

Is Social Capital Persistent? Comparative Measurement in the Nineteenth and Twentieth Centuries and its Synergies with Per Capita Income

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I. INTRODUCTION

A recent stream in the economics literature argues that history affects economic performance through institutions. Perhaps the most well-known paper is that by Acemoglu, Johnson, and Robinson (2001), where they argue that different colonial origins led to different sets of institutions, and the latter gave rise to different economic outcomes. But, what happens when we look at colonizers instead of colonized countries? Is there nothing to say? Guido Tabellini (2007) conducts an empirical investigation on differential economic performance in the European regions, and links this fact to deep cultural roots, based on trust, respect and confidence built up centuries ago. Both these branches represent two separated parts of the world. On the one hand, the colonizers acquiring their culture through centuries of social interaction; on the other hand, the colonizers, inheriting the institutional bequest transferred by the colonizers. Now, is it possible to conduct a historical investigation with a sample of countries representing all regions of the world? And, more importantly, can one reach a generalized conclusion of whether culture and institutions are deterministic or not so when it comes to economic performance? This paper proposes an international index for social capital in the nineteenth century –very close to Tabellini’s definition of culture–, which comprises a varied sample of countries around the world, including both colonized and colonizers. In a second part, the paper enquires about its potential economic influence.

In a phrase, social capital is the quality of the civil society, or the civic values. It should interest economists because it is indeed a form of capital. Social capital has been shown to have had an effect in economic performance for the recent decades, especially enhancing the well-functioning of institutions and reducing principal-agent problems. In his investigation for the European regions, Tabellini (2007) concludes that economic outcomes have their root in historically fundamented attitudes towards trust, respect for others and self-determination. So, there are some indications that it could also have been relevant in the distant past. How does social capital evolve over time and across countries? Is it path dependent? Adding some time dimension to the study of social capital looks promising.

Section II compares three different proposed measures of social capital for the second half of the twentieth century, and looks at the relationships between them. Section III turns the attention into historical data and presents a new social capital index for the late nineteenth century. In Section VI, we are able to look at the inter-temporal evolution of social capital thanks to the newly created index, together with the more recent measurement alternatives. Section V explores the relationship between the newly created index and per capita income. Finally, section VI concludes.

II. COMPARISON OF CONTEMPORARY ALTERNATIVES

This section compares three different twentieth century measurement alternatives, based on the pre-existing measurement attempts. These three are TRUST, CIVIC, and SOCDEV, standing for level of trust in a society, civic engagement, and social development respectively. Both TRUST and CIVIC have been originally extracted from the World Value Surveys, which periodically runs over a whole range of countries over the world. General trust in people (TRUST) is the percentage of respondents who answered ‘yes’ to the following question: ‘Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?’ I amplified TRUST to TRUSTAM by adding extra country data from both the most recent and past rounds of the World Value Surveys. Civic engagement (CIVIC) is the percentage of civic activities in which and average individual participates. The activities included are: social-welfare services for elderly and deprived; education, art, and cultural activities; local community affairs; conservation, environment, ecology; and voluntary associations for health (La Porta et al., 1997). Finally, social development (SOCDEV) was taken from Adelman and Morris (1967). The index is an extraction of factor scores from a principal components analysis including 41 socio-economic variables from 74 countries around the world, for the period 1957-62. Temple and Johnson (1998) used this index before in order to test the economic significance of social arrangements.

With respect to the timing of the measures, the first two correspond to the late twentieth century and have been taken from Knack and Keefer (1997), (hence KK appears in some instances attached to the variable name). Overall, the General Value Survey rounds for 1980, 1990-1 and 1995-6 are incorporated, using always the most recent observation available¹. As an average, we can say the two variables are aimed at monitoring social capabilities at the end

¹ The last round of Surveys dating 2002 is not included because it is beyond the time framework.

of the twentieth century. SOCDEV corresponds to the early 1960's, –this is, twenty to thirty-five years earlier–, so we will need to keep this in mind.

These are three different ways to measure social capabilities that have been proposed in the literature. They are conceptually different from each other and may or may not be related. The correlation matrix (not shown due to space restrictions) suggests that their relationship, if any, is not always linear. Later we will find non-linear relationships between them.

Since we are especially interested in historical considerations, the focus of the paper is driven by past-present contrasts. Nonetheless, comparing both contemporary measures for social capital, TRUST and CIVIC, is not of least interest, since they stand for different concepts. This is done by overlapping throughout the paper two plots in one. In the figure 2.3 (within twentieth century comparisons), the light colored dots and lines depict the pair SOCDEV *versus* CIVIC, while the dark dots and lines represent SOCDEV *versus* TRUST. In other words, the scatter plots below should be read in the following way: Every graph is composed of two overlapping bi-dimensional scatter plots, with the historical index in the horizontal axis and the contemporary (or more recent) index in the vertical axis. SOCDEV is common for both overlapping plots and is always positioned in the horizontal axis. It represents the 1960 measure of social capital. CIVIC and TRUST are always placed in the vertical axis, representing the contemporary measure of social capital. In this way, we can read all the graphs as a historical evolution of social capital, by looking at where countries were positioned in the 1960's (horizontal axis) and where they were positioned in the 1990's (vertical axis).² Of course, we should keep in mind that these are only proxies, and may capture differentiated aspects of the concept social capital. A three-dimensional representation of alternatives is found in Figure 2.1 but this is less informative due to sample size restrictions.

As explained above, Figure 2.3 represents the historical evolution of social capital in the second half of the twentieth century. Both variables CIVIC and TRUST have been standardized and thus vary within the same range. A line has been fitted to the points using a non-parametric technique called 'lowess' (locally weighted linear regression). This method fits the maximum number of points with the minimum number of iterations. Fifty percent of the points have been fitted with only three iterations. This type of graph is very appealing because it reveals the outliers. For the sake of historical findings, the engagingness of this

² STD at the end of the name of the variable means that the variable has been standardised. The variables which do not contain STD at the end of their name were already constructed in a way which allows for comparison.

exercise lays more on unmasking the outliers than on the fitted points that stand on the average. The impossibility of the fit line to match all dots points at the exceptional evolutions (both for the good and for the bad). Striking results are those of India and Japan. They reveal themselves as outstanding performers in social improvement, which is historically consistent with their growth experiences. We can also detect failure stories by looking at the extremely poor contemporary scores compared to the mid-century scores for some Latin American countries like Mexico or Venezuela. Indeed, from figure 2.3 we can observe how some countries strikingly detach from the average evolution. This fact points at the idea that social change seems plausible. For the time being these are only suggestions, since the comparison corresponds to different measures. Should we have time series about longer run social evolution, we would be able to determine with greater certainty if and when does social change happen: before, during, after economic growth, or not at all. Putnam (2000) argues that social change happens up to 70 years ahead of subsequent economic growth. Therefore, we need to go back further into history of social development to be able to contrast this observation. This is done in the next section.

III. CONSTRUCTING A SOCIAL CAPITAL INDEX FOR THE 19TH CENTURY

Constructing a social capital measure for the distant past presents several challenges. The first challenge is the limitations of data availability. Once we turn into the distant past (more than a few decades ago) no surveys can be conducted and one has to rely on data already collected for other purposes. The second challenge, which is going to be addressed now, is to find a quantitative methodology that is flexible enough given the data limitations, but still conveys informative results. For both challenges, one needs to be truly imaginative and make the most out of the resources. Finally, how are the resulting data going to be compared to more recent data? The third challenge is to construct a measure that, at the same time, can be compared – even if imperfectly – to some existing indicator.

III.1. SOURCES: NEW ADELMAN AND MORRIS DATABASE

Contemporary indicators of social capital based on the World Value Surveys are informative. Yet we need a wider time span in order to bring historical perspective into the analysis of social capital. Having pre-First World War social capital estimations would provide useful historical insights in order to study its evolution and test its persistence. At this respect, Adelman and Morris (1988) provide an extensive socio-economic database for the period 1850 to 1914.

The comprehensive nineteenth century series provided by Adelman and Morris are the starting point for our database. The extensive data appendix accompanying their 1988 book is a summary of the work on their data over more than 20 years. It contains cross-sectional data for 23 countries scattered over the globe and referring to 35 summary variables ranging from attitudes to change to political perceptions. The latter depict the socio-economic structure of every country in the sample between 1850 and 1914, being this divided into 3 sub-periods: 1850-1870, 1870-1890, and 1890-1914. Cross-sectional data are supplied for every sub-period. I believe this highly valuable database has been explored under its possibilities. The Adelman and Morris database has unique characteristics of which an economist looking for social influences in historical perspective can certainly take advantage of. These are: The database describes the situation of the economy in the late nineteenth century in conjunction with a detailed picture of the institutional framework, and some interesting social attitudes and customs in different countries. I reconstructed the Adelman and Morris database for the period 1850 to 1914, and then use it to compute a Social Development Index (SDI) for the late nineteenth century. The variables are re-codified for convenience but the integrity of the database is preserved. However, almost half of the variables have been renovated or updated.³

III.2. QUANTITATIVE METHODOLOGY: PCA

Why do I think that the principal components must convey information about the quality of the society? One could have gathered a set of variables which one thinks describe the quality of a society and calculate a simple average. However, not all variables contribute in the same measure to explain the dispersion in the data; some do capture more variance than others. The principal components analysis (PCA) is a sophisticated weighted average that gives more importance to those variables that deserve it in terms of variance explained. If there is something that makes the countries genuinely different, the principal components analysis will capture it.

PCA is especially suitable for sets of variables that are highly correlated among them, as it is the case. The higher the correlation between the original variables, the smaller the number of Principal Components and, thus, the most effective the data reduction is. PCA actually *takes advantage* of these high correlations; it is for this reason that this technique particularly adequate for our purposes. But the principal components analysis is not merely a data reduction exercise. The principal components are the underlying factors behind the variables, those factors that make them move together (covariate), and cannot be captured in any other

³ For a detailed discussion of the new database, please refer to the Phd thesis of Marta Felis-Rota, chapter 2.

way than in the abstract. The variables are just the reflection or result of those underlying factors that make them move together. And social capital is precisely this glue. This is why I think that a set of variables describing a society can help us capture the social capital behind.⁴

III.3. RESULTS: PRINCIPAL COMPONENTS ANALYSIS

The dominant principal component of the renovated Adelman and Morris database can be interpreted as the level of socio-economic development. I have extracted a score for each country and year I have data for. I named this variable SDI [YEAR], standing for social development index in a given year.

The first principal component score coefficients and scores for both years I have full data for, 1870 and 1890, are shown in the tables 2.3 and 2.4. The component scores coefficients shown in table 2.3 are the weights by which variables are multiplied to obtain the country scores. Table 2.4 shows the first principal component scores obtained for every country and year in the sample. These are available for 23 countries. In this way, we have a score for Argentina 1870, another for Argentina 1890, and so on, completing the list of 23 countries. Two additional columns have been added to table 2.4 in order to monitor the evolution of the social development index over time. The third numerical column has been obtained by subtracting SDI 1870 from SDI 1890. The result is the change of the index in these two decades. The last column in table 2.4 indicates the sign of the change, either positive (increase) or negative (decrease).

Interestingly enough, practically all countries in the sample show an improvement in social development for the 20-year period 1870-1890. New Zealand and Japan are the countries that improved the most in the SDI (more than 1 standard deviation in 20 years), being the average improvement around half a standard deviation. The United Kingdom is the only country that appears to have lost some of its stock of social capital with respect to other countries. After the United Kingdom, but still exhibiting a positive sign of change, are China and France, in this order. There seems to be the 2 groups of countries that have improved less than the rest of the sample, these being either Western European countries which departed from a privileged position and therefore do not have so much catching-up potential (UK, France, Belgium), or

⁴ The full paper includes a section with pre-PCA tests, involving tests of general adequacy of the PCA analysis (Bartlett's test of sphericity) as well as variable selection tests (the most relevant being the Kaiser-Meyer-Olkin measure of sampling adequacy), which selects 18 out of the original 35 variables for final inclusion in the index. Results are the best in terms of adequacy of the variables that contribute the most to the principal components. KMO is above 0.9, which is the highest target.

countries in a very poor stage of development which are not making much progress at that time yet (China, Egypt, India). These 2 groups are the countries that have lost or won less in terms of relative position in the ranking.

IV. LONG RUN INTER-TEMPORAL COMPARISONS: 19TH & 20TH CENTURIES

The new SDI series for 1870 and 1890 can be contrasted to the contemporary measures of social capital. In particular SOCDEV for the early 1960's was constructed with a similar technique. Unfortunately, samples of countries for the nineteenth and the twentieth century overlap thinly. This results in a small number of countries being in the two samples for this specific index.

Figures 2.5 and 2.6 depict the historical evolution of social developments over long periods of time. Figure 2.5 represents the change in scores over almost a century, from 1870 to 1960. Figure 2.6 depicts the change over a 70 year period, 1890-1960. The most noticeable result is that all countries in the sample have improved notably over these long periods of time.

We have just seen that tracing the change of the Social Development Index over the twentieth century is currently feasible for a small sample of countries. Now, what can we learn from the relationship of the nineteenth century SDI with other twentieth century indicators of social capital? At this point, given the limitations given by the small sample available over time when we look at SDI only, it turns useful to bring into the analysis the two most popular contemporary alternatives, namely trust and civic engagement. These two notably increase the sample size available for the 2 periods, late-nineteenth and late-twentieth centuries. The question one wants to ask is the following: Are there any discernible patterns in which these two contemporary variables proceeding from surveys relate to the nineteenth century newly constructed estimates?

Starting with the most recent first, the relationship between TRUST and CIVIC is illustrated by means of the overlay scatter plot (i. e. overlapping two scatter plots). The scatter plots should be read in the same way described for the twentieth century analysis in section II. In figures 2.9 to 2.12 the light coloured dots and lines represent the relation between nineteenth-century SDI and contemporary TRUST, while the dark dots and lines represent the relation between nineteenth-century SDI and contemporary CIVIC.

Figures appear quite different from their twentieth-century counterpart studied in section II. In the first place, countries are more widely spread over the social development index range and

less over the vertical axis, corresponding to more recent times. This indicates convergence from a wide range of social development positions in the nineteenth century to a more equalized level at the end of the twentieth century. Furthermore, trust is more volatile across countries than civic engagement is. Civic engagement appears to be more stable or equalized across countries than trust; (recall both TRUST and CIVIC are standardized). This means that all countries in the sample display a relatively similar level of contemporary civic engagement, no matter where they were standing in terms of social development in the past. However, this is not true for trust. There seems to be a pattern in the distribution of trust across countries, depending what was their departure point in terms of social development in the past. In fact, fitting a polynomial to the points reveals a clearly parabolic layout of trust observations (formal tests in Figures 2.11 and 2.12). These facts stand clear from both 1870-nowadays and 1890-nowadays fit lines. Again, India stands as the most paradigmatic outlier in the sample, showing a spectacular social evolution in the course of the twentieth century. New outliers revealed by the nineteenth century analysis are Norway in the good side, and Brazil, Australia, and France in the down side.

The tendencies described above are confirmed with the analysis corresponding to figures 2.11 and 2.12. These present fit lines with ninety-five percent confidence intervals. Quadratic and cubic regression prediction lines were used respectively, according to which method fitted the data best. Again 1870-nowadays and 1890-nowadays analyses show similar results, the main ones being: 1) civic engagement tends to be similar for all countries in the sample, regardless of where they were standing in terms of social development in the past and, 2) parabolic layout of trust observations.

The ‘parabolic layout of trust points’ means that social development in the nineteenth century contrasted with the cross-country study of trust reveals a parabola. Even allowing for a higher level polynomial would the prediction line turn out to be quasi-parabolic. The relevance of the quadratic term can be tested econometrically. It can be shown that the square of social development in a trust regression is significant at the standard 5 percent level. In other words, countries in the middle of the spectrum have improved the most with respect to their nineteenth century position in the SDI ranking. I interpret this parabola as the combined result of two phenomena: First, the unpredictable direction that the worst scored countries follow and, second, the Abramovitz hypothesis of ‘falling behind’ for the historically best positioned countries (Abramovitz, 1986). In this way, countries in the middle of the spectrum have the highest predictable prospects for catching up.

To sum up, a considerable historical perspective is added to the analysis of social capital. We can observe a slow process of change in the ranking positions of the social indicators. So, there is an element of North's hypothesis on path dependency, as suggested by Tabellini (2007). However, outliers depart from the trend, doing nothing but confirm that the results are historically consistent with future economic growth trajectories (this is still to be tested in the next section). This is the case of India, which shows exceptionally high values in the social development index or Brazil, whose scores are deceptively poor. A striking characteristic is the finding that some socially well-located countries in the nineteenth century appear to be losing their relative position at the end of the twentieth century. This preoccupating phenomenon, which surprises as counterintuitive, needs a more detailed consideration. One needs to keep in mind that the comparison is done with different measures. But, as a first approximation, this dramatic finding is nothing but supporting what Putnam (2000) was pointing at in his case study of the United States, *Bowling Alone*, pointing at the weakening of social values in the North American society. This seems to be a tendency for the Western European countries too.

V. THE RELATIONSHIP BETWEEN SDI AND INCOME

The effect of social capital on economic performance has been demonstrated by Putnam (1993 and 2000), Easterly and Levine (1997), Knack and Keefer (1997), Temple and Johnson (1998), DiPasquale and Glaeser (1999), and Alesina and La Ferrara (2000) among others. All of these studies have a fairly recent chronology. The earliest one in terms of chronology is the study by Temple and Johnson (1998), which starts in 1960. This is the only one using the Adelman and Morris socio-development indicator; therefore, is providing us with a framework for comparison.

In fact, the old Adelman and Morris (1967) work could shed some light on the questions in the agenda. Now that we can look at their analysis in historical perspective, it appears to have not only the historical insights the authors were presenting but also more predictive power than they suspected. Their indicators turned out to be *apparently* too pessimistic for Latin America and too optimistic for some Far Eastern countries. At that time, they did not know the importance of their findings. Their indicator could have helped forecasting subsequent growth better than any other contemporary attempt (Temple and Johnson, 1998). The socio-economic index constructed by Adelman and Morris for the 1960's 'could have helped researchers make much better forecasts of long-run growth rates'.

The new Social Development Index (SDI) constructed above for the years 1870 and 1890 gives us the possibility to do the tests that Temple and Johnson performed on 1960 data, but now on data for the nineteenth century. By doing so, we could determine whether the relationship between social development and economic performance could have had further influence beyond the post-Second World War era. The question that this section aims at answering is the following: Is the relationship between social capital and economic performance consistently present over time? In other words, we look for some evidence of a long run structural relationship between social capital and macroeconomic performance.

A linear trend fitted through social development versus per capita income in 1960 returns a highly statistically significant slope of .236 (see Table 1, equation 5). This means that an increase of one whole unit in the 1960 social development index, –ranging approximately between -2 and 2–, is associated to a log GDP level .236 units higher. Another way of seeing moves along the line is measuring moves in terms of standard deviations: The standardized beta coefficient (not shown in the Table but approximately equal to .8) implies that one standard deviation increase in SDI corresponds to an 80% of a standard deviation increase in log GDP.

Nineteenth century calculations count only with 21 countries in the sample due to narrower data availability. Still, statistical results for bivariate analysis are surprisingly clear cut and they all point at the same direction. A line fitted to a cloud of points representing SDI for 1870 and per capita GDP at the same time, exhibits a 20% slope; a similar line fitted to the 1890 counterpart exhibits a slope of 22%. The slope for 1960 data is just above 23%. All three analyses have highly statistically significant and very similar correlation coefficients. Thus, Temple and Johnson's results are confirmed. Moreover, regression results show that the observed associations between social development and income are significantly different from zero in all years discussed, and very similar between them. It can be concluded that social development is positively related to economic wellbeing, and this co-evolution already existed in the nineteenth century.

V.a) MULTIVARIATE REGRESSION ANALYSIS

The main concern regarding the results in the previous section is whether the significant relationships we found can be attributed to a causal link between the two variables. In other words: can it be concluded that social development causes income to be of a certain level? In order to find a causal effect between social development and income, we have to address the endogeneity of social development. Endogeneity is likely to occur because there are variables

that play a role in the determination of income that are not included in the regression, and are potentially correlated with the social development index. The obvious solution to this problem is to include these omitted variables in the regressions.

There is a large literature on growth regressions from which we can borrow. The encompassing summary model by Bleaney and Nishiyama (2002) –coming from a summary paper encompassing model including the studies by Barro (1997), Easterly and Levine (1997), and Sachs and Warner (1997)–, indicates that, according to the most influential multivariate regressions literature, a comprehensive model should include openness to trade, life expectancy, schooling, quality of institutions, democracy, government savings, exports of primary products, climate and active population growth. There are some data limitations to running multivariate regressions on nineteenth century information, but for the last third of the nineteenth century, data are, in general, reliable (Mitchell, 2007). However, the specific control variables proposed in the growth regressions literature were not originally thought for inclusion in pre-Second World War regressions. In many cases we are forced to find proxies available for the nineteenth century.

Multivariate regressions in Table 2 control for the following: foreign trade volume and structure, urbanization, education, quality of institutions, political stability, government expenditure, population growth, and climate. All control variables suggested by Bleaney and Nishiyama (2002) are included in the multivariate regression⁵. About 95 percent of the total variation of income can be explained by the variables included. All four equations have highly significant and very similar coefficients for SDI, all between .40 and .50. Furthermore, these coefficients are comparable to the coefficient obtained by Temple and Johnson for 1960 when Log GDP is included in the regression as a control variable (Temple and Johnson, 1998:973). Moreover, data do not reveal any break between 1870 and 1890. This suggests that the relationship between social development and income enjoyed some generalized stability in the late-nineteenth century.⁶

VI. CONCLUSIONS

⁵ Details and sources of control variables available upon request.

⁶ The full version of the paper also contains a section on SDI and economic growth rates. A statistically significant relation between social capital and long run economic growth for the mid-late-twentieth century is confirmed. The new findings include that the coefficient (or slope) associated to initial SDI decreases from 8 to 2% when we move backwards in time to nineteenth century data.

This paper presents the first international historical estimates for social capital. Two new series of a Social Development Index (SDI) become available: one for 1870 and one for 1890 for 23 countries around the globe. Together with some other contemporary measurement attempts, the new series allow monitoring the evolution of a social development index over time.

The present study looks at the change in the world country ranking of social capital proxies for a period of 70 to 90 years, and the result is that social miracles (as growth miracles) exist. It is true that social attitudes are correlated to economic performance (Tabellini, 2007), but it is not true that the former do not change. When all regions in the world are included instead of only Europe, differentiated patterns of social development trajectories can be pinned down. Thus, North's hypothesis of path dependency is modified. Practically all countries in the sample show an increase in social development during the intermediate period (1870 to 1890), and all of them reveal a very significant improvement over the twentieth century.

On the other hand, different social capital measurement alternatives exhibit different patterns, suggesting that they are simply capturing different aspects. We find statistically significant non-linear relationships between them. In particular, trust describes a parabolic layout with respect to our Social Development Index, and civic engagement stands as surprisingly even across countries. Scandinavian countries are absolute leaders on trust, while they were in the centre of the social development spectrum more than 100 years ago. Meanwhile, some core Western European countries like France or the United Kingdom, who were World leaders once, seem to have lost their privileged positions during the course of the twentieth century.

Finally, the paper investigates the co-evolution of the Social Development Index and per capita income for an international panel of countries in the nineteenth century. Some evidence pointing at a stable long run structural relationship between social capital and macroeconomic performance is found. Firstly, in the post-Second World War era, countries with higher levels of social development are associated to higher levels of income and vice versa. Secondly, making use of a new social development index for 1870 and 1890, it is shown that this positive relationship between social development and log per capita income already existed in the late nineteenth century. At this respect, a strong positive linear association between the two variables is found. Regression results show coefficients that are significantly different from zero in all years discussed, and very similar between them. This upholds after controlling for foreign trade volume and structure, urbanization, education, quality of institutions, political stability, government expenditure, population growth, and climate.

TABLES AND FIGURES FOR II - CONTEMPORARY COMPARISON OF
ALTERNATIVES

Figure 2.1 - 3D Scatter Plots.
Spikes to the Floor and Centroid respectively

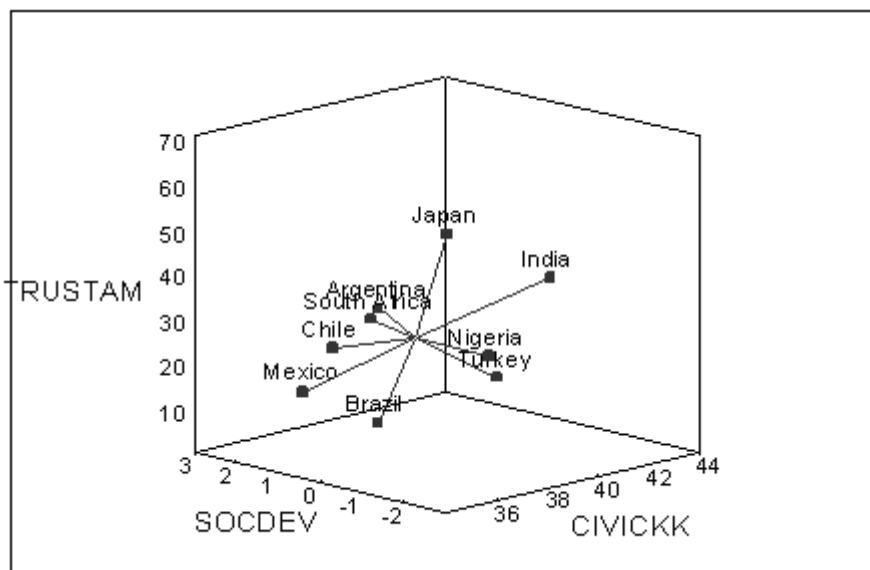
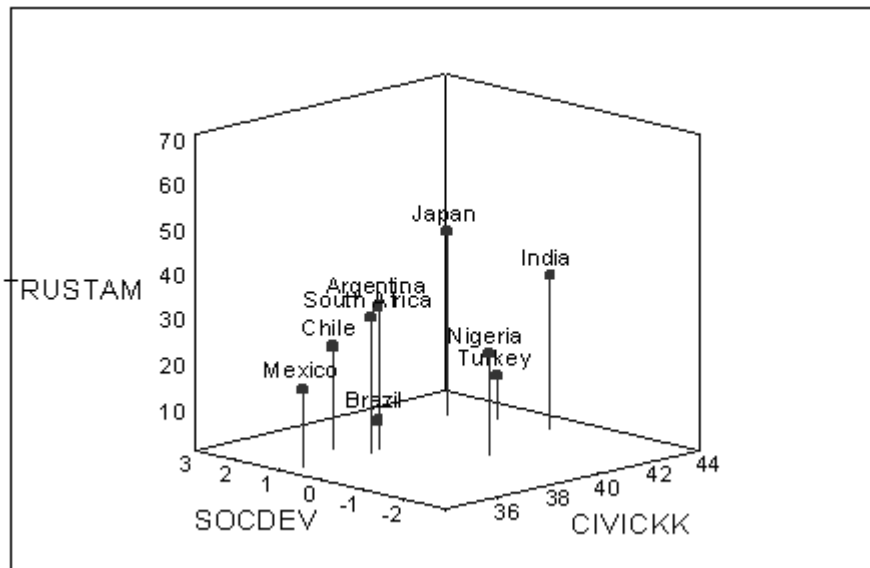
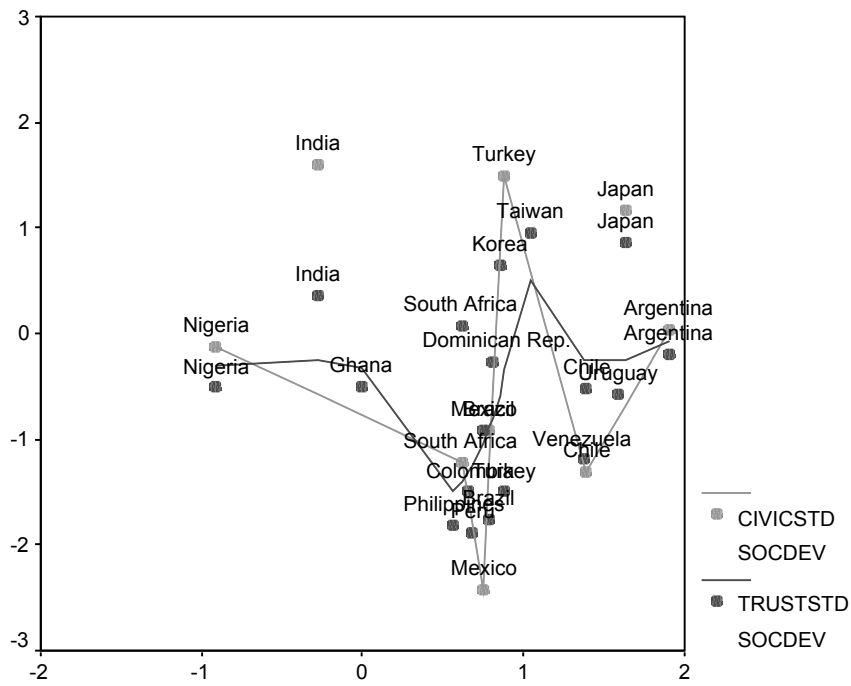


Figure 2.3 - Overlay Scatter Plot with Fit Line



SOCDEV in the horizontal axis, CIVICSTD (light) and TRUSTSTD (dark) in the vertical axis. Fit Method: Lowess. 50% of points fitted with 3 iterations.

**TABLES AND FIGURES FOR III.3 - RESULTS: PRINCIPAL
COMPONENTS ANALYSIS**

Table 2.3 - First Principal Component Score Coefficients (Loadings)

Variable	(1) Joint score	(2) Score 1870	(3) Score 1890
Income	.2463	.2363	.2539
Technique in industry	.2603	.2605	.2583
Adoption of new techniques	.2368	.2492	.2230
Technique in agriculture	.2650	.2630	.2666
Agricultural labour	-.2229	-.2181	-.2282
Inland transportation	.2445	.2319	.2577
Transportation, growth	.1744	.1833	.1496
Shift in export structure	.1897	.1907	.1864
Literacy	.2467	.2290	.2667
Land adoption	.2217	.2208	.2362
Urbanisation	.2036	.2041	.1953
Entrepreneurship	.2537	.2574	.2531
Socio-politics	.2509	.2500	.2515
Representativeness	.2529	.2468	.2565
Colonial status	.1731	.1818	.1770
Market development	.2750	.2721	.2787
Market development growth	.2486	.2601	.2338
Mkt develpt growth, lagged	.2435	.2578	.2247

Notes: The weight given to each variable is determined by the eigenvectors of the correlation matrix of all variables. Columns in the table are the eigenvectors associated to the first principal component. (1) Joint score coefficients; common weights across periods. This is the preferred option. (2) Weights corresponding to 1870 only; (3) weights corresponding to 1890 only.

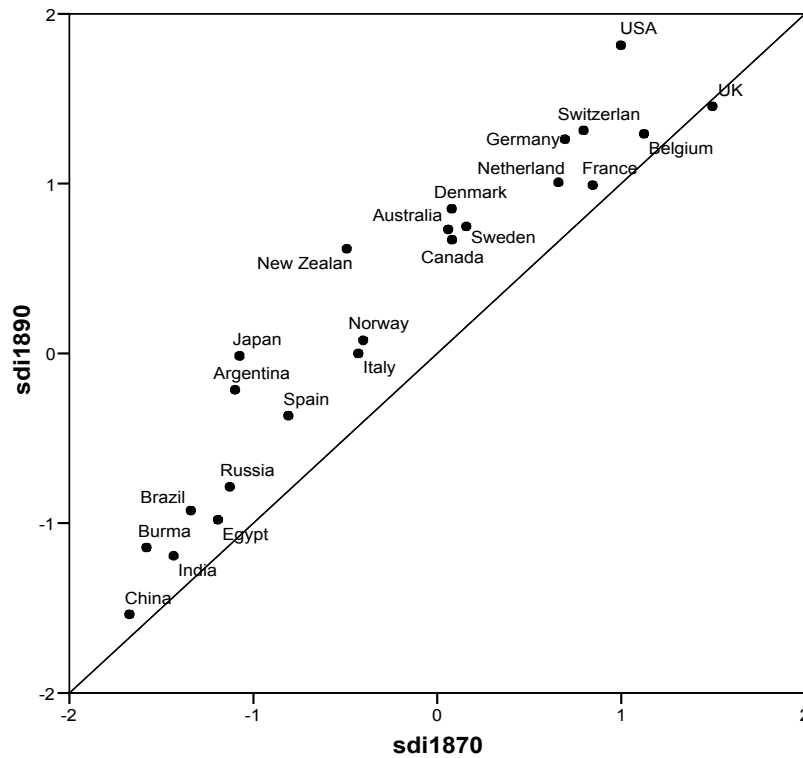
Normalisation: Sum of Squares column =1

Table 2.4 – First Principal Component Scores

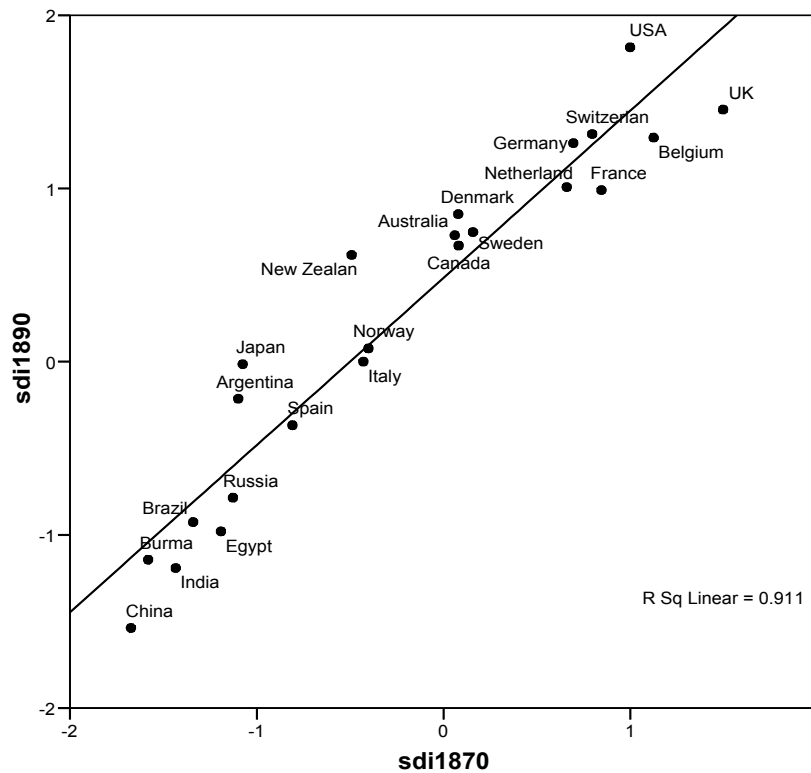
Country	SDI 1870	SDI 1890	Change SDI 1890 –SDI 1870	Sign of Change
Argentina	-1.099	-0.215	0.885	+
Australia	0.060	0.730	0.669	+
Belgium	1.125	1.292	0.168	+
Brazil	-1.339	-0.926	0.413	+
Burma	-1.581	-1.144	0.437	+
Canada	0.081	0.669	0.588	+
China	-1.673	-1.538	0.135	+
Denmark	0.079	0.851	0.772	+
Egypt	-1.192	-0.980	0.212	+
France	0.846	0.990	0.145	+
Germany	0.695	1.261	0.566	+
India	-1.433	-1.192	0.242	+
Italy	-0.429	-0.000	0.429	+
Japan	-1.075	-0.015	1.060	+
Netherlands	0.660	1.007	0.348	+
New Zealand	-0.492	0.615	1.107	+
Norway	-0.402	0.076	0.478	+
Russia	-1.128	-0.786	0.341	+
Spain	-0.809	-0.367	0.442	+
Sweden	0.158	0.747	0.589	+
Switzerland	0.796	1.314	0.518	+
United Kingdom	1.496	1.455	-0.042	-
United States	0.999	1.814	0.815	+

Note: The scores presented here have been standardised to have mean 0 and standard deviation 1. This results in a maximum observed score of 1.814 and a minimum of -1.673. To recover the unstandardised scores, multiply by 3.424. Italy score -0.000 is marked with the negative sign because for more than 4 significant ciphers, the number is negative.

**Figure 2.4 - Scatter Plot for the New Social Development Index:
1870 against 1890**

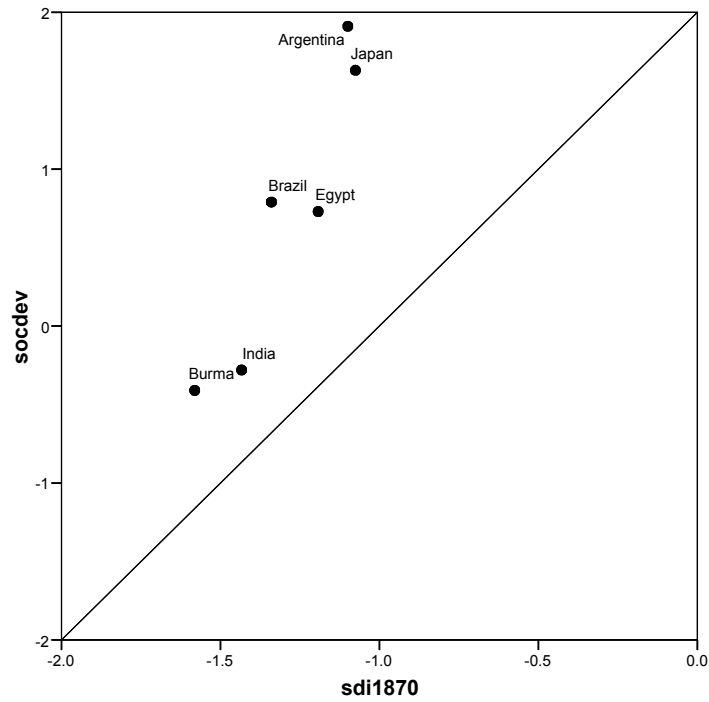


SDI 1870 in the horizontal axis. SDI 1890 in the vertical axis. Almost all countries lie above the 45-degree line. This means all countries except UK improved over this period.



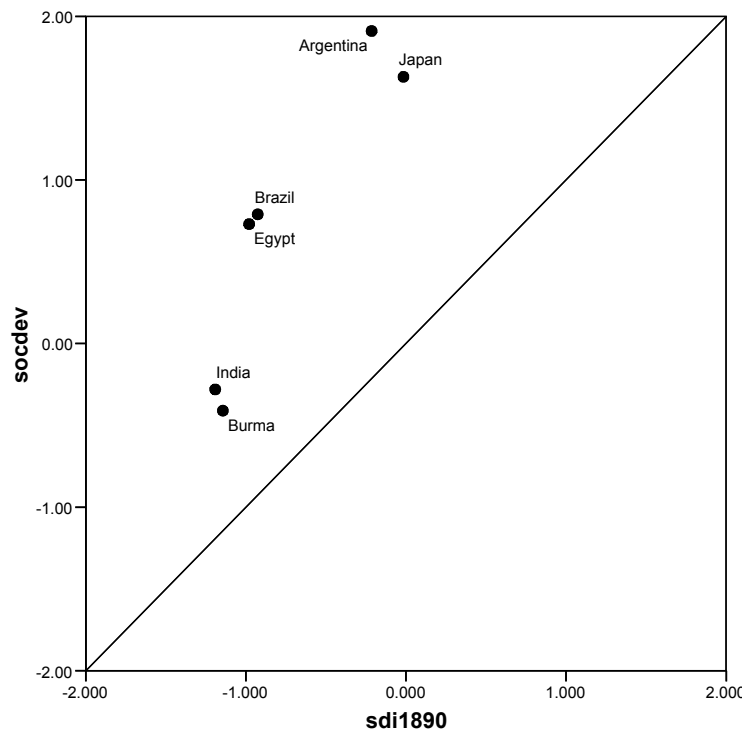
Scores with fit line at average standard deviation. Scores have improved an average of around half standard deviation in 2 decades.

**Figure 2.5 - Scatter plot for Social Development Index.
Historical Evolution from 1870 to 1960**



SDI 1870 in the horizontal axis. SOCDEV in the vertical axis. Countries have improved an average of 2 standard deviations between 1870 and 1960 (90 years)

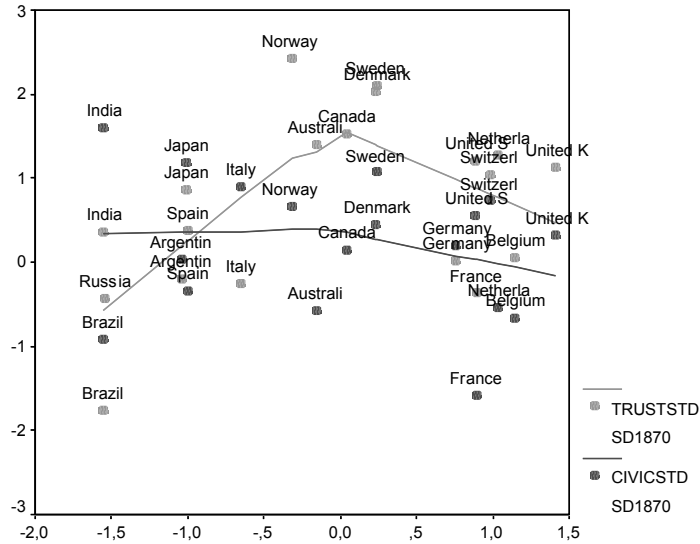
**Figure 2.6 - Scatter plot for Social Development Index.
Historical Evolution from 1870 to 1960**



SDI 1890 in the horizontal axis. SOCDEV in the vertical axis. Countries have improved an average of around one and a half standard deviations between 1890 and 1960 (70 years).

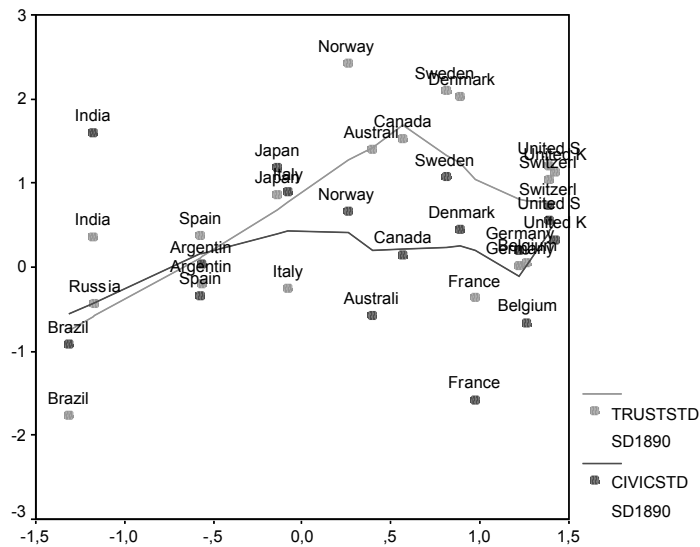
**FIGURES FOR SECTION IV - INTERTEMPORAL COMPARISONS:
NINETEENTH AND TWENTIETH CENTURIES**

**Figure 2.9 - Historical Evolution 1870-Nowadays.
Overlay Scatter Plot with Fitted Line**



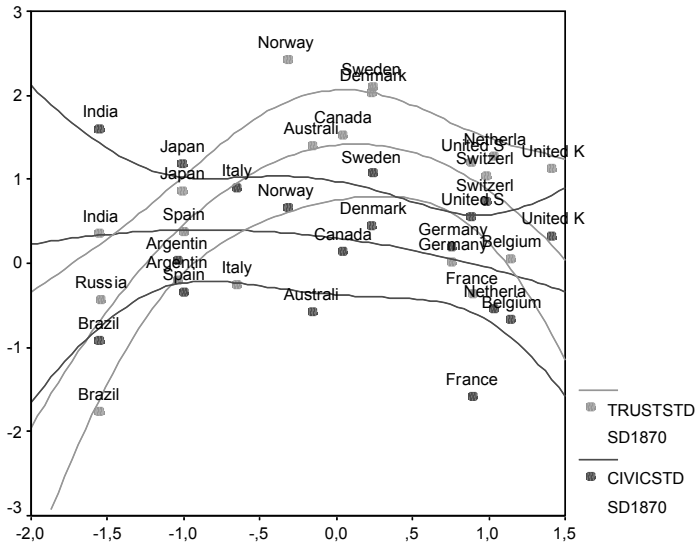
SOCDEV in the horizontal axis, TRUSTSTD (light) and CIVICSTD (dark) in the vertical axis. Fit method: Lowess. 50% of points fitted with 3 iterations.

**Figure 2.10 - Historical Evolution 1890-Nowadays.
Overlay Scatter Plot with Fitted Line**



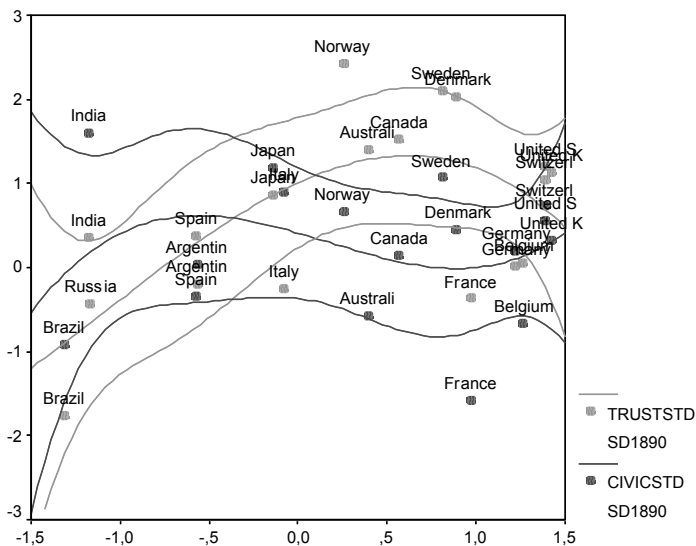
SOCDEV in the horizontal axis, TRUSTSTD (light) and CIVICSTD (dark) in the vertical axis. Fit method: Lowess. 50% of points fitted with 3 iterations.

**Figure 2.11 - Historical Evolution 1870-Nowadays.
Overlay Scatter Plot with Quadratic Regression Lines**



SOCDEV in the horizontal axis, TRUSTSTD (light) and CIVICSTD (dark) in the vertical axis. Fit method: Quadratic regression prediction lines.

**Figure 2.12 - Historical Evolution 1890-Nowadays.
Overlay Scatter Plot with Cubic Regression Lines**



SOCDEV in the horizontal axis, TRUSTSTD (light) and CIVICSTD (dark) in the vertical axis. Fit method: Cubic regression prediction lines.

SECTION V – THE RELATIONSHIP BETWEEN SDI AND INCOME

Table 1
Level of association between Social Development and Income
Dependent Variable: Log GDP Method: OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Year	1870	1870	1890	1890	1960	1960
Observations	21	19	21	19	72	70
SDI slope	.202*** (.035)	.209*** (.022)	.224*** (.034)	.224*** (.025)	.236*** (.023)	.233*** (.021)
R ²	.633	.836	.698	.826	.596	.648
Adjusted R ²	.614	.827	.682	.816	.590	.643

Notes: Constant included in the regressions but not shown on table. Standard deviation of coefficients between parentheses. Influential observations outside 2 standard deviations (Australia and New Zealand for 1870 and 1890, Gabon and Venezuela for 1960). *** Coefficient statistically significant at the 0.01 level.

Table 2
Social Development and Income including control variables.
Dependent variable: Log GDP Method: OLS

	(1)	(2)	(3)	(4)
Year	1870	1870	1890	1890
Observations	21	21	21	21
SDI	.472*** (.123)	.427** (.154)	.417** (.149)	.489*** (.140)
growth of exports	.003 (.002)	-	.001 (.002)	-
foreign dependency	-	-.003 (.003)	-	-.005* (.003)
Urbanisation	-.005 (.004)	-.002 (.004)	-.002 (.004)	.000 (.002)
literacy rate	.012*** (.004)	.008** (.003)	.010** (.003)	.007** (.002)
form of land tenure	-.011*** (.003)	-.010*** (.003)	-.008** (.004)	-.009*** (.002)
political stability	-.004 (.003)	-	-.001 (.003)	-
political power of workers	-	.003 (.005)	-	.006** (.002)
domestic importance of govt	.002 (.003)	.001 (.003)	.001 (.002)	.001 (.001)
shift of exports to manuf	-.008* (.004)	-.005 (.003)	-.004* (.002)	-.004** (.002)
population growth	.010** (.003)	.009** (.004)	.008*** (.002)	.004* (.002)
% land in tropics	-.715*** (.173)	-.686*** (.181)	-.258 (.200)	-.203 (.133)
R ²	.949	.944	.967	.983
Adjusted R ²	.897	.887	.935	.965

Notes: Constant not shown. Standard errors between parentheses. *Coefficient statistically significant at the 0.1 level. ** Coefficient statistically significant at the 0.05 level. ***Coefficient statistically significant at the 0.01 level.

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