Social capability and economic development*

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Abstract

This paper explores the role of 'social capability' in growth and development. We present a wide variety of evidence to show that rates of growth, in per capita income and TFP, are strongly related to the extent of a country's initial social development. We also show that differences in social development can explain polarization taking place in the world income distribution. Not only are these results interesting in themselves, they lead us to reject the influential augmented Solow model in favour of the alternative view, in which technology is allowed to differ across countries and social factors play a role in the speed of catching up.

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Those who study the history of long-run growth and development have long believed that a country's social characteristics are fundamental to its achieving prosperity. Among the earliest thinkers on this topic, Marx saw society and the economy as intertwined, Weber traced the influence of religious ethics on changing economic ideology and practice, and writers in the German historical school, notably Werner Sombart, emphasised the role of sociological factors (Hoselitz, 1953a). Social factors are almost always placed among the preconditions for economic development, as in United Nations (1951), and the root causes of economic backwardness have continually been traced to social structure and culture, as in the first mission reports of the World Bank (Spengler, 1954).

More recently, the idea has been expressed famously by Abramovitz:

> ...technological backwardness is not usually a mere accident. Tenacious societal characteristics normally account for a portion, perhaps a substantial portion, of a country's past failure to achieve as high a level of productivity as economically more advanced countries. The same deficiencies, perhaps in attenuated form, normally remain to keep a backward country from making the full technological leap envisaged by the simple [catch-up] hypothesis. I have a name for these characteristics. Following Kazushi Ohkawa and Henry Rosovsky, I call them "social capability"...a country's potential for rapid growth is strong not when it is backward without qualification, but rather when it is technologically backward but socially advanced.
>
> Abramovitz (1986, p. 387-388)

The idea that a country's ability to catch up depends not only on capital accumulation, but also on its level of social development, is a natural and

appealing one. It provides a simple and intuitive explanation of why some countries stagnate while others overtake the early leaders. The problem with social capability has been, as Abramovitz points out, that "no one knows just what it means or how to measure it".

Earlier attempts to assess its importance, such as Hansson and Henrekson (1994), have acknowledged the measurement difficulty, but done little to circumvent it. In their paper, they use measures of human capital and trade openness, but it is clear that these do not capture a large part of what Abramovitz means by social capability. Marsh (1988) perhaps came closer, making use of variables for newspaper consumption and ethno-linguistic heterogeneity, among others. However, he found no effect of his selected variables, at least when controlling for the investment ratio and the initial level of GDP per capita. Meyer et al. (1979) found little effect of social and political modernization, and speculated that social modernization is perhaps becoming less important given the rise of 'strong states' committed to economic growth.

Recently, social factors have again come to the fore, with the much publicised work of Putnam (1993, 1996). Helliwell and Putnam (1995) have related growth in Italian regions to stocks of 'social capital'. Putnam has emphasized associational memberships and survey measures of social trust as important indicators of social capital. Helliwell (1996), in a study of social capital and Asian growth, finds no effect of an interesting set of variables. Indeed, he finds that his measures of social capital are significantly negatively correlated with 1962-90 productivity growth. In our own work, we focus on 'social capability', or the capacity of social institutions to assist in the adoption of foreign technology (Ohkawa and Rosovsky, 1973, ch. 9). This leads us to emphasise such factors as social mobility, communications,

and 'modernization of outlook', rather than the indicators of trust and social participation discussed in Putnam's work.

In this paper, we use an index of social development constructed in the mid-1960s by the economists Irma Adelman and Cynthia Taft Morris, and documented in Adelman and Morris (1967). We find several interesting results. Economic growth since the early 1960s is strongly related to the initial level of social development. We should emphasise that this result holds true whether one makes use of cross-section regressions, individual growth accounting studies, or stochastic production frontier TFP estimates. The result is robust in the sense of Levine and Renelt (1992), and we also use robust estimation techniques to establish that our findings are not driven by influential outliers.

We can go further than this. The index of social development appears to have considerable explanatory power for movements within the international income distribution. Hence, it can provide a partial explanation of the polarisation and bimodality emphasised by Quah (e.g., Quah 1996). Not only that, we find particularly interesting results when we use the index to split the sample into multiple regimes. We find that, at low levels of social development, schooling is important for growth, physical capital accumulation less so. For countries with higher levels of social development, the effect of schooling appears to be relatively less important.

Taken overall, these findings are important for at least three reasons. First, they affect the view we should take about existing growth theories. In particular, the influential augmented Solow model is rejected in favour of a different view of development, in which the international transmission of ideas is central. Second, controlling for the initial level of social development should improve the standard of future empirical work on economic growth. Finally,

the finding that part of the variation in growth rates is due to differences in social development, while not surprising, is interesting in itself. It opens up many opportunities for innovative theoretical and empirical work, some of which will have a more direct policy orientation than this exploratory paper.

The next section discusses the possible role of social development. Section 2 discusses the construction of the index used, and presents simple graphs indicating the possible importance of social development. In section 3, we assess its role more formally, using the augmented Solow model as a theoretical framework. Regression tree analysis is used to split the sample and investigate the possibility of multiple regimes, where the regimes are divided by social development. In section 4, we use Markov chain transition matrices to investigate the consequences of social development for a country's growth prospects. Section 5 assesses the robustness of the results, using alternative empirical formulations based on Levine and Renelt (1992) and Mauro (1995). Section 6 investigates in more detail the relation between social capability and a variety of measures of total factor productivity growth. Finally, section 7 concludes.

1 Social development and growth

Most historians who have studied long-run growth have pointed to the role of social factors, like the legal and institutional framework. Clark (1965) placed these among the 'fundamental problems' in the study of economic growth. Cole et al. (1992) write that 'the interaction between the organization of a society and its economic performance was once considered perhaps the fundamental question of political economy' (p. 1095). Myrdal (1957) argued that economists too often dismiss non-economic factors. He suggested that a low level of economic development often corresponds to low levels of social

mobility, poor communications, and inadequate education, and made this part of his theory of circular causation. Although vaguely defined, such things as 'modernisation of outlook' and the willingness to experiment could be important in overcoming resistance to new methods and economic change. Lewis (1955) argued that the 'will to economize' is central in determining prospects for growth. For economic growth to take place, it may be important that economic relations are governed by neither social status nor traditional sanctions (Hoselitz, 1955).

These broad ideas can be related to a strand of thought in political science and the sociology of development, 'modernization theory'.[1] Thinkers in this tradition follow Weber in seeing the spread of economic behaviour as the determining force in the economic progress of countries. This in turn requires attitudinal changes in society, which must move from 'tradition' to 'modernity', where modernity is closely identified with the structures and practices of modern Western societies. Usually, modernization theorists have assumed that contact with Western societies is likely to benefit the Third World.

By the late 1960s, this school was coming under attack from a variety of directions. It has been argued that the theory is ethnocentric, and thus fails to consider alternative paths of development. Some of the key concepts, like tradition and modernity, are problematic. In this paper we will ignore these criticisms, and simply suggest that more 'modern' social arrangements do seem to prove beneficial for economic growth, as the modernization theorists assumed; see for instance Inkeles and Smith (1974, p. 312-316). This is not to deny that modernization may bring many problems in its wake - social disorganization, personal demoralization, alienation - and we do not wish

[1] See Alavi and Shanin (1982) and especially So (1990) for an introduction to the sociology of development.

to make strong claims about the effects of social modernization on social welfare.

1.1 Society and entrepreneurship

We turn now to more specific aspects of social development. A common approach in modernization theory has been to relate the sociological concepts of Talcott Parsons to conditions for economic growth.[2] In the modern industrialized countries, roles are open and allocated on the basis of achievement, encouraging initiative and innovation. More fundamentally, the psychologist McClelland (1961) has explored the social sources of drives for achievement.[3]

A closely related theme, long present in the economics literature, is that social conditions are important in determining the quality of entrepreneurship. Innovative efforts are far more likely to be forthcoming when entrepreneurship is prestigious and there is room for social mobility, compared to more conservative and restrictive societies. Hoselitz (1952b, 1953b, 1957), Lewis (1955), Rostow (1960) and more recently Baumol (1990, 1993) all make points along these lines. Gerschenkron (1962) is one of the few to have disagreed with this view.

We can relate these ideas to some of the newest theoretical work on growth. Fershtman et al. (1996) investigate the links between social status, the allocation of talent across occupations, and growth. Galor and Tsiddon (1996) present an explicit theoretical model in which social impediments to earnings mobility will distort the allocation of talent, lower the frequency of innovations, and reduce growth.

[2] See for instance Hoselitz (1953b) and So (1990), p. 21-23.

[3] Anyone who doubts the relevance of these ideas should perhaps ponder the following sentence from McClelland's 1961 book: "one would predict [based on the investigation] that Japan will move from a status of an 'underachiever' in the economic sphere to that of an 'overachiever', say by 1970." McClelland (1961, p. 102).

1.2 Other aspects of social development

Many writers have pointed to the co-existence in developing countries of a modern industrial sector and a more traditional, rural way of life. Herskovits (1952) and Hirschman (1959, p. 129) argue that this dualism can hold back the appearance of modern industrial methods. Linton (1952) pointed to the role of traditional kin groups, and in particular the conservatism of the extended families common in underdeveloped economies. Herskovits argued that the communally oriented kin group tends to lessen work incentives and acts as a conservative influence on consumption patterns. However, it might also contribute to growth, by for instance allowing risk sharing.[4] More generally, we have to be careful in selecting the aspects of 'tradition' that could act as barriers to growth.

Cole et al. (1992) construct a model in which social status determines the allocation of non-market goods. In turn, this creates a concern with relative standing which can affect saving behaviour. When status is determined by relative wealth, this will tend to lead people to save more. So, if the relation between wealth and status differs across societies, this is likely to be reflected in different levels of saving and economic activity.

On a more general note, Parente and Prescott (1994) argue that the stylized facts of development are only consistent with a model in which technology differs across countries, and some countries have high barriers to technology adoption. It is natural to assume that one barrier to adoption lies in ill-suited social arrangements, and that the arrangements of traditional societies may be less well suited to growth than those of Western liberal democracies.

[4]For more discussion, see Hunt (1966) and Wong (1988).

2 The Adelman-Morris index

Clearly, these many aspects of social development present a measurement problem. To solve it, Adelman and Morris construct an index of social development using factor analysis. The technique, initially developed to study intelligence, is intended to relate a group of indicators to a smaller set of common underlying factors, or latent variables. Making use of the results clearly requires several assumptions, not least that a complex multidimensional phenomenon like social development can be meaningfully reduced to a single index or set of indices. The technique is controversial, to the extent that Everitt (1984) writes that "factor analysis has probably attracted more critical comment than almost any other statistical technique" (p. 31), although he goes on to add that much of the criticism is ill-judged.[5]

In this paper we will take an agnostic approach. We present several sets of results making use of the index constructed by Adelman and Morris, which we call *SocDev*. These generally suggest that growth is strongly correlated with the index. Given doubts over the usefulness of factor analysis, we have to retain an open mind on whether or not the index is an accurate indication of a country's social development. But our results suggest that Adelman and Morris have succeeded in quantifying a latent variable that is important to growth, and given how the variable was constructed, it is likely to reflect the level of social development to some extent.

[5] For a good introduction to factor analysis, and discussion of some of the problems, see Chatfield and Collins (1980).

Table 1 Components of the Adelman-Morris index
Size of the traditional agricultural sector
Extent of dualism
Extent of urbanisation
Character of basic social organization
Importance of indigenous middle class
Extent of social mobility
Extent of literacy
Extent of mass communication
Crude fertility rate
Degree of modernization of outlook

What does the index measure exactly? To construct their index, Adelman and Morris use assessments of each country's development as of 1957-62 in a variety of respects, listed in Table 1. It is clear that several of these relate to our earlier discussion in section 1, while others (literacy, the extent of mass communication) can be seen as measures of human capital. The indicators and their possible role in development are discussed in more detail in Adelman and Morris (1967).[6] In the next few paragraphs, we will discuss the interpretation of the final index.

It is clear that the Adelman and Morris index should be seen as representing an overall position in terms of societal development; it should not be identified with any particular one of the indicators in Table 1. Hence, our paper will not tie down the growth effects of particular aspects of social development. Instead, we will take a broader view. Societies can be seen as evolving along a variety of fronts at once - as the modernization theorists believed - and the index measures the extent of a society's overall evolution. Hence, our results are necessarily vague on the question of *why* society mat-

[6]See also Adelman and Morris (1968), Rayner (1970), Brookins (1970) and Adelman and Morris (1970).

ters. We first wish to convince the reader that social factors are important. Given measurement problems, focusing on particular aspects of society will be a harder and more controversial task.

It is also worth noting that to obtain their final results, Adelman and Morris omitted two indicators previously included: the degree of cultural and ethnic homogeneity, and the extent of national integration. Their justification is that inclusion of these indicators led to country rankings that were inappropriate (Adelman and Morris, p. 168-9). Thus it is clear that the final index combines the outcome of a particular statistical procedure with the subjective judgements of Adelman and Morris about what would constitute an appropriate ranking.

This is less of a problem than it may first appear. Since the book was published in 1967, there is little possibility that subjective judgements have been contaminated by knowledge of subsequent growth rates. Even if one disregards the factor analysis, and takes the index as simply reflecting judgements of Adelman and Morris, it may still be a useful guide to the extent of social development. The results from the growth regressions will clarify this question. Indeed, if one takes as given the idea that social development is important to growth, our results can be seen as answering the question: how good a job did Adelman and Morris make of measuring social development?

The values of the index are listed in Table 2. Following Adelman and Morris, the index has been used to group the countries. Adelman and Morris describe the three groups in these terms:

> ...the group of countries with the lowest factor scores consists of societies that are primarily tribal and that are characterized by a preponderant nonmarket sector. The intermediate group is made up of countries in which the typical kinship structure is the

> extended family and in which the exchange sector of the economy is generally much larger than it is in the lowest group. The highest group includes only countries that, although still underdeveloped in the late 1950s, are relatively advanced with respect to both social and economic development.
>
> Adelman and Morris (1967, p. 169)

In figure 1, SocDev is plotted against the log of 1960 per capita income (data from Mankiw, Romer and Weil 1992, henceforth MRW). The close relation between social development and per capita income, noted in Adelman and Morris (1965, 1967) and replicated here using the Summers-Heston data set, is an interesting result in itself.[7] Clearly, the direction of causality is uncertain, and there are presumably links running in both directions. A higher level of social development is likely to be reflected in higher investment and lower population growth, raising steady state income, while economic development is often felt to bring far-reaching social changes in its wake.[8]

[7] Adelman and Morris (1967) showed that 70% of the variation in per capita incomes can be explained using four common factors extracted from 24 socio-political indicators.

[8] For instance, Galor and Tsiddon (1996) discuss the likely endogeneity of intergenerational earnings mobility.

Table 2
The Adelman-Morris index (SocDev)

Group 1		**Group 2**		**Group 3**	
Niger	-1.86	Myanmar	-0.41	Colombia	0.66
Chad	-1.70	Indonesia	-0.40	Peru	0.68
Malawi	-1.57	Bolivia	-0.35	El Salvador	0.71
Benin	-1.54	India	-0.28	Egypt	0.73
Guinea	-1.47	Tunisia	-0.18	Mexico	0.75
Sierra Leone	-1.39	Pakistan	-0.08	Costa Rica	0.78
Nepal	-1.36	Iraq	-0.03	Brazil	0.79
Somalia	-1.35	Ghana	-0.01	Dominican Rep.	0.81
Cameroon	-1.34	Iran	0.09	Panama	0.84
Madagascar	-1.31	Zimbabwe	0.14	Korea	0.85
Tanzania	-1.22	Jordan	0.16	Nicaragua	0.88
Uganda	-1.22	Algeria	0.18	Turkey	0.88
Afghanistan	-1.02	Honduras	0.26	Paraguay	0.97
Liberia	-1.01	Guatemala	0.35	Taiwan	1.05
Ethiopia	-0.99	Sri Lanka	0.35	Jamaica	1.06
Ivory Coast	-0.98	Thailand	0.50	Cyprus	1.08
Nigeria	-0.91	Ecuador	0.54	Trinidad	1.15
Zambia	-0.89	Surinam	0.54	Venezuela	1.37
Gabon	-0.83	Philippines	0.56	Chile	1.39
Sudan	-0.64	Syria	0.57	Greece	1.47
Morocco	-0.57	South Africa	0.62	Uruguay	1.59
Kenya	-0.53			Japan	1.63
Senegal	-0.52			Israel	1.77
				Argentina	1.91

Notes

The index for other countries, not included in the Mankiw-Romer-Weil data set, is: Cambodia (-0.55), Laos (-1.06), Libya (-0.68), South Vietnam (-0.49), Lebanon (1.44). Benin was called Dahomey at the time of the Adelman-Morris study. Their figure for 'UAR' corresponds to Egypt, not the unification of Egypt and Syria between 1958-1961. The figure for Tanzania

is the Adelman-Morris index for Tanganyika, which merged with Zanzibar in 1964 to become Tanzania.

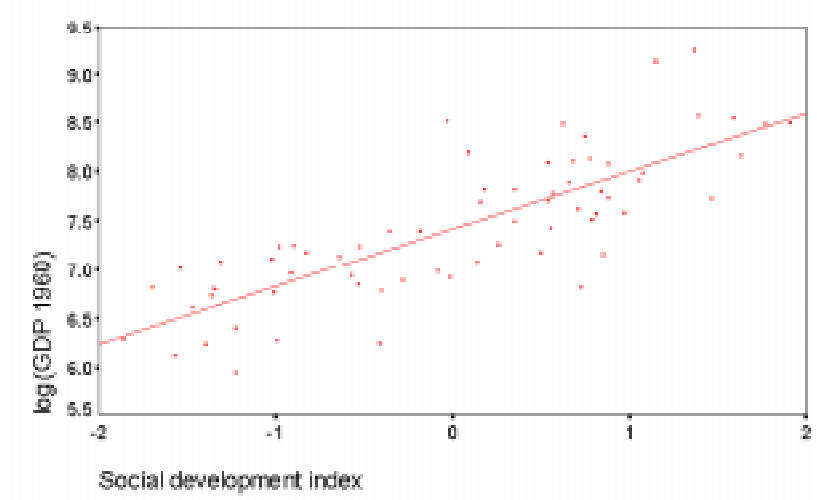

Figure 1: The Adelman-Morris index and per capita income

In figure 2, we plot growth between 1960 and 1985 against the initial level of social development (growth data from MRW). However, rather than simply use SocDev, we use the component of it that is orthogonal to initial per capita income. This is because, although growth may be positively related to social development, it is generally thought to be negatively related to initial income. To avoid this problem, we regress SocDev on the log of initial income, and take the residuals to be the orthogonal component.[9]

It is clear from figure 2 that there is a strong correlation between long-run growth and social development relative to initial income. The simple correlation coefficient is 0.60 and Spearman's rank correlation is 0.54. The R^2 is 0.36, so the component of SocDev orthogonal to initial income explains

[9] De Long and Summers (1991) use a similar procedure. Later in the article, we regress growth on both initial income and SocDev, together with other variables.

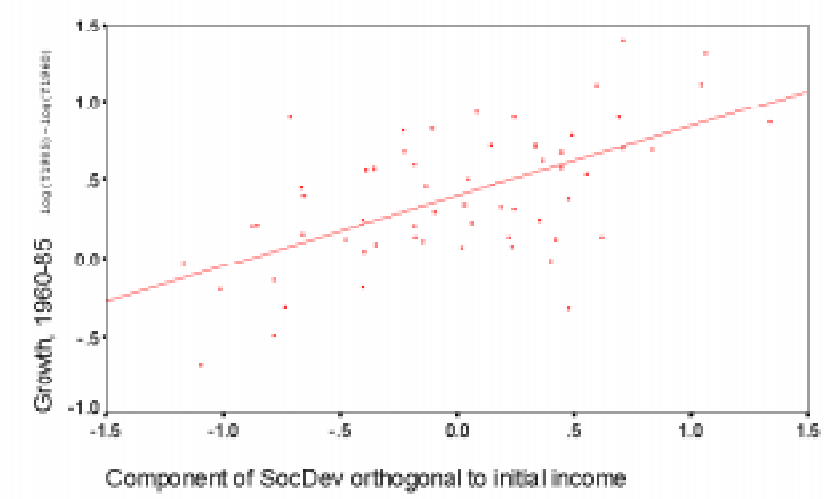

Figure 2: Social development and growth

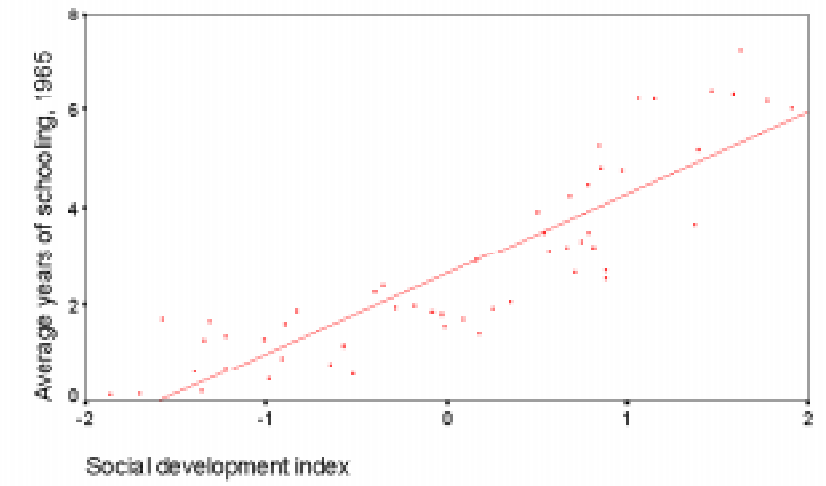

Figure 3: Social development and human capital

nearly 40% of the variation in growth rates. Some caution is needed, since it is also clear from figure 2 that the correlation may be partly due to countries with extreme values of social development relative to initial income. In the work that follows, we are careful to use robust estimation procedures, that should ensure our results are not driven by influential outliers.

In figure 3, we present the relation of SocDev to average years of schooling in 1965 (data from Benhabib and Spiegel 1994). There is a very strong correlation (simple r = 0.87, Spearman's r = 0.92). This is worrying for two reasons. First, it suggests that SocDev may not contain much information beyond that already available in a simple measure of educational attainment. Second, it may be that when we use years of schooling to measure human capital, such variables appear to work well because they reflect the overall level of social development, rather than the skills of the workforce. The remainder of this paper will shed light on both these problems, and suggest that the first may be less troublesome than figure 3 suggests. The second is more problematic, and our results sometimes suggest that SocDev should be included as an explanatory variable in studies of human capital and growth.

3 Social development and the augmented Solow model

This section investigates the role of social development within the augmented Solow model. That model, introduced by Mankiw, Romer and Weil (1992), starts from the proposition that productivity growth is the same across countries. The underlying argument is that technology is a public good. Mankiw (1995) defends the view that there is no reason for technology to differ across countries, so technical progress will proceed at a common world rate. In sharp contrast, researchers like Moses Abramovitz and Paul Romer have ar-

gued that technology differs across countries, and that social factors affect the rate at which countries can adopt more advanced technologies from abroad.

Thus, introducing SocDev into the regressions, we can investigate a question central to empirical work on economic growth: are levels and growth rates of TFP the same across countries? There is also a second issue at stake. In the MRW framework, total factor productivity levels are allowed to differ across countries, because these reflect "not just technology but resource endowments, climate, institutions and so on" (MRW, p. 410-411). However, if these differences in technology are correlated with the regressors, the estimates obtained by MRW will be inconsistent.

Before investigating this, we start with the augmented Solow model, in standard notation:

$$\begin{aligned} Y &= K^{\alpha} H^{\beta} (AL)^{1-\alpha-\beta} \\ L &= L(0)e^{nt} \\ A &= A(0)e^{gt} \end{aligned} \tag{1}$$

Define the stock of capital per efficiency unit of labour, $k = K/AL$, and similarly for output $y = Y/AL$. The evolution of capital is given by

$$\dot{k} = s_k y - (n + g + \delta)k \tag{2}$$

where s_k is the rate of saving and δ is the rate of depreciation. Similarly, define h as human capital per efficiency unit of labour, $h = H/AL$, and assume that it evolves as

$$\dot{h} = s_h y - (n + g + \delta)h \tag{3}$$

Solving these two differential equations for steady state physical and human capital, substituting them into the production function, and taking logs, gives steady state income per capita as

$$\ln\left[\frac{Y^*}{L}\right] = \ln A(0) + gt - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) + \frac{\alpha}{1-\alpha-\beta}\ln(s_k) + \frac{\beta}{1-\alpha-\beta}\ln(s_h) \quad (4)$$

Equation (4) provides a theoretical basis for the first set of empirical results. The argument is that, if the initial level of productivity $A(0)$ or its subsequent growth (g) are correlated with social development, one would expect SocDev to be positively signed and significantly different from zero when entered into equation (4). We carried out these regressions for the 60 countries which form the intersection of the MRW non-oil sample and the countries with an Adelman-Morris index. Although there are a few OECD countries included, for the most part the sample is one of developing countries. We have followed MRW in using the averaged investment ratio for s_k and their schooling proxy for s_h.

From these results (available on request) it is clear that SocDev is strongly correlated with 1985 per capita incomes. It is significantly different from zero at the 0.1% level, and has substantial explanatory power, with a partial R^2 of 0.37. This suggests that either the initial level of technology, or its rate of growth, or both, are related to the initial level of social development.[10] The coefficient on schooling remains significantly different from zero, suggesting that the schooling variable does not simply proxy for the state of social development or vice versa.

We also investigate whether social factors affect the determinants of a country's steady state. When investigating the correlations, we must again be careful to use the component of SocDev that is orthogonal to initial income,

[10] Note that, if the rate of growth (g) is affected, these regressions are not wholly satisfactory, because g is held constant in using the ln (n+g+δ) term.

since investment rates and population growth may be related to initial income more strongly than social factors. Using the MRW regressors, there is some evidence that countries with higher degrees of social development relative to income invest more in physical capital and schooling, while the effect on population growth is uncertain. The Spearman's rank correlations are 0.36, 0.47 and -0.03 respectively. The signs of these relationships are all natural, while the strength of the first two correlations calls MRW's original results into question. It appears that the regressors in their framework are correlated to some extent with the omitted country fixed effects, as argued less directly by Caselli et al. (1995) and Islam (1995). This means that the MRW estimates must be interpreted with caution.

3.1 Social development and growth

The regressions discussed above, like those for steady state incomes in MRW, do not control for transitional dynamics. It is possible that SocDev emerges as significant because it is positively correlated with initial income, so that it proxies for departures from steady states. In this section, we consider the role of SocDev in growth regressions which control for initial income. We find that the effect of SocDev is positively signed and precisely estimated in the whole sample, but performs less well in smaller groups, such as continents.

We follow MRW by using (4) and approximating around the steady state. See for instance MRW or Romer (1996, p. 21-22). Substituting for y^* gives:

$$\begin{aligned} \ln y(t) - \ln y(0) &= \theta \frac{\alpha}{1-\alpha-\beta} \ln(s_k) + \theta \frac{\beta}{1-\alpha-\beta} \ln(s_h) \\ &\quad -\theta \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n+g+\delta) - \theta \ln y(0) \end{aligned} \tag{5}$$

where $\theta = 1 - e^{-\lambda t}$ and λ is the rate of convergence,

$$\frac{d \ln y(t)}{dt} = \lambda [\ln y^* - \ln y(0)]$$

where

$$\lambda = (n + g + \delta)(1 - \alpha - \beta) \tag{6}$$

We can re-write (5) in terms of per capita output:

$$\begin{aligned} \ln \frac{Y(t)}{L(t)} - \ln \frac{Y(0)}{L(0)} &= \theta \ln A(0) + gt \\ &+\theta \frac{\alpha}{1-\alpha-\beta} \ln(s_k) + \theta \frac{\beta}{1-\alpha-\beta} \ln(s_h) \\ &-\theta \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n+g+\delta) - \theta \ln \frac{Y(0)}{L(0)} \end{aligned} \tag{7}$$

We estimated (7) for the sample of 60 countries, and present the results in the first column of Table 3. In the second column, we add SocDev. It is positively signed and significant at the 5% level. Simple calculations show that the effect is also economically significant. The standard deviation of SocDev is one, so a rise in SocDev of one standard deviation leads to an increase in the growth rate over twenty-five years of $(100 \times 0.23/25) = 0.92$ percentage points. As an illustrative example, if India had achieved the same level of social development as South Korea by 1960, at least as measured by Adelman and Morris, then its income per capita would have grown at 2.3% a year instead of 1.3% for the next twenty-five years. Over the period, the higher growth rate for India would have generated a 1985 income per capita almost 30% higher than the actual value. Remember, too, that this is only the direct effect. We have already seen that higher levels of social development are likely to raise investment, increasing steady state per capita income still further.

One worry about the results in Table 3 is that they may be driven by features of this particular sample, if there are outliers or leverage points hidden in the data. To examine this, we use a robust estimator, least trimmed

squares (LTS). The LTS estimator minimises the sum of squared residuals over half the observations, and so can be seen as a method of characterising the most coherent part of the sample. Having obtained LTS estimates, we identified countries with high residuals as possible outliers, because they lie at some distance from the regression line which best fits the majority of the data. These outliers are then excluded from an otherwise straightforward OLS regression. This is a simple form of re-weighted least squares, or RWLS estimation; it is a technique we use throughout the paper.[11] See Rousseeuw and Leroy (1987) and Temple (1995a) for more discussion.

It is clear from the RWLS estimates that the point estimate of SocDev's effect is not driven by outliers. There is, however, a further concern we need to address: to what extent does SocDev work well simply because it acts as a dummy variable for Africa? To investigate this, we added a dummy variable for Africa to the regression. The coefficient on SocDev is more or less unchanged (0.20 compared to 0.23 earlier) and SocDev remains significant at the 10% level. When three possible outliers are excluded (Cameroon, Morocco, and Zambia) then SocDev is significant at the 5% level.

As a further check of the usefulness of SocDev, we estimated the growth regression for three continents (Africa, Asia and the Americas) using the same boundaries as version 5.6 of the Penn World Tables. These results are also shown in Table 3. SocDev is positively signed, but imprecisely estimated, and we cannot reject the null of a zero coefficient at the 5% level. Excluding possible outliers does not change these results.

[11] Note that this technique will detect outliers, but not leverage points (observations with a large effect on the precision of the estimates). The correct treatment of leverage points is an ongoing controversy.

Table 3
Estimation of the augmented Solow model of growth
Dependent variable: log difference GDP per capita, 1960-1985

Sample	All	All	All	All	Africa	Asia	Americas
Estimation	OLS	OLS	RWLS	OLS	OLS	OLS	OLS
Observations	60	60	53	60	25	13	20
constant	4.34	5.33	5.17	5.26	3.62	1.74	5.07
	(1.30)	*(1.34)*	*(1.22)*	*(1.35)*	*(4.06)*	*(5.61)*	*(3.37)*
ln(I/GDP)	0.41	0.35	0.60	0.37	0.24	0.50	0.52
	(0.15)	*(0.14)*	*(0.12)*	*(0.15)*	*(0.21)*	*(1.04)*	*(0.31)*
ln(n+g+δ)	-0.25	-0.09	0.02	-0.10	-0.36	-0.59	0.32
	(0.42)	*(0.42)*	*(0.36)*	*(0.42)*	*(1.16)*	*(1.36)*	*(1.08)*
ln(SCHOOL)	0.31	0.18	0.05	0.16	0.17	-0.11	-0.06
	(0.09)	*(0.10)*	*(0.09)*	*(0.12)*	*(0.25)*	*(0.32)*	*(0.26)*
ln(Y60)	-0.38	-0.53	-0.46	-0.52	-0.43	-0.28	-0.40
	(0.07)	*(0.09)*	*(0.08)*	*(0.10)*	*(0.24)*	*(0.36)*	*(0.24)*
SocDev	-	**0.23**	**0.23**	**0.20**	**0.20**	**0.27**	**0.03**
		(0.10)	*(0.07)*	*(0.11)*	*(0.23)*	*(0.61)*	*(0.30)*
AFRICA	-	-	-	-0.10	-	-	-
				(0.16)			
R^2	0.45	0.50	0.66	0.51	0.31	0.59	0.60
σ	0.33	0.32	0.26	0.32	0.39	0.31	0.26
Implied λ	0.02	0.03	0.02	0.03	0.02	0.01	0.02

Notes

MacKinnon-White HCSEs in parentheses. Observations omitted from RWLS regression: Argentina, Cameroon, Chile, Liberia, Morocco, Somalia, Zambia.

Note that, in these regressions for continent groupings, the coefficients on initial income and schooling are also insignificant at conventional levels. It appears that in these small samples, the information in SocDev is not

sufficiently distinct from that in the schooling variable and initial income to obtain precise estimates. Overall, though, it appears that SocDev has explanatory power for economic growth over and above a dummy variable for Africa.

There is an important problem with our present empirical approach, although it is one that is frequently used. It is clear from the above equations that, if we believe social development affects the rate of total factor productivity growth (g), then λ and so θ must vary across countries. This suggests that the best policy may be to split the sample into groups which are more homogenous in terms of social development, rather than impose a constant-parameter model (the alternative, non-linear estimation, does not seem to work particularly well).

In some ways, the natural groupings to use are those already made by Adelman and Morris, and listed in Table 2. We estimated (7) for these groups, and found that, when SocDev is added as another regressor, it is insignificant at the 10% level. Once again, this suggests that the index works well in broad terms - in the way it classifies countries - but is not sufficiently accurate to explain growth within smaller groups that are more homogenous in terms of social development. In these small samples, the variables identified by the augmented Solow model explain much of the variation in growth rates, typically 70%-90% when excluding a small group of outliers. As in Durlauf and Johnson (1995), allowing for multiple regimes seems to be important.

One natural area of interest is differences across groups in rates of convergence. In these small samples, the convergence rates are not precisely estimated, and as Temple (1995a) demonstrates, rates of convergence are in any case highly sensitive to measurement errors in initial income and the

conditioning variables. We investigate convergence issues more rigorously below.

3.2 Endogenous splits of the sample using regression trees

In studying differences between groups, an interesting departure is to allow the data to determine the location of different regimes, and we can do this using regression trees, as in Durlauf and Johnson (1995). The technique allows one to search for an unknown number of sample splits using multiple control variables. It thus provides a non-parametric way of identifying multiple regimes in the data, using a set of controls.[12]

In their paper, Durlauf and Johnson showed that splitting the MRW sample by initial income and literacy rates gave convincing evidence of multiple regimes. Their splits gave rise to four groups of countries, but they noted:

> While the use of initial income and literacy as conditioning variables produces country groupings which seem overall quite reasonable, there are some clear anomalies in the estimated regression tree. For example, Japan and the Republic of Korea are assigned to group 3 along with El Salvador, whereas Trinidad and Tobago and Uruguay are assigned to group 4 along with the United States. These anomalies would seem most plausibly explained by the existence of additional initial conditions beyond those we study which are relevant for determining long-run growth patterns. One obvious candidate for such an omitted variable is 'social capital'...

[12] For more on regression trees, see the appendix to Durlauf and Johnson, and the book by Breiman et al. (1984).

Durlauf and Johnson (1995, p. 378)

We can test this idea by using SocDev as an additional control variable in splitting the sample. In particular, it is interesting to see whether SocDev dominates initial income and literacy as a means of identifying multiple regimes.

In this paper, the availability of SocDev limits us to a smaller sample (60 countries) than that of Durlauf and Johnson. Using just initial per capita income and the literacy rate, as in Durlauf and Johnson, gave rise to one split on initial income (at \$1450). Repeating the exercise with social development as an additional control variable again led to one split, this time on social development (at -0.275). Given the opportunity to split the sample by output, literacy or social development, the regression tree algorithm shows a preference for a split using social development. This suggests that SocDev dominates the others as a variable useful in identifying multiple regimes in this sample of developing countries. We also experimented with regression trees for income level and growth regressions including SocDev. The algorithm continued to produce trees that made splits using social development, suggesting that our results are not simply driven by the omission of SocDev.

It is interesting to see how the new split, on social development, affects the country groupings. By splitting using social development rather than income, the following countries move from the lower to the top group: Egypt, Ghana, Honduras, Pakistan, South Korea, Thailand and Zimbabwe. In the other direction, only Bolivia moves from a position in the top group to one in the lower.

Table 4 presents estimates of the growth equation (7) for the two groups. Group A, the socially traditional countries, contains all those for which SocDev is less than -0.275, while group B contains the remainder. There

are two striking points about these results. First, investment is far less important in group A than in group B. Second, the reverse is true for human capital. Thus our work suggests that, for countries with low levels of social development, it is accumulating human capital (through schooling) that is important for growth. At higher levels of social development, the influence of school enrollment diminishes, and investment in physical capital takes over as a more important determinant of growth. The effect is clearly strong enough to outweigh diminishing returns to physical capital.

Table 4
Estimation of the augmented Solow model for growth
(for groupings identified by the regression tree)
Dependent variable: log difference GDP per capita, 1960-1985

Group	A	A	B	B
Estimation	OLS	RWLS	OLS	RWLS
Observations	24	21	36	33
constant	8.92	8.83	5.15	3.96
	(3.10)	*(3.54)*	*(1.68)*	*(1.07)*
ln(I/GDP)	0.10	0.13	0.77	0.76
	(0.14)	*(0.11)*	*(0.21)*	*(0.13)*
ln(n+g+δ)	0.38	0.72	0.07	-0.33
	(0.90)	*(0.91)*	*(0.60)*	*(0.37)*
ln(SCHOOL)	0.41	0.29	0.03	-0.02
	(0.12)	*(0.13)*	*(0.13)*	*(0.13)*
ln(Y60)	-0.86	-0.79	-0.39	-0.38
	(0.18)	*(0.19)*	*(0.09)*	*(0.07)*
R^2	0.58	0.67	0.58	0.69
σ	0.28	0.22	0.29	0.24
Implied λ	0.08	0.06	0.02	0.02

Notes

Observations excluded from group A RWLS regressions: Cameroon, Indonesia, Morocco.

Observations excluded from group B RWLS regressions: Argentina, Chile, Ghana.

Interestingly, there are large differences between the groups in rates of convergence, with group A countries converging to their steady states at a much faster rate (8% a year compared to 2%). This may indicate that physical and human capital play a smaller role in the production functions of these countries, or that they have shown faster population and TFP growth. However, as we have already discussed, these estimated convergence rates are highly sensitive to measurement error.

4 Social development and convergence

We now turn to a more sophisticated way of analysing the dynamics of the international income distribution, provided by Quah (1993). In that paper, he takes each country's per capita income relative to the world average as the basic data. The possible values of relative incomes are categorised into five states, using intervals at 1/4, 1/2, 1 and 2 times the world average per capita income. The dynamics of the distribution can then be described by a 5×5 Markov chain transition matrix, whose (j,k) entry is the probability that an economy in state j transits to state k. Low-numbered states correspond to low incomes, so for instance state 1 corresponds to per capita incomes no greater than one-fourth the world average.

Since we are working with smaller samples than Quah, we use just three states, using intervals at 1/2 and one times the sample average per capita

income.[13] Table 5 shows the transition probabilities for our sample of 60 developing countries, where the transition period is 25 years (1960-85). There is some evidence for the long-run tendency to bimodality emphasised by Quah (1996), although remember that the sample here is predominantly one of developing countries alone.

We now estimate three separate transition matrices, for the three groups identified by Adelman and Morris. Looking at the results in Table 6, it is clear that socially traditional countries are tending to slip down the income distribution. Indeed, there is no possibility of upwards mobility, and the probabilities are such that ultimately most of the socially underdeveloped countries will end in state one, the group that is relatively poorest. For countries in groups 2 and 3, those that are more advanced socially, the results are very different. There is now some possibility for upwards mobility, even in the relatively poor state 2, between 1/2 and one times the sample average income.[14] Overall, our emphasis on social development seems to provide at least a partial explanation for the polarisation in world incomes.

[13] Using discrete states necessarily introduces a small degree of arbitrariness. We believe our choice of states is a natural one. An alternative procedure would be to use the stochastic kernels approach of Quah (1996); however, we are working with a smaller sample than that of Quah.

[14] As a test of robustness, we also calculated transition matrices for the two groups A and B identified by the regression tree analysis. Again, the pattern is clear: upwards mobility for the socially modern economies, downwards mobility for the socially traditional. Full results available on request.

Table 5
Markov chain transition matrix
1960-85; grid (0, 1/2, 1, ∞); states, 3

	Upper endpoint		
(Number)	1/2	1	∞
All 60 countries			
(20)	0.75	0.25	0.00
(18)	0.28	0.50	0.22
(22)	0.00	0.09	0.91
Equilibrium distribution	**0.24**	**0.22**	**0.54**

Table 6
Markov chain transition matrices
1960-85; grid (0, 1/2, 1, ∞); states, 3

	Upper endpoint		
(Number)	1/2	1	∞
Group 1			
(14)	0.86	0.14	0.00
(6)	0.83	0.17	0.00
(0)	0.00	0.00	0.00
Equilibrium distribution	**0.85**	**0.15**	**0.00**
Group 2			
(5)	0.60	0.40	0.00
(7)	0.00	0.86	0.14
(6)	0.00	0.17	0.83
Equilibrium distribution	**0.00**	**0.54**	**0.46**
Group 3			
(1)	0.00	1.00	0.00
(5)	0.00	0.40	0.60
(16)	0.00	0.06	0.94
Equilibrium distribution	**0.00**	**0.09**	**0.91**

For each group, we also carried out a test of the hypothesis that a coun-

try's final position within the international income distribution is independent of its initial position, a strong form of convergence. Formally, the tests are likelihood ratio tests of the hypothesis that the rows of the respective transition matrices are equal. We were able to reject this hypothesis at the 10% level for group 2 (p-value 0.00) but not for group 1 (p-value 0.89) or group 3 (p-value 0.16). So there is strong evidence for convergence within groups 1 and 3, but not for group 2.

Some caveats to these results are necessary. The sample sizes are small, and the results should certainly not be used to forecast what will happen in the future, a point that Quah (1993) emphasises. Also note that if social development is partly determined by absolute income, as seems likely, then our groupings and transition matrices have only temporary relevance. Even so, the findings are highly suggestive. Countries with relatively high levels of 'social capability' have sometimes moved up within the international income distribution, while socially traditional countries have tended to slip downwards, as they are left further and further behind by improvements in technology.

5 Robustness

So far, we have established that both the level and growth rate of TFP may be related to the extent of social development. In this section, we test the robustness of this result, using data sets and specifications drawn from Levine and Renelt (1992) and Mauro (1995). To anticipate the results, SocDev emerges as a robust variable in growth regressions, in the sense of Levine and Renelt. It is significant at the 5% level, and quantitatively important, for different combinations of many explanatory variables. The position is less clear when variables from Mauro (1995) are included.

5.1 The robustness of the Adelman-Morris index

In an influential paper, Levine and Renelt (1992) showed that most coefficients in cross-section growth regressions are sensitive to the choice of explanatory variables. Is SocDev also sensitive in this way?

Levine and Renelt start with the regression in column 1 of Table 7. For our restricted sample, the estimates are given in column two. The addition of SocDev (column 3) raises the explanatory power of the regression, and the index is positively signed and significant at the 1% level. Again, the effect is economically significant: a rise in SocDev of one standard deviation increases the growth rate by a percentage point. The coefficient is only marginally different in a least trimmed squares regression, and is clearly robust to the omission of outliers identified by relatively high LTS residuals. Note that this regression, excluding seven countries, explains 75% of the variation in growth rates of the remaining fifty-one.

Table 7 Estimation of the Levine-Renelt regression Dependent variable: growth of GDP per capita, 1960-89					
Estimation	OLS	OLS	OLS	LTS	RWLS
Observations	102	58	58	58	51
constant	-0.83	-1.40	0.23	0.22	0.17
	(0.88)	(0.82)	*(0.96)*		*(0.82)*
RGDP60	-0.35	-0.48	-0.97	-0.96	-0.98
	(0.14)	(0.21)	*(0.35)*		*(0.15)*
GPO	-0.38	0.27	0.07	0.08	-0.36
	(0.22)	(0.37)	*(0.38)*		*(0.24)*
SEC	3.17	7.74	3.96	1.25	1.57
	(1.22)	(2.16)	*(2.44)*		*(1.37)*
INV	17.5	8.24	7.66	13.7	16.6
	(3.45)	(5.60)	*(5.33)*		*(3.57)*
SocDev	-		**1.00**	**1.34**	**0.95**
			(0.28)		*(0.19)*
R^2	0.46	0.42	0.51	-	0.75
σ	1.39	1.39	1.28	-	0.84

Notes

MacKinnon-White HCSEs in parentheses. RGDP60 is the Summers-Heston estimate of real GDP in 1960. GPO is the average rate of population growth. SEC is the initial secondary school enrollment rate. INV is the averaged investment share of GDP. See Levine and Renelt (1992) for more details. The seven countries excluded from the RWLS regression are Cambodia, Jamaica, South Korea, Liberia, Nicaragua, Peru and Surinam.

The results from an extreme bounds analysis, carried out as in Levine and Renelt (1992), bear out the importance of social development to growth.

Regardless of the choice of right-hand-side variables, drawn from the set used by Levine and Renelt, SocDev is always positively signed and significant at the 5% level. It thus qualifies as 'robust' in the sense of that paper.

One danger is that this result is driven by the presence of a few outliers or leverage points. An example might be South Korea, which shows fast growth and a high level of initial social development. To check sample sensitivity, we estimated each regression in the extreme bounds analysis by least trimmed squares, and then omitted countries with high residuals, as in Temple (1995b). In most regressions, SocDev was significant at the 0.1% level. In a few, it was insignificant at conventional levels.

This perhaps suggests that the results are driven by a few observations. Further investigation indicated that the joint inclusion of Greece, India, Israel, Jamaica, Japan, Peru and the Philippines is important to obtaining a robust result. When just Japan is excluded, SocDev is almost always significant at the 5% level, and always at 10%. Excluding all seven possible outliers, the index is usually significant at the 5% level, but in some specifications it is insignificant at 20%. These specifications are usually ones including the export share of GDP, a crude proxy for trade openness.

Overall, SocDev emerges as a remarkably robust regressor. We have carried out a robustness test rather more stringent than that of Levine and Renelt. To render SocDev insignificant at the 10% level, one has to both include the export share of GDP, and exclude a relatively large number of countries. Only then is the coefficient on SocDev imprecisely estimated. These results suggest that SocDev will be useful for further work, part of which might investigate its relationship with openness in more detail.

5.2 Social development, corruption and growth

Since the work of Levine and Renelt, Mauro (1995) has presented results indicating a robust link between corruption and growth. He makes use of indicators of bureaucratic efficiency, corruption and ethno-linguistic heterogeneity. It is perhaps important to assess the robustness of SocDev to these additional variables. It is clear from Table 2 that many of the more traditional societies are in sub-Saharan Africa, and to some extent these are also countries with high levels of political instability, corruption and ethnic heterogeneity. Perhaps SocDev is successful because it proxies for these omitted determinants of growth.

We start by considering the index of ethno-linguistic heterogeneity or fractionalization. Listed in the appendix to Mauro (1995), the index gives the probability that two randomly selected citizens from a given country belong to different ethno-linguistic groups. The higher the 'ELF' index, the more divided a country is along ethnic and linguistic lines. In turn, this may result in greater political instability and corruption.

There is a negative correlation between SocDev and ethno-linguistic heterogeneity (r = -0.59) which is significant at the 1% level. Ethnically divided countries tend to have lower levels of social development. However, on entering ELF into the Levine-Renelt specification, the point estimate and standard error on SocDev were more or less unchanged from the results in Table 8 (point estimate = 0.93, HCSE = 0.27). The coefficient on ELF was low and not significantly different from zero at the 50% level. These results are robust to the omission of outliers, and suggests that SocDev does not proxy for ethnic diversity.

The findings are more ambiguous when using Mauro's indicators of bureaucratic efficiency and corruption. The two indices are based on the sub-

jective assesssments of Business International correspondents and analysts, and should reflect widespread perceptions of country risk. Mauro finds that investment and growth are higher in more efficient, less corrupt countries. Both indices are significantly and positively correlated with SocDev (r = 0.41 for each) indicating that bureaucratic inefficiency and corruption are less widespread in the relatively advanced developing societies. This is an interesting result in itself.

Lack of availability of the indices restricts the sample to 33 developing countries. When the index of bureaucratic efficiency is included in a Levine-Renelt specification, the point estimate on SocDev is unchanged but the standard error rises to 0.62. Thus, we can no longer reject at the 5% level the hypothesis that the true coefficient is zero. Similar findings apply when using the Mauro index of corruption.[15] The point estimate on SocDev is unchanged when using a robust estimator (least trimmed squares) indicating that it is unlikely to be driven by outliers. As for the high standard error, it may simply be that the sample is too small for the precision achieved in earlier results. This indicates some fragility in the results, but it is clear that the data remain consistent with a substantial effect of social development. See also Temple (1995b), who questions the usual classification of a variable as 'robust' or 'not robust' on the basis of significance levels.

6 Social development and TFP growth

From the work so far, it seems clear that the level or growth of total factor productivity is related to social development. However, it could be that causality runs from TFP to social development. As productivity rises, so

[15] As for the growth effects of the Mauro indices, efficiency and honesty appear to be *negatively* correlated with growth when controlling for the level of social development, and concentrating on developing countries.

does income, bringing social changes in its wake. Emphasis on the role of social factors would perhaps be more convincing if we could show that rates of productivity growth are related to the initial level of social development.

One way of investigating this would be to use the physical and human capital stock data in Benhabib and Spiegel (1994). The difficulty with this approach is the biases inherent in estimating the elasticity of output with respect to endogenous inputs. These biases were explored by Benhabib and Spiegel for the case where technology is the same across countries, and by Benhabib and Jovanovic (1991) for the case where technology is stochastic and realizations differ across countries. In both cases, it is likely that the estimated output-capital elasticity is biased upwards. Therefore, instead of estimating the input elasticities, we carried out a simple form of cross-country growth accounting. We set the capital elasticity (α) at 0.33 and the labour elasticity (γ) at 0.67, and used these figures to derive estimates for TFP growth. The correlation of this productivity growth measure with the component of SocDev orthogonal to initial income is 0.37, which is significantly different from zero at the 1% level.[16]

Perhaps the most reliable estimates of TFP growth are those that come from country-by-country growth accounting studies. The adjustments for physical and human capital accumulation, and output per worker hour, are usually far more sophisticated than anything attempted in cross-section empirical work. The disadvantage is that growth accounting is rarely carried out in depth for developing countries, partly because of data problems. One exception is Elias (1992), who calculates TFP growth rates for seven Latin American countries. In figure 4 the averaged rates for 1960-85 are plotted

[16] The Spearman's rank correlation is also 0.37. Assuming a higher output-capital elasticity (0.4) lowers the correlation to around 0.31, but this is still significant at the 5% level.

against the orthogonal component of SocDev for the seven countries. There is clear evidence of a positive relation, and the simple correlation is 0.44 (Spearman's rank correlation = 0.39) despite the presence of an outlier, Argentina. Excluding Argentina, the simple correlation is 0.93.

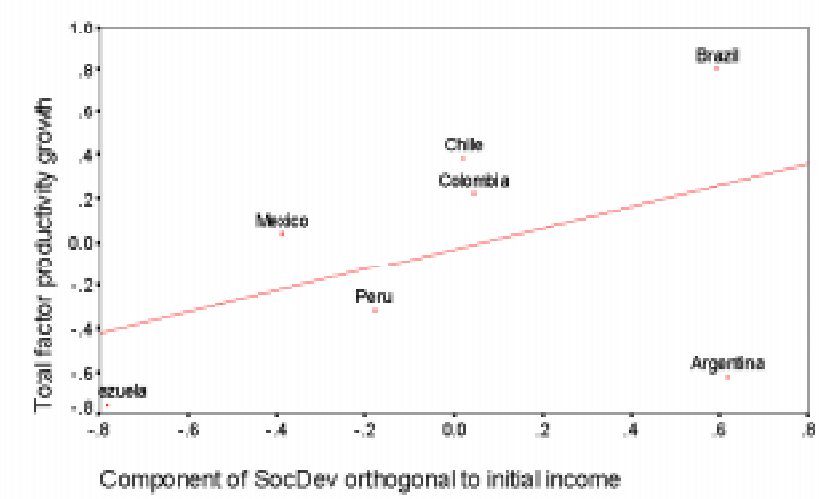

Figure 4: Social development and TFP growth in Latin America, 1960-85

Koop et al. (1995) estimate rates of TFP growth for a wider range of countries, over 1965-90. They use a stochastic production frontier model which allows output changes to be decomposed into input, efficiency and technical changes. Combined, the measures of efficiency and technical change make up a measure of productivity growth. In figure 5, this is plotted against the orthogonal component of SocDev. Once again, there is evidence of a positive relation, and the simple correlation is 0.56 (Spearman's rank correlation = 0.46). The orthogonal component of SocDev explains just over 30% of the variation in productivity growth across countries.

One objection to these results is that the true relation might be between TFP growth and initial human capital, as suggested by Nelson and Phelps

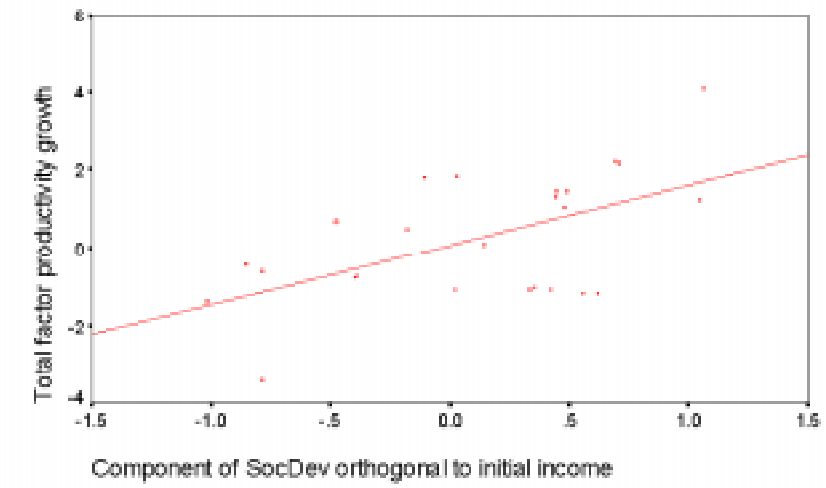

Figure 5: Social development and TFP growth, 1965-90

(1966), rather than between TFP growth and social development. The sample of Latin American countries is not large enough to give an interesting answer. In the case of the Koop et al. (1995) TFP measures, we can regress their estimates of productivity growth on SocDev, the initial level of human capital, and the log of initial income. The intersection of the Adelman-Morris sample with those of Benhabib and Spiegel (1994), Koop et al. (1995) and Mankiw, Romer and Weil (1992) gives a sample of 22 countries.[17] The results are shown in Table 8.

[17] Koop et al. (1995) provide estimates of TFP growth for just 44 countries, many of them developed and therefore lacking a figure for the Adelman-Morris index.

Table 8 Regression for TFP growth Dependent variable: APG from Koop et al. (1995)			
Estimation	OLS	LTS	RWLS
Observations	22	22	18
Constant	23.4	21.0	25.2
	(5.54)		*(3.31)*
SocDev	**2.03**	**2.40**	**2.44**
	(0.65)		*(0.51)*
log (H65)	-0.53	-2.14	-1.29
	(0.62)		*(0.76)*
log (Y60)	-3.09	-2.56	-3.23
	(0.69)		*(0.41)*
R^2	0.53		0.73
σ	1.22		0.81

Notes

MacKinnon-White HCSEs in parentheses. The data for 1965 human capital stocks is taken from Benhabib and Spiegel (1994). Countries excluded in RWLS regression: Dominican Republic, Honduras, Japan and South Korea.

Given their *ad hoc* nature, these regressions explain a surprisingly high proportion of the international variation in TFP growth - over 70% when a few outliers are excluded. The main finding of interest is that SocDev is positively signed and significant at the 1% level. The effect is extremely strong: a rise in SocDev of one standard deviation raises the growth rate of TFP by two percentage points. TFP growth is negatively related to initial income, indicating that the countries furthest behind have the greatest opportunities to catch up, as often claimed. The one surprise of these results is the negative sign for the initial level of human capital (average years of schooling in the

1965 population), which we cannot explain beyond saying that the coefficient is imprecisely estimated.

Taken together, these results strongly support the view of Abramovitz that "a country's potential for rapid growth is strong not when it is backward without qualification, but rather when it is technologically backward but socially advanced". The results suggest that TFP growth differs across countries in systematic ways, related to initial income and the degree of social development. Thus, they contradict the influential augmented Solow model introduced by Mankiw, Romer and Weil (1992). Instead of following those authors in assuming that technology is a freely available public good, progressing at the same rate across the world, we should follow the older, more traditional view of development in which the international transmission of ideas is important. In pursuing this, we need to bear in mind that the rate at which a country can import ideas depends to a large extent on aspects of its social structure.

7 Conclusions

Our analysis has several important, if tentative, conclusions. Technology is not a freely available public good and differs across countries, contrary to the arguments of Mankiw (1995). A corollary of this is that the cross-country data is not well described by single regime Solow models of the kind proposed by Mankiw, Romer and Weil (1992). Their estimates are likely to be inconsistent, since one of the omitted fixed effects (social development) is correlated with the regressors. These results provide support for the findings of Caselli et al. (1995), Durlauf and Johnson (1995), Islam (1995) and Temple (1995a), all of whom criticise aspects of the augmented Solow model. In many ways, the new emphasis on technology differences is far more intuitively

appealing than the restrictions of the MRW framework.

Related to this, we find that rates of TFP growth are related to a country's initial level of social development. This is true whether one uses cross-section growth regressions, growth accounting studies, or the stochastic frontier framework of Koop et al. (1995). We also find that social development can help explain polarisation in world incomes. Direct study of the world income distribution suggests that socially traditional countries are unlikely to overtake others, but instead will fall further behind. In contrast, there are opportunities for upwards mobility for the socially advanced.

Another interesting finding is that the relative importance of investments in physical capital and schooling appears to vary with the extent of social development. In particular, schooling is important at low levels of social development, but physical capital becomes more important at higher levels. This perhaps suggests that we should think more carefully about why education may be important to economic growth. Instead of simply regarding it as an extra factor of production (human capital), schooling may also be important because it encourages an experimental outlook and social change.[18] Sociologists have long been aware that effects like this could represent important externalities of education: see for instance Meyer et al. (1979). At the very least, our results suggest that studies attempting to isolate the effect of schooling should also include the SocDev variable.

As our discussion of schooling indicates, some of our findings raise the spectre of 'social engineering' designed to encourage TFP growth. This is an old debate: Kindleberger (1952) criticised early World Bank mission reports

[18] Little (1981) pointed out that it is hard to see the direct contribution of education to, for instance, the electronic assembly operations common in the fast-growing East Asian countries. For empirical evidence on the social effects of education, see Inkeles and Smith (1974, ch. 9).

for their ethnocentricity, and their underlying assumption that developing countries should simply attempt to duplicate the way of life of Western nations in order to attain the same level of productivity. Even if one sees social development as an inevitable progression towards Western culture and values, in the tradition of modernization theory, it must be recognised that artifical attempts to accelerate social development could be counter-productive. For instance, Hoselitz (1953b) noted that the dissolution of traditional patterns of family organization may result in social problems.[19]

In general, the results in this paper contribute to a particular view of economic growth, but should not be used to support questionable attempts at accelerating social change. Our results indicate a link between social development and growth, not welfare. Though on this it may be worth quoting one of the classic studies of modernization, Lerner (1958):

> In every country, the rural villagers declare themselves the most unhappy fellows. In every country, the modernizing individuals are considerably less unhappy...traditional society is passing from the Middle East because relatively few Middle Easterners still want to live by its rules.
>
> Lerner 1958, p. 398-399

However, as Opler (1952) pointed out, it would often be wrong to ask a people to break with the 'social, ethical, intellectual, and aesthetic forms of the past'. There may in any case be grounds for optimism: at least for a country whose GDP per capita is rising, social changes may follow relatively naturally. McClelland (1961) has a thoughtful discussion of policy implications when society matters; one conclusion is that an important criteria for

[19] See also Goldschmidt (1952) and Herskovits (1952).

assessing policies is the likely effect on values, motives and attitudes of a population over the long run.

Even in the absence of more specific policy recommendations, we feel that the work of this paper contributes to some interesting and important conclusions. It is important not to over-interpret them, because we have seen some evidence that the level of social development is not always a robust regressor when indices of corruption, bureaucratic efficiency and (possibly) openness are used. It may be that our index of social development works because it is a more accurate measure of human capital. However, there are many opportunities for further work. Two stand out. It should be possible to construct alternative measures of social development, perhaps from time series data, which could be used in a panel data setting. Secondly, it would be interesting to investigate which of the many aspects of social development are most important to growth.

8 Computing Appendix

OLS and re-weighted least squares were carried out using PcGive 8.0, which allows calculation of the jackknife HCSEs. Robust regressions were carried out using the statistics language S-Plus. The language only approximates the LMS and LTS estimators, so some of the results presented here will not be exactly reproducible. The regression tree and markov transition matrix calculations were performed with programs written in Gauss-386.

Gauss-386, *Aptech Systems, 23804 S. E. Kent-Kangley Road, Maple Valley, WA 98038.*

PcGive 8.0, *International Thomson Publishing, Berkshire House, 168-173 High Holborn, London WC1V 7AA.*

S-Plus, *Statsci Division, 1700 Westlake Avenue N., Suite 500, Seattle, WA 98109. Email mktg@statsci.com*

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