerational income elasticity is seen in South American countries. In particular, the level of income inequality is stable across the board in Peru (67%), Brazil (58%), and Chile (52%). The Anglo-Saxon countries Great Britain (50%) and the USA (47%) are not too far from South American countries, as the income of the father accounts for around

half of the son's income.

There are two opposing theories behind the underlying economic mechanisms of the so-called Great Gatsby curve. Krueger (2012) argues that there is a causal relationship behind the correlation. He points out that children with affluent parents have a far better starting position in life and thus also have more access to a number of developmental and educational opportunities. On the other hand, the model from Chapter 2 and the works of Hassler et al. (2007) and Solon (2004) suggest that education as a third determinant influences mobility and income inequality and that the correlation between both variables is *cum hoc ergo propter hoc*. A further argument is that the causality may also run in the opposite direction: When the social mobility is high, then the income inequality is less persistent.

An additional explanation that has received relatively little attention until now is a statistical explanation: Perhaps the correlation is simply random. In other words, a sample selection bias could also be responsible for the positive synchronization of the two variables. It is already difficult enough to find a fundamental law on the basis of only 22 countries. So what is the relationship between mobility and inequlaity in the remaining 190 countries in the world? Figure 3 illustrates this relationship measuring social mobility with the variables derived in previous chapters, MOBPOV and MOBEDU.

The graphs provide an interesting insight on the emergens of the Great Gatsby Curve. The mobility variable MOBPOV can be calculated for a large sample of countries and can thus reflect the relationship between income inequality and mobility for a large number of countries. If at first glance one only considers the Corak countries (red dots), the original Great Gatsby Curve remains. However, if all countries incorporated in the analysis, including those that are not part of the Corak (2011) data, no visible correlation in either direction between the two variables can be found. The second graph shows the parallelism between MOBEDU and income inequality. Here the Great Gatsby Curve is preserved in both cases. However, the calculation of mobility by the educational level of the parents is only possible for OECD countries, which are generally quite developed. In sum, the two graphs clearly indicate a bias in the small sample of Corak countries. When all countries are considered, the synchronization between mobility and income inequality disappears.

Asian and African nations in particular provide for the strong deviation from the original Great Gatsby Curve in Figure 3. More general, it is notable that in most cases, it are deleoping economies that deviate from the Great Gatsby

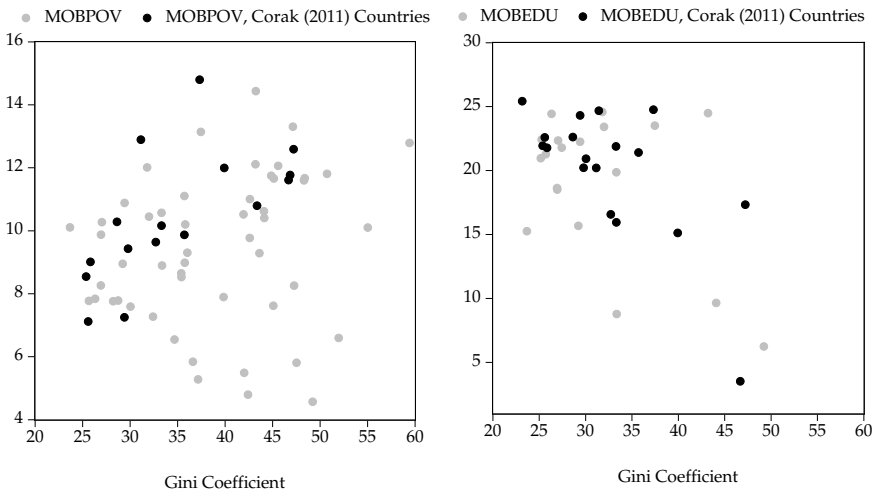

Figure 3 The adjusted Great Gatsby Curve using MOBPOV and MOBEDU.

Curve (e.g. Rwanda, Malawi, Indonesia, Thailand, Senegal, and Jordan). In developed economies, the Great Gatsby Curve even applies when consulting MOBPOV or MOBEDU.

5 Empirical Determinants of Social Mobility

We now turn to the empirically exploration of the determinants behind the differences of mobility rates across counries. The model from Chapter 2 provides a starting point in identifying possible causes of mobility. Some of these variables have been explored earlier; however, empirical evidence is based almost exclusively on micro-data studies conducted for single countries. An explanation of the variance between mobility rates across countries is therefore limited. Chetty, Hendren, Kline, and Saez (2014) demonstrate that mobility in states in the US is higher when local segregation is low, school quality is high, students perform well in primary schools, families are stable, social capital is high, and income inequality is low. The importance of family stability is discussed in detail in Björklund and Jäntti (2009) and Corak (2011). An argument that is often suggested relates to the highly important time window in a child's development between birth and the first year of life. The central idea is that stimulation obtained in this early phase of brain development greatly affects the boundaries

of future mental abilities. In sum, a stimulating social environment leads to better cognitive development, social skills, and health as indicated by Knudsen, Heckman, Cameron, and Shonkoff (2006). In fact, this effect can already be seen in the theoretical model, since the inheritance parameter λ plays an important role in relation to the intergenerational elasticity. The strength of the influence of family environment is often measured with the sibling correlation. When the income of siblings who were brought up in the same environment is strongly correlated, social environment as a deciding factor is at hand. Mazumder (2008) illustrates that the correlation of incomes of brothers is nearly 50%. Björklund and Jäntti (2009) provide smaller values for the Scandinavian countries Norway (14%), Sweden, Finland and Denmark (around 25% each). Family background is therefore less influential in Scandinavian countries than in the USA. It is likely that essential stimulation during early developmental years, which may be missing for children with instable families in many countries, is replaced in Scandinavian countries by the public school system. The fact that non-education specific human capital is largely influenced by upbringing and less so by genes[4] is documented by Sacerdote (2007) and Björklund, Lindahl, and Plug (2006), who find an intergenerational elasticity of income for adopted children in Sweden and the United States of about two thirds of the coefficient of biological children in the same family. Thus the explanation of mobility by family backgrounds leads to the same result as the model in Chapter 2. In both cases, government investment in the quantity and quality of schooling can lead to a reduction in the persistence of income inequality.

5.1 Estimation Equation and Data Specification

In the following, theoretical predictions and the implications of previous micro-economic studies will be empirically tested for a broad sample of countries. The specification of the estimation equation is based on the theoretical implications and generally has the following form

$$\text{MOBILITY}_i = \alpha + \gamma \text{GINI}_i + \sum_{j=1} \beta_j x_{ij} + \delta z_i + \varepsilon_i \,,$$

where MOBILIY represents a measure of mobility and GINI depicts the Gini-coefficient of income distribution after taxes and transfers. The variables

[4] Some authors emphasize the influence of genes on social mobility. Clark (2014) measures the multigenerational income elasticity over centuries with the help of family names. He attributes the high persistence of rich families to genetic traits.

x_j are control variables, while z_j denotes the effect of each variable, whose influence on mobility is to be measured. Due to the heterogeneous samples, it applies that $\mathrm{Var}(\varepsilon_i) \neq 0$. To circumvent the problem of heteroscedasticity, the equation is estimated via FGLS which increases efficiency compared to a linear estimation using Huber-White standard errors. The number of observations of each estimation equation depends strongly on the data availability of the variables x_j and z . Data on income inequality (GINI) is available for 94 countries in the SWIID database, whose mobility measures allow for 22 (MOBCORAK); 72 (MOBPOV) AND 38 (MOBEDU) observations.

The variables included in the estimations can be divided into five broad categories: inequality and redistribution, family structure and social background, education, labor market and culture and religion. Data on inequality and distribution is obtained from the Standardized World Income Inequality Database (SWIID) and is documented and discussed in detail in Solt (2009). The database contains Gini-coefficients for market income and disposable income and also calculates the amount of redistribution as the difference of both variables. Family structure and social background is represented by the national standard deviation of the Index of Economic, Social, and Cultural status (ESCS), which is calculated by the OECD as part of the Program for International Student Assessment (PISA) for each participating student. To obtain an estimate of family stability, the number of children who were not raised by two parents (PARENTS) and the number of divorces (DIVORCE) is considered. This data is obtained from the World Family Map from Child Trend (2013) and UN (2013).

Data on family nonspecific social environment, which provides information about the presence of social capital and the stability of political conditions, includes on one hand the points in the FIFA world rankings in relation to population (SOCCER), which are obtained from FIFA (2014). On the other hand, the influence of crime is measured on the basis of the incarceration rate (CRIME). The corresponding data is collected by the UN (2014).

The third category deals with the effects of education and includes information on education expenditure (PSE), the PISA results (PISA), education inequality (GINIEDUC) and the variation in student performance between schools (SCHOOL) and within schools (SSCAT). PSE and PISA are obtained from World Bank (2014a) and World Bank (2014b). The Gini coefficients of educational level are calculated on the basis of the methods Castelló-Climent and Domenénech (2014) proposed for data from Barro and Lee (2013). Data on variation in student performance is from OECD (2009). In addition, we analyze

the effect of cognitive skills and the variation of cognitive abilities in an economy using data on cognitive skills from Hanushek and Woessmann (2012).

We also investigate the effect of the labor market, using data on the labor force partizipation rate (LFPR) and the size of the manufactoring sector. Both variables reflect average values of the period 2000-2010 in order to smooth cyclical fluctuations. The data source is ILO (2014).

The final category of culture and religion include data on Hofstede's four cultural dimensions. These are power distance, individualism (vs. collectivism), masculinity (vs. femininity) and uncertainty avoidance. The source of this data is Hofstede (2001). The number of religious individuals is calculated with the help of the CREG (2014) database, while the population is from World Bank (2014a). Both databases serve as a foundation for the calculation of the Herfindahl index of ethnic group concentrations.

5.2 Results of the Beaseline Estimate

Table 1 depicts the results of the baseline estimate. For the sake of clarity, the results are only presented on the basis of the intergenerational income elasticity MOBCORAK from Corak (2011) and the variable MOBPOV, which allows for the highest number of observations. The estimations of empirical determinants of the second macro-economic variable MOBEDU provide quite compatible results and are therefore not shown separately.

Column 1 of Table 1 shows the original Great Gatsby Curve, depicted as published in Corak (2011). As expected, the Gini-coefficients of income after taxes and transfers exert a significantly positive influence on intergenerational income elasticity. As most of the regressors are not available for developing countries, there is a slight deviation from this ground rule. Overall, slightly more than half of the variation in mobility rates can be explained by this simple bivariate model. The small number of Corak-countries does not allow for consistent estimation of a detailed multivariate model, since the intersection of the data availability of the regressors is small which drastically reduces the number of degrees of freedom. Therefore column 2 initially only extends the baseline estimation to the variation of the ESCS index. The higher the value of ESCS, the greater are the differences in the social background the children are raised. As it turns out, the influence of ESCS is significantly positive. This means the more the families differ in their social and economic conditions, the more immobile the individuals in this society are. The coefficient of income inequality remains

stable so that there is no change in the Gatsby-relationship after controlling for social background. The explanatory power of the model increases significantly (R-squared: 56% vs. 99%) when the influence of social background is taken into account. At the same time, the number of observations drops from 22 to 18, so the results must be interpreted cautiously.

The estimation of the variable MOBPOV allows for a wider investigation of the causes of income mobility. Columns 3 and 4 display the results of these evaluations. As in the estimate based on the Corak countries, the impact of ESCS is positive, albeit less significant. The model in column 3 also illustrates the influence of educational outputs on mobility, measured by the PISA scores in reading, which students of the respective countries earned in the last PISA study. The correlation between the two variables indicates a third-degree polynomial, which is why PISA has a cubic influence in the estimation. As it turns out, a higher average level of education reduces the social mobility of an economy. This result indicates that the higher the general education level of a society is, more difficult it is for individuals with poor initial conditions within that economy to achieve average human capital levels. The process of catching-up is only made more difficult as the education level of the society increases. The loss of investment in early childhood has an apparent significant effect and therefore upward mobility is lower.

The model in column 3 raises the question of how the mobility of individuals is affected by a direct state redistribution. The redistribution is approximated in the estimation as the difference in the Gini coefficients for market income and disposable income, using the SWIID database in each case. Looking at the data, a non-linear relationship is apparent, which suggests a parabolic function of both variables. For this reason, the REDIST variable in the estimate is linear once and square once. In fact, the results indicate a downward opening parabola. This suggests that redistribution initially exerts a negative effect on mobility and further indicates that there is only a mobility-enhancing effect if redistribution is strong. This is the result of two opposing forces, which are triggered by the redistribution. The first effect reflects the decreasing incentive to invest in human capital in more progressive design of the tax system. The stronger redistribution through the tax and transfer system is, the less willing individuals will be to invest in human capital. This effect is most apparent for families with a low preference for education. In addition, the incentive for poorer families to finance the investment in their children's education via debt from the capital market decreases. In sum, affluent families can be considered

Table 1 Causes of Social Mobility, Baseline Estimates

	(i) MOBCORAK	(ii) MOBCORAK	(iii) MOBPOV	(iv) MOBPOV
α	-0.049	-0.260***	1.553**	-1.834
	[0.54]	[7.21]	[2.49]	[.50]
$GINI_i$	0.012***	0.009***	0.109***	0.108
	[4.92]	[5.21]	[8.36]	[1.59]
$ESCS_i$		0.366***	1.012	
		[4.93]	[1.54]	
$PISA_i^3$			1.200***	4.730**
			[3.43]	[2.80]
$REDIST_i$			0.448***	0.147
			[16.35]	[1.65]
$REDIST_i^2$			-0.020***	-0.007*
			[9.70]	[2.09]
$GINIEDUC_i$			2.441***	.412
			[5.62]	[.44]
$PARENTS_i$				0.150***
				[7.47]
N	22	18	45	22
R-squared	0.56	0.95	0.99	0.94
F Statistic	24.21***	151.30***	1531.15***	46.04***
SER	0.10	0.08	1.72	1.71

Notes: The table reports the results of the FGLS-estimation, t-statistics are in brackets, SER=standard error of the regression, $*p < .10$, $**p < .05$, $***p < .01$.

more likely to invest money in education than poorer households, which leads to a reduction in mobility. However, redistribution is subject to yet another effect. If the government redistributes, there is an exchange of income between rich and poor families, which by definition directly leads to approximation of disposable incomes. If the level of redistribution exceeds a critical value, this second effect offsets the first and thus the economy is located on the right side of the redistribution parabola.

The last variable of the basic model in column 3 shows the influence of educational inequality. The coefficient of GINIEDUC is significantly positive. The higher the inequality of education, the lesser the mobility of income. The same conclusion is also reached when the Corak (2011) mobility is used as dependent variable. This result strongly confirms the implications of the theoretical model in Chapter 2. Higher inequality of education leads to an increase in inequality and at the same time reduces intergenerational income elasticity, as returns to

jobs requiring high levels of education rise.

Column 4 in Table 1 deals with the question of the influence of an intact family on the mobility of children. Chetty et al. (2014) find a strong negative influence on mobility in the US for children raised by a single parent. The authors see a restrictive budget restraint as the reasoning for this result. In addition, it is conceivable that early childhood stimulation suffers from the absence of a second parent because the potential available time of the parents is cut in half. The results of Chetty et al. (2014) are also clearly visible between the countries; the impact of the variable PARENTS is strongly positive. The influence of other remaining variables is reflected in the very robust against the change of the specification. However, the redistribution parable loses some of its significance. Due to the high correlation between ESCS and PARENTS, the scattering of the ESCS index is not included in the estimate in column 4. In fact, the measurement of social background also includes information on single parenthood, so that a multi-correlation between the variables may develop.

Table 2 should be understood as an extension of the base estimate from Table 1, with a focus on education, the labor market and the family nonspecific environment. Unfortunately it is not possible for many variables to be estimated in a comprehensive model, since the intersection of the data availability with an increasing number of regressors is very small. The first model in Table 2 is shown in column 1 and is concerned with the influence of government expenditure on education. The intuition behind this exploration stems from the theoretical model: If the state were to increase investments in education, then the households with a restrictive budget constraint would generally profit more than high-income households. In fact, the estimate shows that public educational investments are highly mobility-enhancing. The presumption of Hassler et al. (2007), which argue that the positive relationship between intergenerational income elasticity and income inequality results only from the third variable namely the expenditure on education, remains unconfirmed. The significantly positive effect of the Gini coefficient is retained even after taking into account the expenditure on education. Moreover, the marginal effect remains remarkably constant (0.012 without and 0.011 with spending on education).

The second model in Table 2 illustrates the impact of school quality. The variable SCHOOL measures the variance of PISA results in reading between schools in each country as a percentage of the total variance in the OECD countries. The higher the value, the more heterogeneous the quality of schools in the national economy is. As indicated by the second model in Table 2,

Table 2 Causes of Social Mobility, Extension 1

	(i) MOBCORAK	(ii) MBCORAK	(iii) MOBPOV	(iv) MOBPOV	(v) MOBPOV
α	0.063**	-0.240***	1.255	7.797***	4.279***
	[2.38]	[21.20]	[1.48]	[12.53]	[13.77]
$GINI_i$	0.011***	0.017***	0.158***	0.098***	0.120***
	[17.41]	[69.86]	[12.09]	[9.24]	[15.80]
PSE_i	-0.009**			0.700***	
	[3.06]			[8.71]	
$SCHOOL_i$		0.002***	0.068***		
		[4.61]	[5.91]		
$SSCAT_i$			0.141***		
			[4.34]		
$LFPR_i$				-0.093***	
				[7.92]	
$SOCCER_i$					0.004***
					[6.61]
$CRIME_i$					0.007***
					[16.23]
N	20	19	46	54	51
R-squared	0.96	0.99	0.78	0.92	0.96
F Statistic	188.73***	2973.68***	48.81***	184.49***	379.09***
SER	0.09	0.08	1.79	2.91	2.13

Notes: The table reports the results of the FGLS-estimation, t-statistics are in brackets, SER=standard error of the regression, $*p < .10$, $**p < .05$, $***p < .01$.

the less pronounced the differences in the quality of individual schools are, the more mobile societies are. Model 3 extends this investigation to the variance within individual schools (SSCAT). This variable also indicates a clearly evident mobility-inhibiting effect.

Model 4 examines the effects of education spending on a broad basis, using the mobility variable MOBPOV and also analyzes the effects emanating from the labor market, captured by the labor force participation rate LFPR. The results confirm the mobility-promoting effect of governmental education spending. In this model, the Great-Gatsby correlation remains; however, the marginal effect is halved (from about 0.2 to about 0.1.) This clearly shows that education spending influences both the mobility and the Great Gatsby correlation, as assumed by the theoretical model. However, this estimate also shows that this is not a conclusive explanation. The effect of the Gini coefficient indeed decreases, but is not zero. The model further suggests that unemployment

decreases mobility as LFPR possesses a negative sign and is strongly significant.

The last of the studies in Table 2 deals with general social conditions of the countries which act the same for all people, independently of family background. The variable SOCCER approximates the level of social capital available to the people in a country. It depicts the point value of the respective nations in the FIFA world rankings, each divided by the population. A high point value per capita indicates a thriving culture of clubs and associations. In these organizations, children form social connections and networks, learn to be integrated into communities and maintain intrapersonal connections. Social capital is proven to be an important determinant of intergenerational income elasticity in a number of studies, such as in Borjas (1992), Putnam (1995) and Chetty et al. (2014). Putnam (1995) uses the spread of bowling centers in the United States as an approximation of social capital. Yet in a cross-country analysis we are convinced that soccer is much more appopriate to proxy social capital, as bowling is not nearly as popular as soccer outside the United States, especially when considering children and adolescents.

The second variable of family nonspecific social environment is the extent of crime (CRIME) in the country. Crime is mapped via the ratio of inmates per economy and serves as a proxy of the extent of social stability within a society. If a country is characterized by high crime rates, then the family nonspecific social background must be deemed disadvantageous. The influence of both variables on the mobility is negative. This means a less stable environment has a negative effect on mobility. It is quite conceivable that there is an incentive in countries with a high crime rate to earn income by illegal means, rather than through the devotion to the comparatively more difficult alternative of human capital allocation. Similar empirical evidence for this can be found in Levitt (2004). What is surprising is the result of social capital. As the estimate suggests, a higher social capital reduces mobility. This effect is understandable if there are high monetary restrictions on entry to organizations (e.g. membership fees) or if the preference for participation in associations is less pronounced in families with a weaker social background. In both cases, a corresponding structural reinforcing effect on immobility would result.

Table 3 provides a further extension of the baseline estimates that considers the effect of cognitive skills. We use three of the measures provided by Hanushek and Woessmann (2012) that capture the cognitive abilities of students, distinguishing between the percentage of students possessing at least basic skills (BASIC), the share of students with a high cognitive skill level (TOP)

Table 3 Causes of Social Mobility, Extension 2

	(i) MOBPOV	(ii) MOBPOV	(iii) MOBCORAK	(iv) MOBPOV
α	13.777***	6.211	1.403**	13.147***
	[11.95]	[1.39]	[2.14]	[7.30]
GINI_i	.098***	.123***	.012***	.074***
	[8.93]	[7.22]	[4.82]	[5.57]
COGNISCAT_i	7.945***	4.148*	.982**	7.092***
	[5.90]	[1.87]	[2.15]	[3.56]
COGNITIVE_i		.687	-.114**	
		[1.56]	[-2.44]	
GINIEDUC_i				1.920***
				[3.40]
N	47	47	19	47
R-squared	.67	.78	.94	.69
F Statistic	45.28***	49.75***	83.57***	32.14***
SFR	1.93	1.91	.08	1.97

Notes: The table reports the results of the FGLS-estimation, t-statistics are in brackets, SER=standard error of the regression, $*p < .10$, $**p < .05$, $***p < .01$.

and the average level of the economy (COGNITIVE). The index uses data from international test scores achieved in math and science between 1964 and 2003 and normalizes the data to match the PISA norm of mean 500 and standard deviation 100, divided by 100. We use BASIC and TOP to construct a measure (COGNISCAT) that gives the variation of cognitive skills in a country

$$\text{COGNISCAT}_i = \frac{(\text{TOP}_i - \text{BASIC}_i)}{\text{BASIC}_i}\,.$$

Whenever the gap between the different levels of cognitive abilities is high, COGNISCAT assumes high values. The first column in table 3 depicts the effect of COGNISCAT in the basic specification using MOBPOV as independent variable. It is clearly visible that a high scatter of cognitive skills of students leads to a decline in social mobility, as COGNISCAT possesses a positive sign and is strongly significant. Column 2 expands this basic model controlling for the effect of the average level of cognitive skills. The negative effect on mobility emanating from COGNISCAT remains, whereas COGNITIVE further enhances immobility. This results strongly resembles the negative effect of the average human capital endowment found in table 1. The higher the average cognitive skills in an economy, the more difficult it is for disadvantaged students to catch up to

the mean level of education when lacking the important cognitive stimulation in early childhood. Column 3 follows the same specification using intergenerational income elasticity of Corak (2011) as dependent variable. The negative impact of COGNISCAT is confirmed in this estimation; however, unlike in column 2, the average level of cognitive skills positively affects mobility. The last specification of table 3 examines the effect of COGNISCAT controlling for education inequality rather than the average education level. The intuition behind this exploration is that it allows to disentangle the effects emanating from the output and the general abilities. Whereas GINIEDUC gives the educational inequality that results from a schooling system, COGNISCAT illustrates the inequality of abilities. The outcome of the model in column 4 suggests that both concepts differ substantially. First, significance of both variables indicates that there is no multi-collinearity. Indeed, the correlation between the GINIEDUC and COGNISCAT is quite low (less than 2%). The model illustrates that both inequality in abilities and inequality in education output reduces mobility. With respect to the very significant influence of COGNISCAT, the argument of Knudsen et al. (2006) concerning the importance of early childhood brain stimulation finds some strong empirical support.

The outcomes of the estimates illustrate a number of interesting implications regarding the cause of mobility; yet some of the influence factors raise even more questions concerning the underlying mechanisms. In the following, we discuss the individual determinants of mobility in detail.

Redistribution and Inequality

One effect that is highly relevant for policy is the relationship between redistribution and mobility. As the estimates illustrate in Table 1, this linkage is parabolic. Figure 4 illustrates the empirical synchronization of the variables on the basis of MOBPOV. The coefficients suggest that redistribution on average leads to an increase in mobility only if the difference of Gini coefficients for market income and the Gini coefficients for disposable income is at least 11%. This value is surprisingly robust and is also set when the mobility is regressed on the redistribution parable without any control variables. However, up to the critical threshold, the negative effect on the incentives to invest in human capital is predominant, resulting in a reduction of mobility. This has an asynchronous impact on investment in education and tends to benefit children from more affluent families and those with high preferences for education. If one only

considers the Corak-countries, as in the second graph in Figure 4, the impression is that redistribution continually supports mobility. However, the analysis based on a broad data sample in the first chart indicates that this conclusion is misleading and is caused by a sample selection bias through the exclusive use of Corak-countries. Apparently, almost all Corak countries are on the right arm of the parabola, which would not come to light without consideration of other nations.

Which countries are able to move past the critical hurdle and in which countries does redistribution actually lead to an increase in mobility? The mean in the sample of 94 SWIID countries is 6.21 and the median is 3.63. This means the average of the degree of redistribution in most countries amounts to only half of the necessary distribution levels required for more social mobility. If redistribution-induced mobility effects are desired, then the tax and social security systems in many countries must undergo a fundamental change. However, in the light of existing incentive structures, a sudden increase in redistribution can trigger a variety of side-effects. Overall, 23 of the 94 SWIID countries exceed the critical value redistribution. This includes the Scandinavian countries Denmark, Finland, Norway and Sweden. Mobility-promoting effects are also likely in Austria, Canada, Ireland, and France due to their expansive systems of redistribution.

However, the data does not provide any conclusion to the question of the form of redistribution. The method of considering the difference of Gini for market income and Gini for disposable income merely indicates how the *result* of the redistribution process affects mobility. The exact distribution policies behind this result remain to be seen. The critical value of 11% points is also relatively high. This means that there must first be a large measure of redistribution before the positive effects on mobility take place. However, up to this point, there are significant incentive effects on investments in education and the labor supply. The question whether an economy is willing to hazard the consequences is a matter of preferences of the respective society. Yet the level of efficiency suffers considerably under these incentive distortions, so that a high price for the increase in mobility must be paid. The results of the estimation, however, reveal a variety of approaches to the reduction of intergenerational income elasticity. Many of these approaches lead to positive effects on other variables, such as equal opportunities, the reduction of income inequality, and economic growth. For this reason, the increase in mobility via redistribution appears to be the worst of all approaches.

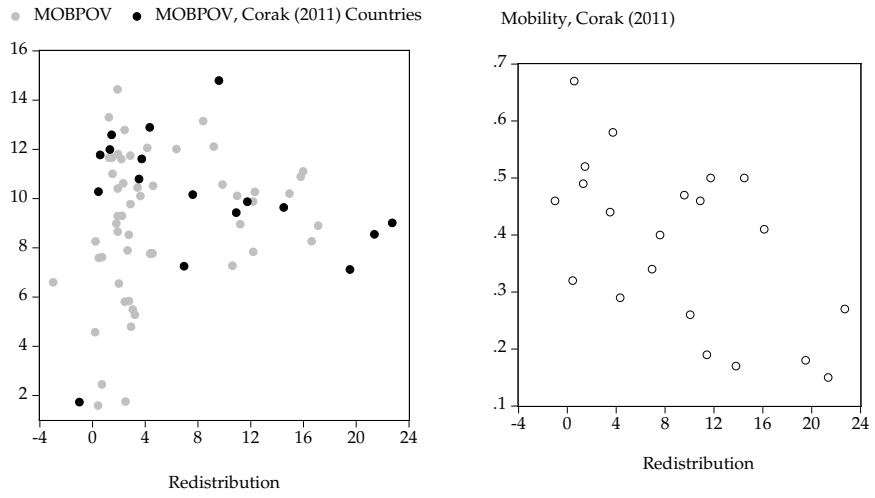

Figure 4 The Redistribution Parabola.

Family Structure and Social Background

Many studies emphasize the influence of family stability on mobility, such as Becker (1991), Murray (1984, 2012) and Chetty et al. (2014). Until now, this influence has been confirmed either exclusively theoretically or through the use of country-specific micro-data. The influence of the variation of the ESCS index and the number of children being raised by a single parent (see Table 1) confirms the relationship in the context of an analysis between the countries. A stable family environment apparently on average provides better stimulation of cortical skills in early childhood and softens the budget constraint as compared to a child with a single parent. It is striking that the number of children without a second parent in Sweden is at about the level of the median (20%). Nevertheless, social mobility in Sweden in comparison to other countries is very high. Apparently, the Swedish education system with its broadly based preschools is able to compensate for a large amount of stimulation that is missing in unstable families. One result is the extremely low variance in student performance. While the OECD countries have on average a variance of 33% in school performance in science according to the PISA study (Germany: 66%), Sweden is far below this value, exhibiting a variance of only 11%.

If the importance of a stable family structure is susbtantially, a nearby conjecture would be that divorce must lead to a negative effect on the income of

children. Figure 5 depicts the relationship between the number of divorces and social mobility based on the Corak countries.

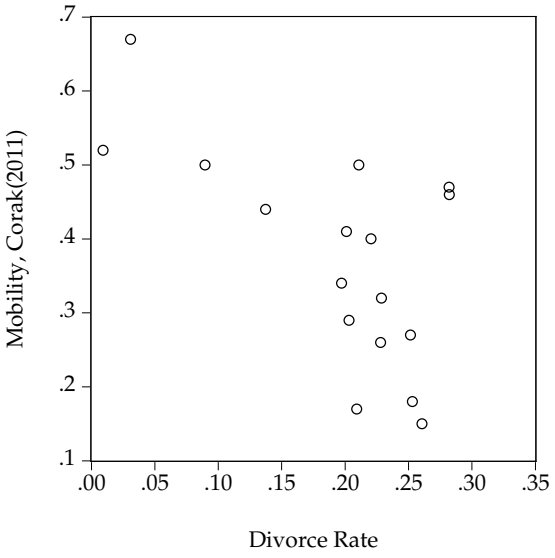

Figure 5 The Correlation of the Divorce Rate and Social Mobility.

As it turns out, there is no positive correlation between the two variables. On the contrary, the concepts even seem to be negatively correlated (-62%). This means that children of divorce contribute to mobility to some extent. There is at least a partial explanation for this counterintuitive result. The argument of stricter budget constraints and the reduced time for parental attention and the resulting loss of stimulation for cognitive ability is not a crucial factor for a large number of divorces. Alimony and visitation rights ensure that the negative effects are less pronounced if both divorced parents remain involved in the education of the child. Thus, the negative effect of single parenthood is lower for children with divorced parents than for children who lost a parent through death. Moreover, Bellou (2013) demonstrates that rising inequality in many developed economies has led to a reduction in divorce rates in recent decades. If true, Figure 5 again would reflect a form of the Great Gatsby Curve.

Education

Family structure and education are closely intertwined, as indicated by the Swedish example. A developed educational system is able to account for family-related disadvantages and can thus provide more equal opportunities. The influence of education is evident in the estimates of Tables 1 and 2. The influence of spending on education is equally significantly negative for MOBCORAK and MOBPOV, which suggests that countries with higher state educational spending tend to also have a higher social mobility. Thus one of the key predictions of the theoretical model in Chapter 2 is confirmed. Even if poor and rich families are able to draw the same profits from state education transfers, there is an increase in mobility, as poor families gain disproportionately relative to their budget constraint.

However, if one considers not only the input of the educational system, but also the output of government investments with the PISA-results, it becomes clear that a higher general level of education reduces mobility if deficient equality of opportunities hinders investments in human capital for disadvantaged children. Thus, the investment in public education is indeed an adequate means of increasing mobility. It exerts an effect only when it is possible to benefit all students equally. If the investments are asynchronous, then only the general human capital level is increased, making it more difficult for children from disadvantaged families to catch up to the average levels. This point is clearly confirmed in Table 2. As it turns out, a high variance in student performance between schools and a strong divergence of performance within schools are mobility-inhibiting. In particular, countries which can guarantee a quality education, regardless of the school which the children attend are characterized by high mobility rates. Germany, compared to OECD countries, is quite a negative example here. The variation in results between schools located in Germany is at 68%, well above the OECD average (42%). Only in very few countries (Israel, Qatar, Turkey, Trinidad and Tobago and Argentina) is this value more pronounced. At the same time, the variation in student performance within a school is relatively low (44% vs. 65% in the OECD). Thus although students in good schools are on a comparable level, at the same time, the chances for students in poor-performing schools of reaching the stock of average human capital are reasonable.

Segregation according to social origin and education are closely interrelated and influence the mobility of children to a large extent. Public investments in

human capital must therefore be aimed first and foremost at reducing segregation. In this way, "cream skimming" of the best students by good schools would be prevented.

Labor Market

Table 2 indicates that a high labor force participation rate exerts a mobility-enhancing effect. Therefore the higher the size of the labor force is, the higher social mobility is. People who do not participate in the labor market naturally have a lower opportunity for advancement, making this relationship intuitively understandable. Some studies, such as Wilson (1996), have demonstrated that the presence of jobs in the manufacturing industry represents a ladder for low-skilled workers to move upwards in income distribution. Hence the greater the size of the production industry is, the higher social mobility tends to be. The link between the number of jobs in the manufacturing sector and income mobility is depicted in Figure 6.

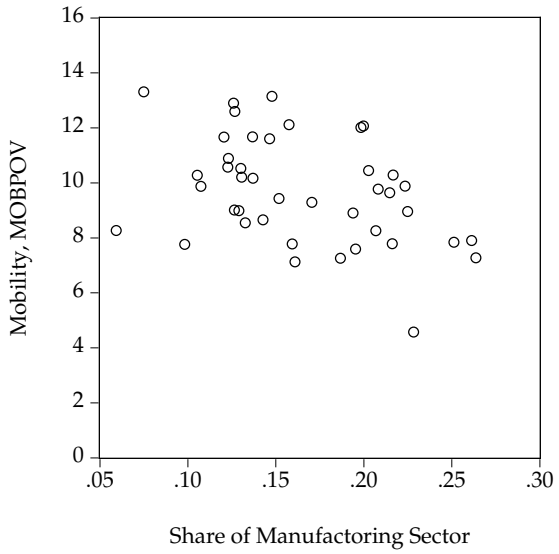

Figure 6 The Size of the Manufactoring Sector and Social Mobility.

In fact, the figure illustrates a negative correlation of the two variables. Whenever a high percentage is employed in the manufactoring sector, mobility tends to be higher. The correlation of the variables is relatively strong with -

40%, although the scatter around this average is quite high. In many developed economies, several structural changes have taken place in recent decades. One particular observation is that the industrial sector diminished in importance as the service sector began to exert a stronger influence on the national labor markets. This is especially true for the United States. For example, while the size of the manufacturing sector in 1970 was 22.4%, the sector had shrunk significantly by 2009, where it only amounted to a share of 8.9% of total employment. At the same time, social mobility in the United States is relatively low. Moreover, Levine and Mazumder (2007) and Aaronson and Mazumder (2005) demonstrate that mobility in the United States has declined significantly in recent decades. In Germany the manufacturing industry is still relatively large with 18.5%, but a downward trend in the data (1979 vs. 2009: -48%) can also be seen. Figure 6 indicates that the mobility-inhibiting effect of structural change may possibly emerge in the future in Germany.

Culture and Religion

An influential variable, which has received very little consideration in empirical estimates, is the cultural and religious component. Basically, it is conceivable that mobility rates in societies whose values are closely connected with a hierarchical doctrine would tend to be rather low. Conversely, the very high mobility rates in Scandinavian countries suggest that countries with cultures in which equality is strongly emphasized have a lower persistence of income inequality. Of course, subjectivity and low operationality have the potential to be problematic in empirical studies of culture. However, the Hofstede (2001) approach enables the quantification and measurability of culture and thus facilitates the incorporation of culture in quantitative empirical estimations. This method involves the analysis of a society's culture on the basis of six dimensions, in which data was collected in nearly 60 countries for each dimension. Of these dimensions, four are crucial to mobility: power distance denotes the extent to which less powerful individuals are willing to accept an unequal distribution of power. The degree of individualism indicates whether a society is more influenced by individual values or by a collectivist culture. The third dimension, masculinity, determines whether a society is characterized more by masculine or feminine values. Hofstede (2001) considers values such as confidence and competitiveness to be masculine, while cooperation, tolerance, and humility are thought of as more feminine values. The last dimension is uncertainty avoidance, which

reflects the degree of aversion to unpredictable situations.

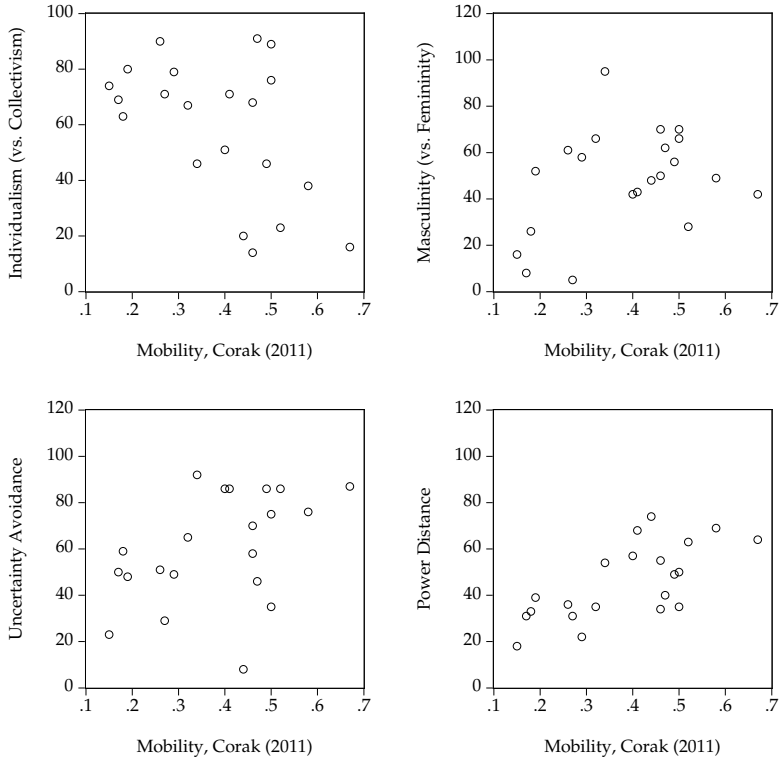

Figure 7 Culture and Social Mobility.

Figure 7 illustrates the relationship between the four dimensions and intergenerational income elasticity. The clearest correlations in the data can be seen in terms of individualism (correlation -51%) and power distance (69%). The more individualistic a society is, the more mobile the people are in the income distribution. At the same time, the persistence of the income distribution is lower if less powerful individuals do not accept an unequal distribution of power. In particular, the Scandinavian countries are characterized by a very low power distance (Sweden: 31 Denmark: 18, Norway: 31 Finland: 33). This is of course where mobility is highest worldwide. The relationship may also reflect the context of the expansiveness of the redistribution systems. Thus it stands to reason that a society with a low power distance also harbors a relatively high preference for redistribution. At the same time, however, there is also a low level

of acceptance of nepotism and crony capitalism. It is obvious that economies in which professional success does not depend on established relationships tend to be more mobile.

The results in terms of masculinity (correlation 36%) and uncertainty avoidance (45%) are less straightforward. While a mobility-inhibiting effect can be seen in terms of the degree of uncertainty avoidance, there is no clear connection between masculinity and mobility. Societies in which individuals are willing to take risks tend to be more mobile. This result is strongly related to the degree of entrepreneurship. If the level of risk-aversion towards entrepreneurship or towards investment in new businesses and inventions of any kinds is high, then the opportunity for upward movement is limited. These are, however, precisely the economic activities which tend to cause the highest jumps in the income ladder.

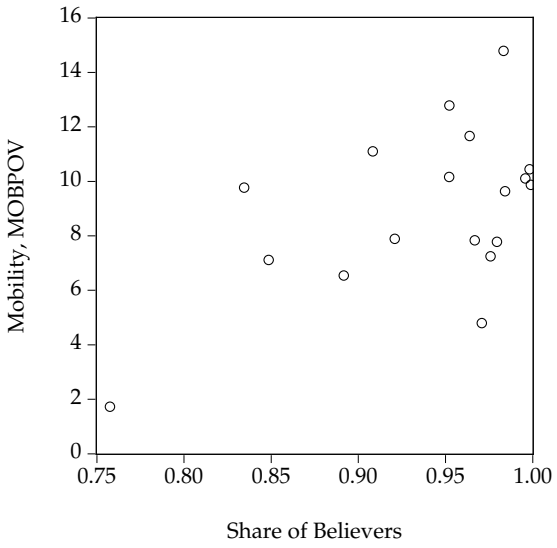

Figure 8 Religion and Social Mobility.

If the cultural influence on mobility is analyzed, one may also raise the question to what extent religion influences intergenerational income elasticity. Figure 8 illustrates this relationship. The measure of religiousness is determined by percentage of religious individuals in the total population. Depending on the country, this percentage may involve various different denominations; however,

it is the prevalence, not the type of religion that is significant for this analysis. As illustrated in Figure 8, there is no clear correlation between religion and mobility. Thus unlike culture, religion plays no role in relation to the equality of opportunity for individuals.

A final variable assigned to culture is the distribution of ethnic groups in a country. Chetty et al. (2014) demonstrate that a strong scattering of ethnic origin reduces mobility. Figure 9 considers this relationship, where a Herfindahl index is used as a measure for estimating the dispersion of ethnic groups. The data basis is the CREG (2014) Database of the University of Illinois. The data contained therein depicts the number of each respective ethnic group from the years 1945 to 2013, where the type and number of ethnic groups differ from country to country. The higher the value of the Herfindahl index is, the greater the concentration if individual groups in each country is. The basic idea of this index is the summation of squared shares, so that the index of H is defined as $0 < H < 10,000$.

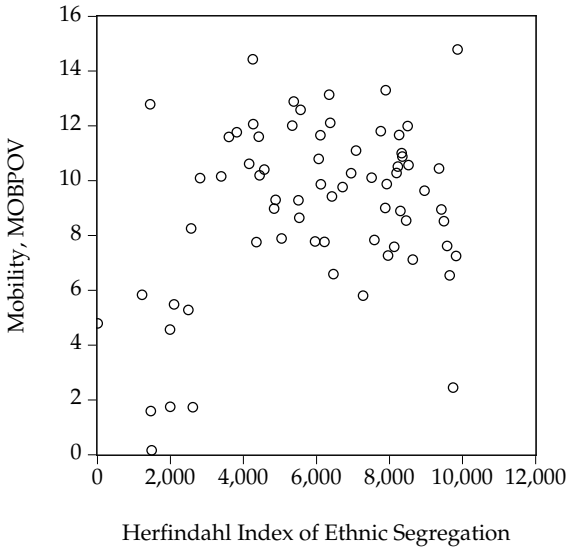

Figure 9 Concentration of Ethnic Groups and Social Mobility.

The relationship of the two variables is surprisingly distinct. It clearly illustrates a parabolic synchronization of the variables. This means that mobility is highest in societies that are either very homogenous or very diverse. In both

cases it can be assumed that on average there is relatively little prejudice and resentment against other individuals on the basis of ethnicity. In the case of rather uniform societies, this is because there simply are no different ethnic groups; in the other case, a high level of diversity allows no single ethnic group to be systematically favored or be disadvantaged. Yet when it comes to a moderate concentration, mobility is significantly lower. Apparently the dominance of a small number of groups amidst an equal distribution of skills between the various ethnic groups leads to a systematic nepotistic distortion.

6 What Is To Be Done

The results of this paper provide a variety of approaches to increasing social mobility in a society. In some cases, the fruits are low-hanging and easily reached as the necessary measures can be implemented easily and can also exert positive effects on other factors. In other cases, implementation is difficult and can only be managed with greater structural and institutional change. In any case, implementation always depends on the subjective preference of the deciding individuals; there is rarely ever a starting approach without a normative component.

As the estimates indicate, education and socialization are the most important empirical factors influencing social mobility. However, these factors are not independent of each other, but are instead closely interwoven. It is clear from Table 1 that the promotion prospects of children always are lower when they are not raised by a two-parent family, and if the social conditions in a society differ greatly from one another. In other words, companies with a high segregation according to social status are less mobile on average. One obvious policy for the increase of mobility is greater investment in education. In fact, Table 2 illustrates that an increase in government expenditure on education encourages mobility. However, the results also show that the type of investment is of crucial importance. A simple increase in a school's financial resources is the worst of all alternatives. The explanation behind this conclusion can be found in Models 3 and 4 in Table 1. As it turns out, mobility is lower in countries with a relatively high educational output. The better the students perform on average, the harder it is for disadvantaged students to catch up to the average level of education. If increased state spending on education leads to a further disparity between students, this cements income inequality rather than increas-

ing mobility. This effect can be seen in Table 2 in particular. Apparently, a high dispersion of academic achievement between schools inhibits mobility. The same applies to the scattering of students' performance within a school. Whenever the difference between good and bad schools is large, mobility is always relatively low. Public expenditure on education must therefore ensure quality education nationwide. But how can this be accomplished?

First, a brief inventory: Countries with high social mobility invest on average a little more in the education system, but these differences are generally not so great. While the Scandinavian countries Sweden (7.0%), Finland (6.8%), Norway (6.9%) and Denmark (8.7%) have a relatively high proportion of GDP invested in education, this value is lower in other nations with high mobility (Canada: 5.4% and Australia: 5.1%). The relatively immobile Anglo-Saxon nations of the USA (5.4%) and Great Britain (6.2%) do not actually give less funding to schools. Even Germany (5.1%) and the group with a similar level of mobility (France: 5.7% and Japan 3.9%) are at a comparable level with these countries. Only in the highly immobile countries Chile (4.5%), Peru (2.8%) and Brazil (5.8%) is there an average significant difference in the amount of government investment in education. As this distribution indicates, the level of expenditure on education plays a deciding role. To improve school quality, it is not enough to simply give schools more money to spend. This is also demonstrated by Hanushek (2003). Much more important are the questions of how the current budget is spent and the accessibility of a school's financial resources.

In Germany the problem of segregation according to social origin is severe. According to the results of the OECD (2012), the influence of social background on educational success in Germany is as strong as it is in most of the other 38 countries included in the study. Only in Hungary, Chile, Turkey and Belgium does social status play a more influential role than in Germany. There are multiple reasons for this. One of the main causes is the strong scattering of school quality in Germany. If the demand for places at good schools exceeds existing capacities, the risk of "cream skimming", i.e. the risk that the "best" students will be awarded places at these schools is relatively high. Lubienski (2006) demonstrates that children from disadvantaged families are rarely chosen. Moreover, Musset (2012) illustrates that a large part of this cream-skimming is due to local segregation. If there is an increased geographical concentration of citizens with a comparable social background, the problem of mobility is complicated further. Firstly, residential area is an indicator of social status

that can be used by schools as a basis for selection of individual students. Furthermore, more affluent families tend to avoid schools with a higher number of children from disadvantaged families. Studies carried out by Schneider and Buckley (2002), Hastings, Kane, and Staiger (2005) and Raveaud and Van Zanten (2007) show that wealthy parents usually enroll their children in schools whose students have a similar ethnic origin. Riedel, Schneider, Schuchart, and Weishaupt (2010) also illustrate for Germany that families take into account the socio-economic background of the other students and the percentage of children from migrant families in their choice of school. While wealthier families choose the "best" school for their children, families with a weaker socio-economic status tend to send their children to the geographically closest school. This increased local segregation leads to an increase in the problem of immobility.

Why are there such distinct differences in the choice of schools? The results of Hastings et al. (2005) suggest that families with a lower level of education take less time to choose a school. In addition, it is evident that wealthier families have a clear information advantage in relation to the education system and school quality, partly because of their own experiences. Overall, it is often difficult for disadvantaged families to obtain the information needed for an informed decision about school choice. In some cases, the choice of school or school form is simply the result of the preferences of the parents; parents with higher levels of education tend to have a higher preference for education. This is suggested by the results of the OECD (2009), which show that an early separation of children in different types of schools leads to a higher degree of segregation and to a reduction of educational success. The less time spent at the primary and secondary school level, the more significant the preferences of the parents, while the children's preferences are less significant. Moreover, the study illustrates that the number of different types of schools is positively correlated with the level of segregation. Both findings are the result of a lack of information available to disadvantaged families and differing educational preferences.

Insufficient information policy has strong implications: The results of the PISA study show that in Germany, students from families with a migration background achieve only 88% of the score of native students. In open societies such as Australia (100%), Canada (98%), New Zealand (98%) or the United States (95%), the process of catching up to the level of average human capital is significantly easier. It is also striking to note that little progress can be seen between the results of first generation migrant children (450 points in reading PISA) and the second generation (457) in Germany. On one hand, education

potential is wasted, which exerts considerable negative macroeconomic effects on the economy in the face of structural change, skill-based technological change, and the expected shortage of skilled workers. At the same time, the waste of educational potential associated with a uniform distribution of abilities in children from families with different socio-economic backgrounds essentially leads to a reduction of mobility, as indicated by the results of the estimations shown in Chapter 5.

How can these problems be overcome? Ladd, Fiske, and Ruijs (2009) show that cream-skimming always becomes a problem when schools can choose their own admission criteria, if the application deadlines for the schools differ from each other and if fees are estimated. Uniform application deadlines nationwide and a consistent information policy in the pre-school and elementary areas, especially for disadvantaged parents, are indispensable. Godwin, Leland, Baxter, and Southworth (2006) report positive effects of a corresponding field project in the United States. Performance in the elementary stage is often seen as the most crucial criterion for admission of students in various types of schools. However, in school systems in which there is an early separation of children, this leads to a premature selection, which is ex post difficult to correct. In addition, the results of a series of studies show that students from disadvantaged social backgrounds continue on to the secondary level significantly less often, even though they often possess sufficient skills. If the separation were to occur later in the school system, this channel of segregation would be reduced.

A further mobility-promoting measure here is the reduction of local segregation. However, this is difficult to realize and not very feasible in the long term. Thus improvement in the incentive structure of schools in the selection of students seems a reasonable way to avoid segregation of students according to socio-cultural and economic background. One such example is "formula funding", which has been practiced in the Netherlands since 1985. In this system, each student is first assigned a weight. The school's funds are ultimately determined by the sum of its weights. If students from disadvantaged families are assigned a higher weight, it provides incentives for schools to take on these students, thereby taking into account that the admission of disadvantaged students can be cost-intensive due to a higher need for care for these students. Cream skimming is therefore limited; a mixture of students from diverse ethnological and social background leads to a reduction of cluster formation. Desegregation also decreases the influence of parental preferences that are suboptimal for children, whether they are individually determined or determined by social and

cultural origin. At the same time, this method reduces the number of "bad" schools. However, as indicated by Waslander, Pater and Van der Weide (2010), higher travel expenses occurring for children from disadvantaged families that must travel to a "good schools" negatively affects the choice of school. The subsidization of ticket prices or framework agreements that affect price reduction on economies of scale can remedy this.

The importance of cognitive stimulation in early childhood was emphasized in previous chapters. Studies such as those of Knudsen et al. (2006) indicate that early childhood education is crucial for the later education potential and thus has a significant impact on social mobility. Children who are denied this stimulation often tend to perform significantly worse in later school years. As the theoretical model and the results of the estimate suggest, early childhood education is significantly influenced by the preferences of the parents for the type of education and by the number of parents involved in raising the child. In addition, the example of Sweden illustrates that cognitive stimulation, which is initially unavailable to children from disadvantaged families under certain circumstances, can be administered by the government. For this reason it is of great importance that the state provides sufficient resources for early childhood education in the preschool area and that these resources in particular are readily available for underprivileged children.

Another measure that is often discussed is the provision of education vouchers. This can help reduce segregation and allow students to have free choice of schools, regardless of their socio-economic background. This also leads to an increase in competition between schools, thereby also creating incentives to improve quality. Friedman (1955) first introduced this concept in the mid-1950s by stating that educational institutions should no longer be financed directly from the state, but indirectly via the students. Here each student would receive a voucher that can be redeemed at a school of their choosing. In Germany there are vouchers from the Federal Labor Agency for various continuing education programs. However, similar programs in Chile and a few other OECD countries have yielded mediocre results at best. The reason for such sobering outcomes is the fact that it has not yet become possible for these programs to prevent cream-skimming and increase competition between schools. This may be because the quality of schools exhibits a high persistence, meaning that the schools, which were initially very popular before the introduction of voucher programs, remained in demand for potential students afterwards. The combination of education vouchers with Dutch-style "formula funding" could reduce

cream-skimming of the "good" students. A further cause for the previously sobering effect of school vouchers is the fact that they do not take into account all costs of education. There are often additional costs, such as fees for the care of children during breaks, travel expenses, costs for tutoring, course materials, school uniforms and school strips. Waslander, Pater, and Van der Weide (2010) and Elacqua (2012) suggest that these additional costs negatively affect choice of school.

Alongside education and social background, the analysis in Chapter 5 illustrates further factors influencing mobility. It turns out that the labor market is an instrument essential to the achievement of higher social mobility. Countries that are able to bring more people into the work force can be characterized on average by a higher social mobility. Structural change in terms of labor market policy has been proven to be a key driver of immobility. Technological advances have changed the demand for skills on the part of the company. If the changing nature of jobs does not fit the current skills of workers, the result is mismatch unemployment. Thus is it critical that policy makers respond quickly to this structural change. This concerns first and foremost the manufacturing industry. The analysis shows that countries with large manufacturing sectors are more mobile on average. If these jobs are lost or moved abroad in the course of structural change, the society becomes more immobile. In particular, the service sector profits from this industrial shift, as a number of new jobs will be created in coming years. A targeted information policy and promotion of these career fields in school age children may make it possible to draw positive macroeconomic change from the structural shift.

The analysis also shows that the effect of redistribution on social mobility is parabolic, so that a small amount of redistribution first decreases mobility and greater upheavals cause a mobility-enhancing effect. Only when the amount of redistribution exceeds a relatively high value of 11% points of the Gini coefficient is there a positive effect on mobility. As shown above, the average in the sample of the 94 SWIID countries is 6.21, the median is 3.63. This means the average is just half the amount necessary for a positive effect on mobility is redistributed. However, redistribution induced effects on mobility would result in fundamental changes of the tax and social security systems in many countries. With increased incentive structures, this can trigger a number of side-effects, especially in terms of labor supply and the decision to invest in human capital. In addition, the question of how redistributed funds for underprivileged families should be used remains. If these funds are not used on the education of the children, but

are instead consumed, there is no positive effect on mobility. The theoretical model clearly shows that the use of a family's budget is highly dependent on the parental preferences for either present consumption or for education of their children. Thus an increase in mobility via a greater redistribution appears to be the worst of all alternatives.

A final finding from the analysis of this paper is that both the culture and the composition of ethnic groups in a society exert influence on the mobility of their individuals. It is not desirable to change the culture in a country; however, the results of the study suggest that highly diverse societies are more mobile. A plausible cause of this result is the fact that there are relatively few prejudices and resentment towards other ethnic groups in a diverse society, as no one group has a favored status. Nepotistic structures that arise from membership in a selection group are significantly reduced. Thus the results indicate that the trend in Germany towards greater ethnic diversity can be seen as a positive development in terms of mobility, especially considering the Herfindahl value of 8,200 for Germany, which is near the top of the parabola (6,400).

7 Conclusion

This paper has empirically examined the causes of differences in social mobility rates across countries using widely available macroeconomic data. We further discussed various approaches to solving the problem. As the analysis indicates, mobility is always high when (1) there is less social segregation in a country, (2), children grow up in a stable family environment and are given an appropriate level of stimulation of cognitive abilities in early childhood, (3), the employment rate is high, (4), the process of catching-up to the average level of human capital is easier, i.e. there is more equality of opportunities, (5) the extent of redistribution is either very high or very low, (6) there is an adequate and sensible level of investment in the education system, (7) the variation of school quality is low and (8) social capital is open to any citizen of a country. The question of whether a society wishes to increase social mobility and what paths they are ready pursue in order to achieve this is always a normative one. However, a restructuring of the education system not only creates a higher social mobility, but also leads to a lower income inequality, greater equity, targeted expenditure, and positive effects on efficiency.

References

Aaronson, D. and B. Mazumder (2005): "Intergenerational economic mobility in the u.s., 1940 to 2000," *Working Paper Series*, 05–12, federal Reserve Bank of Chicago.

Barro, R. and J.-W. Lee (2013): "A new data set of educational attainment in the world, 1950-2010," *Journal of Development Economics*, 104, 184–198.

Becker, G. (1991): *A Treatise on the Family*, Harvard University Press.

Becker, G. and N. Tomes (1979): "An equilibrium theory of the distribution of income and intergenerational mobility," *Journal of Political Economics*, 87, 1153–1189.

Becker, G. and N. Tomes (1986): "Human capital and the rise and fall of families," *Journal of Labor Economics*, 4, 1–39.

Bellou, A. (2013): "Male wage inequality and marital dissolution: Is there a link?" *IZA Discussion Paper*.

Björklund, A. and M. Jäntti (2009): "Intergenerational income mobility and the role of family background," in B. N. Wiemer Salverda and T. Smeeding, eds., *The Oxford Handbook of Economic Inequality*, Oxford University Press.

Björklund, A., M. Lindahl, and E. Plug (2006): "The origins of intergenerational assoociations: Lessons from swedish adoption data," *Quarterly Journal of Economics*, 212, 999–1028.

Borjas, G. (1992): "Ethnic capital and intergenerational mobility," *Quarterly Journal of Economics*, 107, 123–150.

Castelló-Climent, A. and R. Domenénech (2014): "Human capital and income inequality: Some facts and some puzzles," *BBVA Research Working Paper*.

Chetty, R., N. Hendren, P. Kline, and E. Saez (2014): "Where is the land of opportunity? the geography of intergenerational mobility in the united states," *NBER Working Paper*.

Child Trend (2013): *World Family Map Database*, Child Trend.

Clark, G. (2014): *The Son Also Rises: Surnames and the History of Social Mobility*, Princeton University Press.

Corak, M. (2006): "Do poor children become poor adults? lessons for public policy from a cross country comparison of generational earnings mobility," *Research on Economic Inequality*, 13, 143–188.

Corak, M. (2011): "Inequality from generation to generation: The united states in comparison," *Unpublished Paper*, university of Ottawa.

CREG (2014): *Composition of Religious and Ethnic Groups Data*, Cline Center for Democracy, University of Illinois.

Elacqua, G. (2012): "The impact of school choice and public policy on segregation: Evidence from chile," *International Journal of Educational Development*, 32, 444–453.

Erikson, R. and J. Goldthorpe (1992): *The Constant Flux: A Study of Class Mobility in Industrial Societies*, Oxford Press.

FIFA (2014): *The FIFA/Coca-Cola World Ranking*, International Federation of Association Football.

Friedman, M. (1955): "The role of government in education," in R. Solo, ed., *Economics and Public Interest*, Rutgers University Press.

Godwin, K., S. Leland, A. Baxter, and S. Southworth (2006): "Sinking swann: Public school choice and resegregation of charlotte's public schools," *Review of Policy Research*, 23, 983–997.

Greene, W. (2000): *Econometric Analysis*, Prentice Hall, 4 edition.

Hanushek, E. and L. Woessmann (2012): "Do better schools lead to more growth? cognitive skills, economic outcomes, and causation," *Journal of Economic Growth*, 17, 267–321.

Hassler, J., J. Rodriguez Mora, and J. Zeira (2007): "Inequality and mobility," *Journal of Economic Growth*, 12, 235–259.

Hastings, J., T. Kane, and D. Staiger (2005): "Parental preferences and school competition: Evidence from a public school choice program," *NBER Working Paper*.

Hofstede, G. (2001): *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*, Sage Publications, 2 edition.

ILO (2014): *LABORSTA Database*, International Labour Organization.

Juhn, C., K. Murphy, and B. Pierce (1993): "Wage inequality and the rise in returns to skill," *Journal of Political Economy*, 101, 410–442.

Knudsen, E., J. Heckman, J. Cameron, and J. Shonkoff (2006): "Economic, neurobiological and behavioral perspectives on building america's future workforce," *NBER Working Paper*, 12298.

Krueger, A. (2012): "The rise and consequences of inequality in the united states," Manuscript of the Speech at the Center for American Progress, January 2012.

Ladd, H., E. Fiske, and N. Ruijs (2009): "Parental choice in the netherlands: Growing concerns about segregation," *Disussion Paper of the University of Vanderbilt*.

Levine, D. and B. Mazumder (2007): "The growing importance of family: Evidence from brother's earnings," *Industrial Relations: A Journal of Economy and Society*, 46, 7–21.

Levitt, S. (2004): "Understanding why crime fell in the 1990s: Four factors that explain the decline and six that do not," *Journal of Economic Performance*, 18, 163–190.

Lubienski, C. (2006): "School diversification in second-best education markets. international evidence and conflicting theories on change," *Educational Policy*, 20, 323–344.

Mazumder, B. (2008): "Sibling similarities and economiv inequality in the us," *Journal of Population Economics*, 21, 685–701.

Murray, C. (1984): *Loosing Ground: American Social Policy, 1950-1980*, Basic Books.

Murray, C. (2012): *Coming Apart: The State of White America*, Crown Forum.

Musset, P. (2012): "School choice and equity: Current policies in oecd countries and a literature review," *OECD Education Working Paper*.

OECD (2009): *PISA 2009 Database*, Organisation for Economic Co-operation and Development.

Piketty, T. (2000): "Theories of persistent inequality and intergenerational mobility," in A. Atkinson and F. Bourguignon, eds., *Handbook of income Distribution*, Elsevier.

Putnam, R. (1995): "Bowling alone: America's declining social capital," *Journal of Democracy*, 6, 65–78.

Raveaud, M. and A. Van Zanten (2007): "Choosing the local school: middle class parents' values and social and ethnic mix in london and paris," *Journal of Education Policy*, 22, 107–124.

Riedel, A., K. Schneider, C. Schuchart, and H. Weishaupt (2010): "School choice in german primary schools: How binding are school districts?" *Journal for Educational Research Online*, 2, 94–120.

Sacerdote, B. (2007): "How large are the effects from changes in family environment? a study of korean american adoptees," *Quarterly Journal of Economics*, 122, 119–157.

Schneider, M. and J. Buckley (2002): "What do parents want from schools? evidence from the internet," *Educational Evaluation and Policy Analysis*, 24, 133–144.

Solon, G. (2004): "A model of intergenerational mobility variation over time and place," in M. Corak, ed., *Generational Income Mobility in North America and Europe*, Cambridge University Press.

Solt, F. (2009): "Standardizing the world income inequality database," *Social Sciences Quarterly*, 90, 231–242.

UN (2013): *UNSD Demographic Statistics Database*, United Nations.

UN (2014): *UNODC Database*, United Nations.

Waslander, S., C. Pater, and M. Van der Weide (2010): "Markets in education: An analytical review of empirical research on market mechanisms in education," *OECD Education Working Paper*.

Wilson, W. (1996): *When Work Disappears: The World of the New Urban Poor*, Knopf.

World Bank (2014a): *World Development Indicators Database*, The World Bank.

World Bank (2014b): *Educational Statistics*, The World Bank.