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Income Distribution, Political Instability, and Investment

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This paper successfully tests on a sample of 64 countries for the period 1960-1985 the following hypotheses. Income inequality, by fueling social discontent, increases socio-political instability. The latter, by creating uncertainty in the politico-economic environment, reduces investment. As a consequence, income inequality and investment are inversely related. Since investment is a primary engine of growth, this paper identifies a channel for the frequently noticed inverse relation between income inequality and growth.

We measure socio-political instability with a composite index which captures the occurrence of more or less violent phenomena of political unrest. We test our hypotheses by estimating a two-equation model in which the endogenous variables are investment and the index of socio-political instability.

Our results are robust to sensitivity analysis on the specification of the model, and are unchanged when the model is estimated using robust regression techniques.

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Income Distribution, Political Instability, and Investment

by Alberto Alesina and Roberto Perotti

SUMMARY

This paper suggests and tests the following hypotheses: Income inequality fuels social discontent and political instability. Socio-political instability increases the uncertainty faced by entrepreneurs and, therefore, reduces investment. As a consequence, income inequality has a negative influence on capital accumulation and growth.

These ideas are tested on a sample of 64 countries for the period 1960-85 and our results are consistent with the hypotheses. Specifically, we find that a reduction in income inequality, namely an increase in the share of income of the "middle class" at the expense of a reduction in the share of income of the richest of the income distribution, significantly reduces socio-political instability. In turn, more social stability increases total investment.

We measure socio-political instability by means of a composite index, which takes into account the occurrence and number of political demonstrations against the government, of violent riots, of political strikes, of deaths occurred in connection with political activities, of politically motivated armed attacks against individuals, of political executions, and of successful and unsuccessful military coups d'etat. Finally, the index also takes into account whether the country is a democracy or not. We show that this index is positively correlated with income and education. Richer and more educated countries are more stable.

We then estimate a system of two equations in which the two endogenous variables are the ratio of total investment to GNP and our index of socio-political instability. Measures of income distribution are taken as exogenous.

Our results are very sensible. After controlling for several economic and regional determinants of investments, we still find that the amount of socio-political instability has a strong negative influence on investment. In turn, we find that even after controlling for the level of per capita income, education, urbanization, and regional differences, still there exists a significant impact of income inequality on socio-political instability. In more colorful terms, we find that the presence of a "healthy" middle class reduces instability and, via this channel, increases investment.

These results have potentially important policy implications. An argument often made in policy debates is that redistributive policies targeted to reduce inequality should reduce growth. This observation follows from the fact that distortionary taxes need to be levied on the productive rich investors to support transfers to the poor. However, our results suggest that these transfers may, in the end, produce a benefit for the investors via a reduction of socio-political instability. Even from the point of view of growth, fiscal transfers may be beneficial, if the fiscal burden of the transfers is compensated by the gain in social harmony.

1 Introduction.

This paper studies the effects of income distribution on investment, by focusing on political instability as the specific channel which links these two channels. Income inequality increases social discontent and fuels social unrest.[1] The latter, by increasing the probability of coups, revolutions, government changes or, more generally, by increasing policy uncertainty and threatening property rights, has a negative effect on investment and, as a consequence, reduces growth.

Our paper is related to a recent line of empirical research which investigates the relationship between political instability and various measures of economic performance. For instance, Venieris and Gupta (1986) show that what they identify as "socio-political instability" has a negative effect on the savings rate.[2] Barro (1991) and especially Alesina, Ozler, Roubini and Swagel (1992) and Block-Bomberg (1992) find negative effects of political instability on growth.[3] Goodrich (1992) reports that political instability reduces foreign investment in LDC's. Benhabib and Spiegel (1992) show weak evidence on an inverse relationship between political instability and private domestic investment.

A second recent line of research studies the relationship between growth and income distribution rather than political instability. The main mechanism generating an adverse effect of inequality on growth is the effects of income distribution on the degree of redistribution through the fiscal system. In more unequal societies, the demand for

[1]On this point see, for instance, Huntington (1968).

[2]The same authors (Venieris and Gupta (1989)) present further evidence of interesting non-linearities in this relationship.

[3]Londegran and Poole (1990, 1991) in related work do not seem to find such evidence. For a discussion of their results and comparisons with other literature see Alesina, Ozler, Roubini and Swagel (1992).

fiscal redistribution financed by distortionary taxation is higher, causing a lower rate of growth.[4]

We estimate on a cross-section of 64 countries a two-equation system in which the endogenous variables are investment in physical capital and a measure of political instability.[5] We emphasize that economic and political development are jointly endogenous: this joint endogeneity has been generally ignored in the recent literature on the political economy of growth.[6] We are specifically interested in two questions:

(i) Does political instability reduce investment?

(ii) Does income inequality increase political instability?

Our results suggest that the answer to both questions is in fact a "yes" with only minor qualifications. We find a strong negative effect from political instability to investment in both samples, 1970-85 and 1960-85. Income inequality increases political instability in the sample 1960-85, while on this point the results for the sample 1970-85 are not as strong. Interestingly, our results suggest that the presence of an economically powerful middle-class reduces political instability and, therefore, stimulates capital accumulation.

The effect of political instability on investment is strong both statistically and economically: indeed, the coefficient is quite large in absolute value. The effect of income inequality on political instability is statistically significant but relatively small in magnitude.

[4]A non-exhaustive list of papers in this area includes Alesina-Rodrik (1991), (1992), Persson-Tabellini (1991), Bertola (1991) and Perotti (1993). The first two present some supportive evidence on the reduced form relation between income distribution and growth implied by these models. However, Perotti (1992) estimates the simultaneous-equation systems generated by these and other models and finds much less support for the mechanisms of these models.

[5]The number of countries used in different specifications and different tests may vary slightly because of data availability. We have always chosen the largest sample of countries for which data were available.

[6]Exceptions are Londegran and Poole (1990), (1991), Alesina et al. (1992) and Block-Bomberg (1992).

Of course, the idea that income distribution might affect investment is not new. Perhaps the most influential theory on the subject is still the one advanced by Kaldor in his famous 1956 paper: since different income groups have very different propensities to save, income distribution is a powerful determinant of investment via its effects on aggregate savings. In one of our specifications, we test this hypothesis too, but we do not find much support for it.

This paper is organized as follows. In section 2 we address the problem of how to define and measure political instability. In section 3 we discuss data issues; we present our data set and highlight simple correlations between variables. Section 4 discusses the model specification. Section 5 presents the basic results. In section 6 we discuss various robustness tests and perform sensitivity analysis. Section 7 concludes.

2 Definition and measure of political instability.

Social and political instability are variables that are hard to define and measure in a way which can be used for econometric work. Political instability can be viewed in two ways. The first one emphasizes executive instability. The second one is based upon indicators of social unrest such as strikes, political violence, demonstrations etc.

The first approach defines political instability as the "propensity to observe government changes". These changes can be "constitutional", i.e. take place within the law, or "unconstitutional", i.e. they can be coups d'etat. The basic idea is that a high propensity to executive changes is associated with policy uncertainty and, in some cases, with threats to property rights. Note that the "propensity" to executive changes is distinct

from the actual frequency of changes, and can be measured by probit regressions in which the probability of a change in the executive is related to several economic, socio-political and institutional variables.

For example Cukierman et al. (1992) and Edwards and Tabellini (1991) adopt this definition of instability in their work on inflation. One important issue, however, which these authors do not completely address is that of "joint endogeneity". On one hand, political instability affects aggregate economic outcome. On the other hand, the latter influences executive instability. Londegran and Poole (1990), (1991), Alesina et al. (1992) and Block-Bomberg (1992) have explicitly taken into account this problem in their work on executive instability and economic growth. Both sets of authors estimate two-equations systems. One equation is a probit regression, which estimates the propensity to government changes, while the other is a regression for economic growth.

The second approach does not focus directly on executive changes. Socio-political instability is measured by constructing an index which summarizes various variables capturing phenomena of social unrest. An important reference on this point is Hibbs (1973), who uses the method of principal components to construct such an index. More recently, Venieris and Gupta (1986), (1989), Gupta (1990), Barro (1991), Ozler and Tabellini (1991) and Benhabib and Spiegel (1992) have used several indices of socio-political instability as an explanatory variable in various regressions in which the dependent variable is an economic one. As emphasized above, joint endogeneity issues are key here; in many cases there are good reasons to believe that the left hand side variable that one is attempting to explain as a function of socio-political instability (such as inflation, growth,

investment etc.) is itself a determinant of social unrest.

Which of the two approaches to measuring political instability described above is preferable is not clear a priori and may depend upon the specific issue under consideration. For instance, one may argue that, for *a given level of expected government turnover,* phenomena of social unrest do not have any direct impact on policy uncertainty, and therefore on economic decisions. This might be a strong but useful "identifying" assumption: policy changes relevant for economic decisions can occur only when governments change. On the other hand, one may argue that, particularly when it reaches very high levels, social unrest disrupts market activities and increases economic uncertainty above and beyond its direct effects on executive instability. Long and violent strikes, riots and physical threats to workers and entrepreneurs engaged in productive activities can have direct effects on productivity and therefore on the rate of return to investment.

This paper adopts the second approach to measuring political instability. We explicitly take into account problems of joint endogeneity by estimating a system of two equations in which the two endogenous variables are investment and an index of socio-political instability, SPI.

Rather than constructing our own SPI index we obtain it by applying a formula suggested by Gupta (1990). Two reasons have convinced us of this choice. First, as we argue below, this index is quite reasonable and appears consistent, both conceptually and empirically, with our views concerning the meaning of socio-political instability. Second, by not constructing or own index, we cannot be accused of building the index which produces the best results for our purposes.[7]

[7]In a previous version of this paper, we adopted a related but different index, proposed by Venieris and

Gupta (1986) proposes the following index of socio-political instability (SPI):

$$\begin{aligned} SPI &= 1.14 + .0007PROTEST + .0049RIOT + .0086STRIKE \\ &+ .0000043DEATH + .13ASSASS + .0008ATTACK \\ &+ .0033EXECUTION + 1.38SCOUP + .264UCOUP + .92DEM \end{aligned} \tag{1}$$

where $PROTEST$ is the number of political demonstrations against a government; $RIOT$ is the number of riots; $STRIKE$ is the number of political strikes; $DEATH$ is the number of people killed in conjunction with any domestic political violence; $ASSASS$ is the number of politically motivated assassinations; $ATTACK$ is the number of politically motivated attacks on individuals; $EXECUTION$ is the number of politically motivated executions; $SCOUP$ is the number of successful coups; $UCOUP$ is the number of unsuccessful coups, and DEM is a dummy variable that identifies democracies, taking a value of 0 for democracies, .5 for semi-democracies and 1 for dictatorships. All variables are expressed as the average of annual values over the sample period.

The SPI index specified in equation (1) is derived by Gupta (1990) by applying discriminant analysis in a sample of countries which is a subset of our sample. Gupta has considered a large set of variables, collected by Jodice and Taylor (1988), which represent various socio-political events. The variables included in the index capture both violent and peaceful expressions of political dissent and turmoil. For example, the

Gupta (1986). That index was dominated by the weight attributed to the institutional regime (democracy or dictatorship) of the country, on the ground that the same number of, say, demonstrations is an indicator of higher instability in a dictatorship than in a democracy. The index which we use in the current version is much more balanced. We are grateful to Edgar Ariza-Nino for pointing out this problem.

variables *PROTEST* and *STRIKE* indicate more peaceful forms of political action; *RIOT*, *DEATH* and *ASSASS* more violent forms. Note that the variable *DEATH* has a very small coefficient: the reason is that cases of civil wars with large number of casualties would otherwise receive an overwhelming weight.[8] The variable *DEM* captures the idea of legitimacy. Our dummy variable for democratic institutions is different from the one used by Gupta (1990). He uses a dichotomous, zero/one variable, while we use the same classification proposed by Alesina et al. (1992) and described in Table 1. This classification identifies three categories. "Democracies" ($DEM = 0$) are countries with free competitive elections with more than one party running for office. "Dictatorships" ($DEM = 1$) are countries without free elections. "Semi-democracies" ($DEM = .5$) are countries with some forms of elections but with severe limits on political rights. The middle group captures countries like Mexico which, although not a dictatorship, has experienced severe limitations to political rights and freedom of multi-party elections. The variable *DEM* is included in the *SPI* index because in repressive dictatorships it is more difficult (and costly) to protest against the government; more generally, expressions of political discontent are repressed. Furthermore, in most dictatorships the government controls the press and restricts the diffusion of information, particularly abroad. Thus, measures of social unrest are likely to be under-reported, for propaganda reasons, in dictatorships.[9]

[8]The index also includes the variable *SCOUP*, the average number of successful coups. Following our previous discussion on the two different ways of measuring political instability, we interpret this variable not so much as an indicator of government change, but as an indicator of political violence.

[9]The weight attributed to the democracy variable is not excessively large (see footnote 7.). For example, a democracy with 8 assassinations has now a higher instability index than a dictatorship with no assassinations and more unstable than a "semi-democracy" with 5 assassinations, ceteris paribus. Similarly, one unsuccessful coup makes a "semi-democracy" as unstable as a dictatorship, ceteris paribus.

3 Data and sample period.

We perform cross sectional regressions using a sample of 64 countries for the periods 1960-1985 and 1970-85. The binding constraint on the number of countries is the data availability. We have income distribution data for 72 countries, but for only 64 of these we have data on urbanization and political instability. We use the same data on income distribution assembled by Perotti (1993) which is very similar to the data set used by Alesina and Rodrik (1991). The main source of these data is Jain (1975). For a more complete description of sources of income distribution papers see the Appendix of this paper and Perotti (1993). The income distribution data consists of the income shares of the five quintiles of the population, measured as close as possible to the beginning of each sample period, 1960 for the 1960-85 sample and 1970 for the 1970-85 sample. In our specification, income distribution is treated as predetermined; therefore, it is appropriate to use this variable measured at the beginning of the sample period.

The binding constraint on the initial date of the sample period is the availability of economic data. We use the same data employed by Barro (1991) and Perotti (1993). The end of our sample period (1985) is imposed by the availability of socio-political variables. The list of these variables is included in Table 1.

Measurement errors are likely to be a problem for these socio-political variables. Specifically, one issue often emphasized is that of under-reporting of episodes of social unrest in poor countries, and particularly in Africa.[10] Partly for these problems, and

[10]Most of these variables are constructed by means of checking news reports, particularly in the New York Times. News of a riot in, say, France are much more likely to be reported accurately than news of a riot in, say, Mauritania.

partly for other conceptual issues (discussed later) a regional dummy for Africa is always included in our equation for political instability.

We computed the *SPI* index on a yearly basis using the formula in eq. (1) and then we averaged over the 1960-85 and 1970-85 samples. Table 2 reports the average of the SPI index for the sample 1960-85, ordered from the poorest to the richest country, in terms of their per capita income in 1960. This ordering immediately highlights a strong positive correlation between poverty and socio-political instability. Furthermore, a couple of countries suggest interesting observations. For example, Japan has a lower index of instability than countries at comparable level of development in 1960. Thirty years later this country is one of the richest in the world. The opposite observation holds for Argentina. Not surprisingly, the most stable countries are OECD democracies, even though several LDCs, such as Venezuela, are also relatively stable.

Table 3 reports the summary statistics for our variables and Table 4 highlights simple correlations between them.[11] The two key correlations for our purposes are those between *SPI* and investment, *INV*, and between *SPI* and *MIDCLASS*, which represents the share of total income perceived by the third and fourth quintiles of the population.

The correlation between *SPI* and *INV* is -.60, while *MIDCLASS* has a correlation of -.50 with *SPI*. All of these signs are consistent with our hypothesis, namely that socio-political instability depresses investment and income inequality makes the socio-political environment more unstable. Also, *SPI* is highly negatively correlated with both the level of income and the level of education. However, the latter two variables are highly correlated with each other. Finally, *MIDCLASS* has a correlation of -.93 with the share

[11] Both tables cover the sample 1960-85 only.

in income of the richest quintile. This implies that an increase in the share of the middle class is associated, on average, with a one for one decrease in the share of the richest quintile. This is the main reason why the two variables do not appear at the same time in our regressions.

4 Model specification.

Our hypothesis is that socio-political instability reduces the propensity to invest. Several arguments justify this hypothesis. The most compelling one emphasizes the effect of socio-political instability on uncertainty: in a more uncertain environment investors may choose to postpone projects, invest abroad (capital flights) or simply consume more. A high value of the SPI index implies high uncertainty for two reasons. First, when social unrest is widespread, the probability of the government being overthrown is higher, making the course of future economic policy more uncertain. Second, social unrest may imply direct disruptions of productive activities. If workers are engaged in strikes or other forms of non-violent political protests, investors will be less likely to start or expand productive projects.

As to the effects of income inequality on socio-political instability, our hypothesis is that there should be a positive relation between these two variables. A large group of impoverished citizens, facing a small and very rich group of well-off individuals is likely to become dissatisfied with the existing socio-economic status quo and demand radical changes.

We capture these two effects in the following basic specification of a simple bivariate

simultaneous equation model in SPI and investment:

$$INV = \alpha_0 + \alpha_1 SPI + \alpha_2 EDUC + \alpha_3 PPPIDE + \epsilon_1 \tag{2}$$

$$\begin{aligned} SPI &= \beta_0 + \beta_1 EDUC + \beta_2 GDP + \beta_3 INV + \beta_4 MIDCLASS \\ &\quad + \beta_5 URB + \beta_6 AFRICA + \beta_7 LAAMER + \beta_8 ASIA + \epsilon_2 \end{aligned} \tag{3}$$

The breakdown of investment between private and public is available only for 53 of the 64 countries of our sample and only from 1970 onward. Therefore, for the 1960-85 sample we use only total investment (INV) as dependent variable in equation (2). For the 1970-85 sample we can use both total and private investment ($PRIVINV$). There are reasons to believe that public investment as well as private investment should be negatively affected in periods of high socio-political instability. Since these are usually periods of high and contrasting demands on the government budget, public investment projects are likely to be reduced to make room for redistributive expenditure.

Some comments on the specification of the two equations are necessary. As discussed above, we expect α_1 in the investment equation to be negative. The variable $EDUC$ is a proxy for human capital. Complementarity between physical and human capital would imply a positive sign for α_2. It is also reasonable to expect that a higher PPP value of the investment deflator $PPPIDE$, due for instance to domestic distortions, should reduce the rate of investment. Thus, α_3 should be negative.

One may argue that income distribution affects investment directly, not only through

political instability, but also through two additional channels. The first one is a "Kaldorian" saving function. According to Kaldor (1956), the "capitalists" save more in proportion to their income than the "workers". A proper test of this theory would require data on the functional distribution of income. However, since the correlation between measures of personal and functional distribution of income is likely to be very high, it is possible to gather some idea of the validity of this theory by testing the hypothesis that the higher is the share of the top quintile, i.e. the more *unequal* is the distribution of income, the higher is investment. On the other hand, Alesina and Rodrik (1991) and Bertola (1991) argue that the more unequal the distribution of income, the higher is the demand for fiscal redistribution through taxation of capital. The latter may depress investment by increasing the tax burden on investors. In order to explore these direct channels we have run a second specification, in which we added an income distribution variable in the investment equation. However, since the two channels discussed above go in opposite direction, the sign of the associated coefficient is a priori ambiguous.

Turning to the SPI equation, we included the variable $EDUC$ because a higher level of education may reduce political violence and channel political action within institutional rules (see Huntington (1968)). Therefore, we expect $\alpha_1 < 0$. A similar argument justifies the inclusion of income per capita at the beginning of the period, GDP: the basic notion is that "good things go together", so that richer countries are more stable. Thus, β_2 should be negative according to this hypothesis. Investment is included to test the idea that rapidly growing economies tend to be more stable, which implies a negative sign for β_3.[12] As discussed at length above, we expect a positive relation between inequality and

[12]See, however, Huntington (1968) for an in depth discussion of possible non linearities in this

instability. Accordingly, under the null hypothesis the sign of β_1 should be negative when an index of equality is used, and positive when an index of inequality is used. A variable for urbanization is also included: more urbanized countries should be more unstable, because political participation is positively associated with urbanization. Therefore, β_5 is positive under our null hypothesis. Finally, we added regional dummies for three reasons. First, cultural and/or historical reasons may influence the amount of socio-political unrest in different regions of the world. Second, in certain regions, particularly Africa, under-reporting of socio-political events can be particularly acute. Third, there might be spillovers of political violence from a country to its neighborghs.

Before proceeding, it is appropriate to spend a few words to justify, on a priory grounds, our identifying assumptions. The first crucial identifying assumption is the exclusion of $PPPIDE$ from the SPI equation. This variable measures market distortions that should have a direct effect on investment decisions and a much less clear-cut effect on social unrest. Second, there are more compelling reasons (discussed above) to introduce exhaustive regional dummies in the SPI equation than in the investment equation. Third, we have imposed the restriction that income distribution influences socio- political instability but not investment directly. Sensitivity analysis on these and other identifying assumptions are presented below in Section 6: our basic results are quite robust to changes in the specification of the system.

After presenting our specification and data, we can now discuss the relation of our model to related work by Gupta (1990). Like us, Gupta estimates a structural model where income distribution affects political instability and the latter affects investment.

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relationship.

Our specification, however, builds on the recent empirical literature on growth and differs substantially from Gupta's. Moreover, he has observations on income distribution for only 49 of the 104 countries in his sample. The remaining observations are obtained by regressing the existing sample of income distribution variables on a set of explanatory variables, and using the estimated coefficients to generate values for the missing observations. There is no need to underline the problems of this procedure. Finally, for reasons that are not clear to us, in all his regressions Gupta uses the 1970 value of the SPI index rather than its average on the estimation period as we do. These and other differences are sufficient to explain the difference in results between the two works: in fact, contrary to our results, in Gupta's book both income distribution and political instability turn out to be insignificant in explaining political instability and investment respectively.

5 Estimation results.

This section describes the results of the estimation of our base specification, equations (2) and (3). Table 5 reports results on both samples, 1960-85 (first two columns) and 1970-85 (last two columns); in both cases, *MIDCLASS* is the measure of inequality used. The two key coefficients are those that capture the effects of *SPI* on *INV* and of *MIDCLASS* on *SPI*. Both coefficients have the expected signs and are significant at the 5% level: socio-political instability depresses investment and a rich middle class reduces socio-political instability. Thus, a "healthy" middle class is conducive to capital accumulation because it creates conditions of social stability. As noted above, the share of income of the middle class has a correlation of almost -1 with the share of the richest

quintile. Thus, a wealthier middle class implies more equality in the distribution of income. An increase by one standard deviation of the share of the middle class causes a decrease in the index of political instability of about 1.2, which corresponds to about one fifteenth of its average value and one fourth of ist standard deviation. This in turn causes an increases in the share of investment in GDP of about one percentage point. Although not huge, the effect of income distribution on investment implied by these estimates is not negligible either, since the difference between the highest and lowest value of *MIDCLASS* in the sample is about 4 standard deviations. In addition, an exogenous increase in the *SPI* index by one standard deviation causes a decrease in the share of investment in GDP of about 4 percentage points.

The other coefficients in the investment equation have the expected signs and are significant at high levels of confidence. The proxy for market distortions, *PPPIDE*, has a negative effect on investment, while education has a positive one.

The estimation results for the *SPI* equation are also very sensible. Both *GDP* and *EDUC* have a negative impact on *SPI*. As expected, richer countries and countries with higher levels of education are more stable. The coefficient on investment is insignificant. Urbanization has a positive coefficient, marginally insignificant at standard confidence levels: as expected, urbanization fuels social unrest. This result on urbanization is consistent with the arguments of Huntington (1968) and the empirical tests of Berg and Sachs (1988) and Ozler and Rodrik (1992): all of these authors argue that urbanization leads to more social demands and political pressure for redistributive policies. All the regional dummies are insignificant.

The next two columns in Table 5 report results with private investment (*PRIVINV*) as a dependent variable, rather that total investment. As mentioned in section 4, this variable is available only for 53 countries and after 1970. Thus, for these regressions the sample period is 1970-85. The effect of *SPI* on private investment remains very strong and significant. However, the income distribution variable is insignificant in the *SPI* equation, although it has the correct sign.

In order to check whether private and total investment behave differently we have also run the same regressions using total investment averaged over the same sample period, i.e. 1970-85. The results (not reported but available upon request) are very similar to those obtained using private investment. This finding suggests that the differences between the results of the first two columns of Table 5 and those of the last two are due to the different sample period, rather than to the differences between private investment and total investment.

We do not have a clear sense of why the results are slightly different in the two samples. However, the hypotheses that we are testing here have a "long-run" nature: we are trying to explain long-run politico-economic development. A fifteen year sample (1970-85) may be more influenced by specific shocks (for instance, the two oil shocks) which may blur these long-run structural relationships. It is interesting to note that the t-statistics on two other variables (*URB* and *EDUC*) also drop in the 1970-85 sample relative to the 1960-85 sample, indicating that our estimation of the *SPI* equation is generally more successful in the longer sample.

With these qualifications, we can summarize our results in the following way: more

inequality leads to socio-political instability which, in turn, slows down the process of capital accumulation.

6 Robustness and sensitivity analysis.

We have estimated several alternative specifications, but the key results described in the preceding section do not disappear. First, since the variables *EDUC* and *GDP* are highly correlated, we tried several alternative combinations: we added *GDP* in the investment equation, with or without *EDUC*, and we performed the same experiment in the *SPI* equation. Second, we tried several alternative specifications regarding the regional dummies in the two equations: we included all three dummies in the investment equation rather than the *SPI* equation, and we also experimented with including one regional dummy at a time. Third, we dropped the variable *URB*, which allowed us to gain 6 observations to our sample. We estimated all these specifications on both samples, 1960-85 and 1970-85, the latter using private investment as endogenous variable.

Overall, the results of these several dozens of runs confirm the picture emerging from Table 5. With only one exception, which we discuss below, the effect of *SPI* on investment is large and significant in both samples. The effect of *MIDCLASS* on *SPI* is statistically significant in the 1960-85 sample, and, in general, not significant but with the correct sign in the 1970-85 sample. The specification presented in Table 5 is our preferred one on a priori ground, but we point out that in several other reasonable specifications our result appears even stronger.

The one exception mentioned above is the specification in which both the variable

EDUC and the Latin American dummy variable are included in the investment equation. In this case, the effect of *SPI* on investment remains significant in the 1970-85 period, but becomes insignificant in the 1960-85 period. The effect of *MIDCLASS* on *SPI* remains unchanged as in all the other specifications: significant in the 1960-85 sample, insignificant in the 1970-85 sample. Our first interpretation was that the Latin American dummy and the SPI index are highly correlated, since Latin America is a highly unstable region. However, we observed that first, the *SPI* index remains extremely significant when *EDUC* is dropped (with or without *GDP*) and the Latin American dummy is included; second, when we drop the Latin American countries from our sample, *SPI* remains insignificant in the investment equation whenever *EDUC* is also included as a regressor.

We studied the sensitivity of our results to specific observations by dropping (in various combinations) countries for which we had good reasons to believe that the available data on income distribution were particularly poor. Once again, our results did not change.

Table 6 displays estimates of the same specification of Table 5, with the only addition of *MIDCLASS* to the investment equation. Thus, this specification tests Kaldor's idea that income distribution is a major determinant of aggregate savings and therefore affects investment directly. Only the investment equation of each system is reported in Table 6, since the corresponding *SPI* equation is the same as in Table 5 (remember that these are 2SLS estimates). Our estimates do not lend much support to Kaldor's hypothesis: the income distribution variable in the investment equation is always statistically and

economically insignificant. Since *MIDCLASS* might not be the appropriate measure to test Kaldor's hypothesis, we run the same regression using the ratio of the top quintile to the two bottom quintiles as the income distribution variable, but again the coefficient was insignificant in both samples. One possible explanation of these results is that, as we mentioned in section 4, there are a priori reasons for a more unequal distribution of income to depress investment by generating higher demands for fiscal redistribution and therefore more distortions.

It is useful to compare this findings with those obtained by Alesina and Rodrik (1992). In a single equation regression they show that income inequality has adverse effects on investment. Our results suggest that the link between these two variables is *SPI*. In fact, after controlling for *SPI*, inequality does not seem to influence investment directly.

An additional way of looking at the robustness of the results is to estimate the model using robust estimation methods. Roughly speaking, robust regression methods provide estimators that downweigh those observations that are "outliers". One dimension along which the robust estimators differ is the definition of an "outlier". Typically, an outlier is characterized by a large residual. We have chosen to estimate the *SPI* and *INV* equations by applying the bounded-influence estimator proposed by Krasker and Welsch (1982). The main reason for this choice is that this estimator identifies and downweighs outliers not only in the residuals' space, but also in the regressors' space. As shown by Krasker and Welsch (1983), an observation can be very influential and nevertheless the residual corresponding to that observation may be smaller than most other residuals. Since we are estimating a simultaneous-equation model, we implement the 2SLS version

of the Krasker and Welsch estimator.[13]

Table 7 shows the Krasker-Welsch estimates of the same *SPI* and *INV* equations estimated in Table 5. In the first two columns the sample is 1960-85, while last four columns estimate the same systems over the period 1970-85.One can see immediately that the point estimates of virtually all the coefficients are not very different from those of the 2SLS estimators. The relative efficiency of the Krasker-Welsch estimator is always quite low relative to typical values of .9 or .95 used in applied work. This is an indication that the estimates are indeed robust: the less efficient is the Krasker-Welsch estimator relative to the 2SLS estimator, the easier it is for an observation to be considered an outlier.[14] These results are therefore quite reassuring: although there are well known measurement error problems in income distribution and political data, they are not of such a nature as to make the estimates of the model very sensitive to some particular observation.

Finally, we addressed the related issues of heteroskedasticity and misspecification due to measurement errors. Regarding the first problem, we ran a Breusch-Pagan and a Hall-Pagan test[15] on all the equations of Table 5, assuming that the error variance was proportional to the inverse of initial GDP. The tests were never significant at the 10% level. As an additional check, we reestimated the *SPI* equation applying White's

[13]Robust estimator for 3SLS have not been devised yet. See Krasker and Welsch (1982) and Krasker,Kuh and Welsch (1983) for a theoretical treatment of robust estimators, and Kuh and Welsch (1980) and Peters, Samarov and Welsch (1982) for some applications. The estimates of this section are obtained by applying a RATS program implemented in Perotti (1993).

[14]The reason why relative efficiencies are different in different equations is that we fixed the constant c in Peters, Samarov and Welsch (1982) at a value of .55 rather than adjusting it every time to achieve a desired value of relative efficiency.

[15]The advantage of the Hall-Pagan test is that it is in principle not contaminated by the presence of heteroskedasticity in the other equation of the system.

heteroskedasticity correction, which in this IV framework becomes White's Two-Stage-Instrumental-Variables estimator (see White (1983)).[16] Again, neither the coefficients nor the t-statistics changed substantially.

To test for the presence of misspecification, possibly due to measurement errors in the income distribution variables, we run a Hausman test on all the systems we have estimated, using the 2SLS and the 3SLS estimators. The statistic was never significant at the 10% level.[17]

7 Conclusions.

Income inequality increases socio-political instability which in turn decreases investment. These findings, obtained for a sample of 64 countries, are quite robust, particularly in the sample 1960-85.

These results have positive and normative implications. From a positive point of view they suggest an argument that might help explain different investment and growth performances in different parts of the world. Two economies in East Asia, Korea and Taiwan, have had very high growth rates in the post-WWII period. In the aftermath of the war, these countries had land reforms that reduced income and wealth inequality. Furthermore, and, perhaps as a result of this reform, these countries have been relatively

[16]The two estimators are different only in the case of the investment equation, since the *SPI* equation is exactly identified.

[17]Since the *SPI* equation of the specification of Table 5 is exactly identified, it is not possible to check the issue of measurement error in income distribution variables further by dropping *MIDCLASS* from the list of instruments. However, we feel confident that this is probably not a major issue, for several reasons. First, we have estimated the model dropping several combinations of countries whose income distribution variables might be, for several reasons, of particularly poor quality. Second, we have estimated the systems using robust estimation methods. Third, the Hausman tests are always insignificant.

stable politically, compared to, say, Latin American countries. The latter, in turn, have had a much more unequal income distribution, more socio-political instability and less growth. A particularly good example of successful Asian economies are the "four dragons" (Hong Kong, Singapore, South Korea, and Taiwan). Unfortunately, because of data availability only Taiwan is included in our main sample. However, all of them seem to fit our hypothesis, since these economies have had much more stability and much less inequality than, say, Latin American countries, which had a comparable GDP per capita in 1960.

From a normative point of view, our results have some implications for the effects of redistributive policies. Fiscal redistribution, by increasing the tax burden on capitalists and investors, reduces the propensity to invest (Alesina and Rodrik (1991)). However, the same policies may reduce social tensions and, as a result, create a socio-political climate more conducive to productive activities and capital accumulation.[18] Thus, by this channel fiscal redistribution might actually spur economic growth. Therefore the net effect of redistributive policies on growth has to weigh he costs of distortionary taxation against the benefits of reduced social tensions.

This paper, not unlike the related literature surveyed in the introduction, focuses on policy outcomes (investment, growth etc.) and relates them to socio-economic variables. The next step in this line of research is to look more explicitly at actual policy instruments, as Perotti (1993) has started doing. The link between politics and economic outcomes goes through policy choices, particularly, in this context, fiscal policy. Several questions are left open: what are the effects of income inequality on the degree of redis-

[18] A similar argument has been put forward by Sala y Martin (1992) and Fay (1993).

tribution implemented in different political systems? Who actually benefits from such redistributions? What are the distributional effects of different spending programs? Do the very poor really benefit from government programs toward them? Answering these questions requires the use of more disaggregated fiscal policy data than have been used so far.

Table 1: Definition of variables and data sources.

This Table describes the data used in the regressions. All the data are from the Barro-Wolf [1990] data set, except for the income distribution data (which are from a variety of sources detailed in Table A.1 in the Appendix) or unless otherwise indicated.

GDP: GDP in thousands of 1980 dollars, from the Summers-Heston data set.

EDUC: primary school enrollment rate in year 1960 or 1970.

MIDCLASS: share of the third and fourth quintiles of the population in or around 1960 or 1970.

URB: Urban population as percentage of total in year 1960 or 1970. Source: World Bank Tables;

INV: ratio of real domestic investment (private plus public) to real GDP (average from 1970 to 1985 or from 1960 to 1985.);

PRIVINV: Ratio of real private domestic investment to real GDP (average from 1970 to 1985);

PPPIDE: Deviation of the PPP value for the investment deflator from the sample mean, 1960;

SPI: index of socio-political instability, constructed using the formula of equation (1), average over 1960-85 or 1970-85.

Table 2: SPI index (sample 1960-85).

COUNTRY	SPI60	COUNTRY	SPI60
Tanzania	2.101	Turkey	2.032
Malawi	2.073	Panama	2.064
Sierra Leone	2.232	Brazil	2.166
Niger	2.163	Colombia	1.563
Burma	2.157	Jamaica	1.154
Togo	2.270	Greece	1.735
Bangladesh	2.366	Costarica	1.144
Kenia	3.117	Peru	2.269
Botsawana	1.380	Iran	2.702
Egypt	1.920	Mexico	1.673
Chad	2.228	Japan	1.185
India	1.970	Spain	2.093
Morocco	2.122	Iraq	2.678
Nigeria	2.634	Ireland	1.179
Pakistan	2.252	South Africa	1.703
Congo	2.449	Israel	1.203
Benin	2.497	Chile	1.736
Zimbabwe	2.039	Argentina	2.817
Madagascar	2.189	Italy	1.514
Sudan	2.433	Uruguay	1.852
Thailand	2.276	Austria	1.148
Zambia	1.993	Finland	1.141
Ivory Coast	2.061	France	1.354
Honduras	2.142	Holland	1.150
Senegal	1.837	U.K.	2.036
Gabon	2.195	Norway	1.141
Tunisia	2.075	Sweden	1.149
Taiwan	2.065	Australia	1.152
Philippines	1.942	Germany	1.210
Bolivia	2.766	Venezuela	1.324
Dom. Republic	1.787	Denmark	1.142
Sri Lanka	1.170	New Zealand	1.141
El Salvador	2.340	Canada	1.167
Malaysia	1.222	Switzerland	1.143
Ecuador	2.126	U.S.A.	1.567

Table 3: Summary statistics (sample 1960-85).

	NOBS	MEAN	STD. ERR.	MIN.	MAX.
INV	64	19.39	7.29	7.00	36.91
SPI	64	18.19	5.12	11.41	28.17
GDP	64	2.19	1.94	.21	7.38
EDUC(PRIM)	64	79.59	31.92	5.00	144.00
EDUC(SEC)	64	25.52	22.68	.30	86.00
MIDCLASS	64	33.27	5.57	20.10	41.90
URB	64	39.51	23.33	4.00	82.00
PPPIDE	64	-.03	.25	-.49	.86

For definitions of variables and sources, see Table 1.

Table 4: Correlation matrix (sample 1960-85).

	INV	SPI	GDP	PRIM	SEC	MIDCLASS	URB	PPPIDE
INV		-.60	.55	.66	.66	.33	.53	-.31
SPI	-.60		-.61	-.61	-.66	-.50	-.46	-.10
GDP	.55	-.61		.70	.81	.48	.78	.09
PRIM	.66	-.61	.70		72	.26	.75	-.04
SEC	.66	-.66	.81	.72		.59	.74	.02
MIDCLASS	.33	-.50	.48	.26	.59		.36	-.01
URB	.53	-.46	.78	.75	.74	.36		.04
PPPIDE	-.31	-.10	.09	-.04	.02	-.01	.04	

For definitions of variables and sources, see Table 1.

Table 5: Investment and SPI equations, 1960-85 and 1970-85.

	INV	SPI	PRIVINV	SPI
	(1a)	(1b)	(2a)	(2b)
constant	20.00	29.35	28.64	24.84
	(3.50)	(6.23)	(3.71)	(3.24)
EDUC	.07	-.11	.06	-.09
	(1.98)	(-2.80)	(1.71)	(-1.41)
SPI	-.78		-.98	
	(-2.63)		(-3.39)	
PPPIDE	-10.36		-10.70	
	(-4.26)		(-3.79)	
GDP		-.73		-1.25
		(-1.50)		(-1.99)
INV		.17		
		(.89)		
PRIVINV				.29
				(.86)
MIDCLASS		-.23		-.07
		(-2.05)		(-.33)
URB	.06		.06	
	(1.51)		(.97)	
AFRICA		.95		-3.17
		(.44)		(-.85)
LAAMER		1.92		1.56
		(1.09)		(.63)
ASIA		1.82		.38
		(1.00)		(.14)
SEE	4.78	4.13	5.21	5.83

2SLS. t-statistics in parentheses. Estimates using 3SLS are very similar. First four columns: 1960-85. Last four columns: 1970-85. Number of observations: 64 (1960-85) and 53 (1970-85).

Table 6: Investment equation, second specification.

	INV [c]	PRIVINV
	(1)	(2)
constant	31.74	30.29
	(1.68)	(2.49)
EDUC	.06	.07
	(1.24)	(1.69)
SPI	-.89	-1.02
	(-1.66)	(-2.86)
PPPIDE	-10.96	-10.75
	(-3.92)	(-3.72)
MIDCLASS	-.04	-.03
	(-.22)	(-.18)
SEE	4.93	5.36

2SLS. t-statistics in parentheses. Estimates using 3SLS are very similar. First column: 1960-85. Second column: 1970-85. Number of observations: 64 (1960-85) and 53 (1970-85).

Table 7: Robust regressions, 1960-85 and 1970-85.

	INV	SPI	PRIVINV	SPI
	(1a)	(1b)	(2a)	(2b)
constant	26.86	29.01	29.70	22.86
	(2.93)	(5.00)	(3.07)	(2.20)
EDUC	.07	-.10	.06	-.07
	(1.83)	(-2.21)	(1.20)	(-.88)
SPI	-.74		-1.00	
	(-2.15)		(-2.75)	
PPPIDE	-9.50		-11.73	
	(-3.31)		(-3.14)	
GDP		-.79		-1.24
		(-1.36)		(-1.57)
INV		.15		
		(.67)		
PRIVINV				.22
				(.51)
MIDCLASS		-.22		-.02
		(-1.68)		(-.07)
URB	.06		.04	
	(1.25)		(.61)	
AFRICA		1.24		-2.04
		(.47)		(-.43)
LAAMER		1.82		1.29
		(.85)		(.41)
ASIA		2.25		-.18
		(1.03)		(-.05)
SEE	4.76	4.09	5.26	5.66
Rel.eff.	.90	.92	.85	.86

2SLS. t-statistics in parentheses. First two columns: 1960-85. Last two columns: 1970-85.

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