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GROWTH, INEQUALITY AND SOCIAL PROTECTION

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SUMMARY

1. Economic growth is, ultimately, the result of the myriad of transactions which take place in a market economy. Similarly, the distribution of income depends on who has ownership of factors of production, how much they can sell them for, and whether the resultant income is redistributed or not. It would be surprising were economic growth and income distribution not to be linked. But how exactly they might be linked has been the topic of many competing theories and empirical evaluations. Unfortunately, the studies have not led to a convergence on a common view that there is, or is not, a trade-off between the two goals of an equitable society and a rich one.

2. This lack of enlightenment becomes less surprising once the empirical studies are examined in detail. Many empirical studies have looked at the final distribution of income, when some of the theories make stronger predictions about the links between growth and the distribution of income before taxes and transfers; similar confusions have marred estimates of the effects of social expenditure on growth. Recently produced OECD data on human capital, income distribution and social expenditure permits a much more refined approach to the examination of the links between income distribution, social protection and growth.

3. The results consist of four conclusions: first, there is no reliable evidence of links between the final income distribution and growth. Second, data are consistent with the theory that more social spending can be bad for growth. Third, when disaggregating types of social expenditure, it transpires that 'active' social spending *promotes* growth. A fourth finding is that income inequality before taxes and transfers is closely related to the amount countries spend on social expenditure.

4. The results in this paper cannot be used to argue that less social expenditure is always good for growth. There are a number of circumstances in which social protection can be good for growth. These include: to avoid social unrest; to spread the gains from other growth-enhancing policies more widely in the population; to facilitate human capital investment; and to support consumption expenditures during cyclical recessions. The strongest conclusion of the report is nevertheless that to promote participation in the labour market through active social expenditure, as repeatedly recommended by OECD reports and ministerial meetings, is the best way to ensure that economic development is both rapid and beneficial to all.

RESUME

5. La croissance économique est, en fin de compte, la résultante des multiples transactions qui se déroulent dans une économie de marché. De même, la distribution du revenu dépend de l'identité des propriétaires des facteurs de production, du revenu qu'ils peuvent escompter de la vente de ces facteurs et du point de savoir si ce revenu est redistribué ou non. Il serait étonnant qu'il n'y ait pas de lien entre la croissance économique et la distribution du revenu. Quant à savoir quel est exactement ce lien, c'est là un thème auquel ont été consacrées maintes théories et évaluations empiriques concurrentes. Malheureusement, ces études n'ont pas permis d'aboutir à des conclusions convergentes sur le point de savoir s'il y a ou non relation inverse entre ces deux objectifs que sont une société équitable et une société riche.

6. Cette situation apparaît moins surprenante lorsqu'on examine précisément les études réalisées. De nombreuses études empiriques considèrent la distribution finale du revenu quand certaines théories font des prédictions mieux étayées sur les liens entre la croissance et la distribution du revenu avant impôt et transferts ; les mêmes ambiguïtés pèsent sur les estimations des effets des dépenses sociales sur la croissance. L'OCDE a établi récemment des données sur le capital humain, la distribution du revenu et les dépenses sociales qui permettent une approche beaucoup plus fine de l'examen des liens entre la distribution du revenu, la protection sociale et la croissance.

7. Quatre conclusions se dégagent. Premièrement, aucun élément probant ne permet de dire qu'il y ait un lien entre la distribution du revenu final et la croissance. Deuxièmement, les données concordent avec la théorie selon laquelle un accroissement des dépenses sociales peut être mauvais pour la croissance. Troisièmement, lorsque l'on distingue entre les différents types de dépenses sociales, il apparaît que les dépenses « actives » *favorisent* la croissance. Quatrièmement, les inégalités de revenu avant impôt et transferts sont étroitement liées aux montants que les pays consacrent aux dépenses sociales.

8. On ne saurait s'appuyer sur les résultats mis en évidence dans cette étude pour affirmer qu'une réduction des dépenses sociales est toujours favorable à la croissance. Il est un certain nombre de circonstances où la protection sociale peut être bonne pour la croissance. Elle peut contribuer à éviter les troubles sociaux ; faciliter une plus large diffusion des retombés bénéfiques des politiques propices à la croissance dans la population ; favoriser l'investissement dans le capital humain ; et encourager les dépenses de consommation en phase de récession. La conclusion qui se dégage le plus nettement de cette étude est toutefois qu'encourager la participation à la vie active par des dépenses sociales actives, ainsi que cela a été maintes fois préconisé dans les rapports de l'OCDE et lors des réunions ministérielles, est la meilleure façon de parvenir à un développement économique rapide et qui profite à tous.

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INTRODUCTION.

9. Implicitly or explicitly, much discussion of social protection systems is dominated by supposed tradeoffs between the goals of growth and equity. Allusion is often made to the 'affordability' of social programmes and to the effect on individual incentives to work and save. Equity, be it in terms of access to social services or the final distribution of income, is usually viewed as having a cost in terms of foregone output, which some argue is a price well worth paying, but which others resist.

10. This way of considering possible links between equity and growth can be misleading. For a start, even if we consider only one dimension of equity -- the distribution of income -- it is often very confusing about whether it is the distribution of income *per se* which is affecting growth, or whether it is in fact the *policies* put in place to achieve an equitable distribution of income. In fact, there are plausible theories about how the distribution of income itself can affect growth, both positively and negatively, without acting through the intermediary of social protection. Furthermore, unless growth benefits all equiproportionally (an implausibly strong assumption), then growth will itself affect the distribution of income.

11. Once one considers *policies* designed to achieve equity goals, the permutations become even more complex. Regardless of whether the policies achieve their objective of narrowing the distribution of income, they can have very different effects on the allocation of resources in an economy and therefore on growth. Furthermore, there is good reason to think that demand for certain types of social protection is strongly linked to the level of income per capita, and hence to growth.

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12. The purpose of this paper, undertaken as part of the OECD horizontal project on growth, is to clarify what might be the tradeoffs, if any, between equity and growth objectives, and between policies designed to achieve equity goals and growth. It is structured in six sections:

- The first section describes the approach taken in this study: to take the most commonly-used way of explaining differences in growth rates across countries and over time, and to see whether social protection and income inequality have any effects over and above the 'standard' causes. The econometric approach is outlined briefly (it is described in much more detail in annex 2) and some of the problems which are encountered in performing such analyses are described.

- The next four sections take four key issues in turn. First, does the income distribution affect growth? Second, does social expenditure affect growth? Third, does active social spending affect growth differently from passive social spending? Fourth, what are the links between market income inequality and social expenditure? In each case, the theories that have been developed to look at these issues are described, the results of previous empirical studies (if there are any) are summarised, the data used described and econometric estimates reported.

- Section 6 concludes.

1. THE APPROACH

1.1 The strategy followed.

13. A plausible case can be made that inequality is good for growth, promoting savings and rewarding effort; equally, a case can be made for it being bad for growth, denying resources to those who need them in order to take advantage of market opportunities, leading to social and political unrest which may call existing property rights into question and discouraging growth-enhancing policy changes. Similarly with social protection: high taxes and support for those who do not work or save are cited as reasons why growth may be inhibited. On the other hand, social expenditure may help people find work, increase their skills, and improve their health, promoting growth.[2]

14. Reasonable people probably accept that there is something in all these theories. Where they differ in opinion is in their relative importance. Without empirical evidence, it is impossible to talk of effects of income distribution and social protection on growth as if even the *direction* of any effects of income distribution and social protection can be known *a priori*.

15. The empirical approach taken in this paper is to take the most commonly-used way of analysing growth, and to see whether developments in the distribution of social spending and income inequality might explain some of what the basic model leaves unexplained. The paper does *not* develop any new theoretical approach to the problem (given the variety of theories already on offer, such novelty would

2 . See, for instance, the surveys of Aghion et al. (1999), Bénabou (1996), Bertola (1998) and Temple (1999) for a comprehensive overview of the literature on the relationship between growth and inequality.

seem superfluous), *nor* does it use new econometric techniques. Rather, the paper attempts to identify more clearly whether each theory requires a measure of market income distribution or final income distribution, of the entire population or just of the working-age population, of social expenditure in general or social expenditure on the working age population, of active social spending or passive social spending, and in each case to use new data which has just become available from previous OECD projects on income distribution and social expenditure.

16. This approach has been possible because although the theories underlying attempts to test empirically links between inequality, social protection and growth are sometimes complicated, in practice estimation has nearly always involved taking a simple model of the causes of growth, and augmenting it with a measure of inequality and social protection. Hence, although this paper does not have a series of formal equations which lead to a hypothesis which can be tested empirically, it is consistent with any number of theories which have previously been proposed. This paper can be seen as reproducing many of these previous studies, but with better (or more refined) data.

17. Furthermore, a variety of econometric techniques are used, reflecting limitations in the data and attempts to overcome problems intrinsic to empirical estimations of the causes of growth in general and social protection in particular. To the extent that different estimation techniques deal with different potential problems, if they come up with similar results, so does it become possible to be more confident about whether the results are robust, rather than being statistical artifacts.

1.2 The growth model

18. Most analyses of the causes of growth have used an empirical model proposed by Solow (1956) and Swan (1956). More recently, as analysts have become more aware of the importance of human capital, this model has been 'augmented', with human capital treated as a factor of production in its own right, as suggested by Mankiw, Romer and Weil (1992) -- henceforth, MRW -- and it is this approach which has become the benchmark for most empirical work analysing the determinants of economic growth. Studies which follow this approach are derived from a constant returns to scale production function with labour, capital and human capital. The result is that growth in GDP per working-age population[3] is seen as being a function of the following:

- income at the beginning of a period (the poorer is a country, the more rapidly is it likely to grow, because poorer countries can copy technologies from richer countries without having to develop new techniques themselves. For this reason, it is referred to as being the 'catch-up' variable);

- investment in physical capital (more investment means more capital assets per worker, so more growth)

- the level of human capital (more human capital means greater efficiency in using physical capital)

- growth rate of the working age population (more population growth means slower growth in income per capita, *given* the level of physical capital. Hence this is *not* the same as saying more rapid fertility or migration is bad for growth, as long as physical capital rises accordingly).

3. The reason for using the working age population rather than, say, GDP per capita is that the latter is influenced by demographic changes. An increase in the number of children or retired people, for example, will reduce GDP per capita (because the numerator is increased but the denominator is unchanged assuming that they do not work), making it harder to separate out the effects of economic variables such as investment, schooling etc on growth.

19. This framework is usually 'augmented' by adding whatever other variables are thought to be missing from this basic approach to growth. Consequently, those studies which look at the links between inequality or social protection and growth add measures of inequality or government spending on transfers as independent variables in a more or less *ad hoc* manner (Temple (1999)), although some studies do derive formal justifications for what they are doing from first principles. Because the MRW growth model is the most common model in the empirical work on growth, its choice ensures that any differences between the empirical work of this paper and that of the majority of studies is not due to the particular specification of the underlying model.

20. The Box provides a brief description of the core variables used in the empirical analysis.. This growth equation is estimated using an annual sample of 21 OECD countries running over the period 1970 to 1998.[4] The choice of this period and set of countries reflects a trade-off between the number of countries included and the time period available. This core data-set -- and indeed much of the theoretical approach underlying this study -- is drawn from Bassanini *et al.* (2001).

Box. Core variables used in the empirical analysis

- *Dependent variable*: Annual average growth rate of real GDP per working-age population (aged 15 to 64), expressed in 1993 Purchasing Power Parities.[5]

Baseline variables

- *Catch-up*: lagged real GDP per working-age population (aged 15 to 64), expressed in 1993 Purchasing Power Parities.
- *Investment*: real private non-residential fixed capital formation to real GDP.
- *Human capital*: average number of years of schooling of the population aged 25 to 64. This variable is drawn from the De la Fuente and Doménech (2000) dataset.
- *Population growth*: annual average rate of growth of the working-age population (aged 15 to 64).

Note: all variables come from the OECD Analytical database (ADB), unless otherwise specified.

1.3 Problems in estimation and solutions

21. Although this approach is widely used, there are some underlying problems which have not yet been resolved.

1.3.1 The generality of conclusions

22. The first problem is widely recognised: growth being the sum change in the sum of all economic activity, anything which affects any part of economic activity can plausibly be argued to have an effect on growth. If the data are related to enough combinations of variables which might possibly affect growth rates, growth can be found to be correlated with pretty much anything and everything (see Sala-i-Martin (1997a and 1997b)). It is difficult to construct a case for preferring a specification which shows that one set of variables are important over another one.

4 . The sample includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, (Western) Germany, Greece, Ireland, Italy, Japan, The Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the United States.

5 . GDP measures market activity. It does not measure the welfare of countries, and there are numerous reasons why trends in GDP per capita may depart from welfare per capita, including, for example, the time spent in activities such as caring for children and older people.

23. This study does not make any pretence of overcoming this problem. No attempt is made to say whether income distribution, or social spending, is more important than the large number of other factors which might potentially affect growth rates. Rather, it copies previous approaches to modelling the effects of inequality and social protection on growth, on the assumption that reliable results are more likely to be obtained in this study than in previous studies, for reasons outlined below.

1.3.2 The estimation approach

24. This approach to estimating growth may be very widely used, but there are some fundamental and widely recognised sources of inconsistency in the existing cross-country empirical work on growth. As pointed out by Caselli *et al*. (1996), most empirical studies suffer at least from at least one of these problems and the vast majority are afflicted by more than one.

25. For example, one problem is that not *everything* that might matter can be put into an equation at once. Yet if something is excluded which, in fact, is a very important determinant of growth (be it the inflation rate, the legal system, the amount of natural resources, the climate, etc), there is a risk that the statistical basis upon which estimates can be made falls apart. Conclusions based on such estimates can sometimes be completely wrong. More specifically, in order for the standard econometric techniques to work properly and produce reliable estimates, it is usually assumed that such effects are totally uncorrelated with the independent variables on the right-hand-side of the equations. This key assumption may be violated by the very nature of the growth model which includes a lagged dependent variable (the 'catch-up' variable). The result is that there is a risk of serial correlation in the error term, which, unless it is controlled for, makes results unreliable.

26. A second problem is that of *endogeneity*: growth being the sum change in the sum of all economic activity, anything which affects any part of economic activity can plausibly be argued to have an effect on growth[6] (see Sala-i-Martin (1997a and 1997b) and Caselli *et al.* (1996)). For example, low growth (or in a recession, negative growth) may lead to higher unemployment and therefore to higher social spending. It would be wrong to infer that higher social spending has 'caused' the low growth -- it is low growth which has 'caused' high social spending. In the presence of endogeneity, it is extremely difficult to construct a case for preferring one set of variables over another set.

27. A trade-off is often encountered in the literature in terms of seeking to minimise these two potential sources of bias in the estimates. Most of the research trying to defeat the problems associated with omitted variables turns a blind eye to the endogeneity problem.[7]

28. This study uses estimation techniques which attempt to overcome these problems. No single technique can be guaranteed to have completely eliminated both types of problem, but where possible, two entirely different approaches have been used. Other problems may still be present, but by using more than one technique it becomes possible to get a picture of just how robust the results obtained might be. In particular, if similar results are obtained using one technique which is robust even when there are

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6 . Caselli *et al.* (1996) take the endogeneity debate to an extreme, pointing out that "[a]t a more abstract level, we wonder whether the very notion of exogenous variables is at all useful in a growth framework (the only exception is perhaps the morphological structure of a country's geography)." The authors add that "our overview of the literature leads us to argue that *almost all existing cross-country regressions, either based on cross-section, or panel-data techniques, have been estimated inconsistently*" (text in italics in the original document).

7 . Alternative econometric techniques such as Chamberlain's Π *-matrix* suffer from this problem (see Knight *et al.* (1993) and Islam (1995), among others).

correlated individual effects and another which copes with endogeneity, then it seems reasonable to believe that the results are reliable, in a way that is not possible if only one technique is used.

29. Annex 2 discusses the various techniques used in more detail, and Annex 3 gives the results for the 'baseline model' (i.e. the model as described by MRW, *without* the addition of income distribution or social expenditure variables) for all the different techniques used. As shown in Annex 3, sometimes the 1990s look 'different' from the 1980s and 1970s -- estimated coefficients are larger and estimates explain much more of the variation within and across countries when the 1990s are excluded. Where possible, the empirical estimates included in this study are therefore given both including and excluding the 1990s.

30. As pointed out by Bassanini *et al.* (2001), most studies using growth regressions have used averages of the data over long (20 years) or short (5 or 10-year) time periods. Very few studies have attempted or had the opportunity to use annual data. Yet this approach of averaging over time entails a considerable cost in terms of failing to use all possible information and indeed the baseline model estimated using the 10-year sample (as presented in Table A3.1 of Annex 3) leaves unexplained a great deal of variation in growth rates across countries and over time. When using techniques which permit annual data to be used, much greater precision in point estimates of the various parameters is obtained.

1.3.3 The data

31. The third and most important limitation with which researchers have had to grapple is that the data used to test the hypotheses about the effects of income distribution and social protection are often inadequate. In particular:

- often only summary measures of final income distribution for the whole population have been used in empirical evaluations.

- Spending on a large variety of social programmes are subsumed under the heading 'social protection'.

32. Most existing studies implicitly treat all the various types of social expenditure as if their effects on economic behaviour will be the same. Using total social expenditure means that policies such as active labour market policies which reduce inequality through their effects on *market* income (income from work and capital) are included alongside cash transfers, and income transfers to the elderly are treated as if they have the same effect as income transfers to the working-age population. Similarly, sometimes it may be appropriate to look at the final income distribution of the whole population to examine the effects on growth, but often it makes more sense to exclude the effects of the elderly who are unlikely still to be working in the formal labour market. Furthermore, some theories (described in the relevant section below) really require an examination of the effects of *market* income inequality -- income before taxes and transfer payments by government -- rather than the *final* income distribution.

33. As described in subsequent sections, this paper is based upon the timely appearance of a new study looking at trends in the income distribution of OECD countries since the mid 1970s (Förster 2000), and an update of the OECD Social Expenditure database (OECD, 2000). These two data sources allow for a much more precise examination of the various theories which have been suggested as being important.

1.4 Short, medium and long run effects

34. Inequality and social protection spending need not necessarily have the same effect on growth in the short term as in the long term. Most of the estimates to be found in this paper are based on 20 to 30

years of data. This means that it is necessary to understand what effects are (and more importantly, what effects are *not*) being captured in the estimates.

35. Social protection spending usually goes up automatically in recessions, reflecting increased use of unemployment and other benefits for those without work. In acting as an automatic stabiliser for the economy, social protection spending may help to ensure that short-term large-scale swings in consumer expenditure are avoided. The estimation procedures used in this paper must cope with short-term effects such as these. But conjunctural effects such as these are not really the focus of the paper, and no assessment of the adequacy of social protection in performing this task is given. This is not to say that such effects of social protection on short-term demand have no impact on the results: insofar as macroeconomic stability is indeed promoted by automatic stabilisers, then growth may be promoted where they exist compared with their absence.

36. At the other end of the time spectrum are very long-term effects of social protection on economic development. For example, for a variety of reasons, some capital markets (in particular, in insurance against social risks such as sickness and unemployment) are 'missing'. This is one of the economic justifications for the existence of social spending. It follows that social insurance can be 'welfare enhancing' -- providing people with a service that the market cannot provide. There are a number of theories that suggest that providing these services through an implicit contract between the generations can be efficient. Reducing social expenditure may encourage some parts of society to question whether it is in their interests to continue with the implicit contract, and may indeed lead them to break the contract. Yet if the alternatives are less efficient that the social contract, the result may be to reduce the rate increase in economic welfare. Such effects can only be observed, if at all, in the very long term -- certainly more than 20 to 30 years.

37. Similarly, some sorts of social expenditure cannot reasonably be analysed with the length of data available. Education expenditure may take many years before the beneficiaries of such spending are economically active, and reductions in poverty during childhood may well have improve child development, but any economic gains from this will not be felt until well into adulthood.

38. The estimates obtained in the approach followed in this paper fall between these two extremes of short-term and very long term. If inequality and/or social protection affect labour supply, savings or the general efficiency with which resources are allocated, then such effects should show up in the estimates.

39. It is theoretically possible that the effects of inequality on growth may vary over time. A widening of income inequality may initially improve the allocation of resources in the economy, and promote growth. But in the longer term, human capital investment might be reduced, or other measures introduced as a reaction, reducing inequality but harming investment. To the extent that such a scenario is plausible, the empirical results obtained in this paper need to be interpreted according to whether the 20-30 year period is seen as being short or long term.

40. Furthermore, in the model of growth underlying the empirical results obtained here, only changes in underlying labour productivity independent of the capital stock can change the long-run growth rate. All other changes, including those due to increases in the capital stock, may raise output, but only raise the growth rate temporarily until it settles down at its underlying rate as determined by changes in labour productivity. However, these temporary changes may persist for some time, so the paper does refer to such alterations of the growth path as being changes in the rate of growth.

2 INCOME DISTRIBUTION AND GROWTH

2.1 Theories about income distribution and growth

41. This section considers the various ways in which the distribution of income might affect the growth rate. There are a number of theories which are based around the idea of their being a link between the amount of social expenditure determined through the political process and the distribution of income, with the idea being that some distributions cause more social expenditure, in turn affecting growth, than others. A discussion of these theories is held over until section 5 below.

2.1.1 When might inequality be good for growth?

42. The most straightforward of these theories, pioneered by Lewis (1954), Kaldor (1956, 1957) and Stiglitz (1969), is to note that, in a closed economy, the greater is the amount of savings, the lower is the cost of capital and the greater is the rate of investment, and hence (at least temporarily in a neo-classical model, permanently in some other formulations) the greater is the rate of growth. Because the rich have a higher savings ratio than the poor, it follows that the more unequally is national income distributed, the greater will be the aggregate savings rate, and hence the greater will be the investment and growth rate. Income redistribution would retard growth unless governments took additional steps to ensure that investment remained high.[8]

43. High income inequality may also encourage factors of production to be used more efficiently. The larger is the difference in returns to working in different occupations, the more might people seek those qualifications which let them work in high-productivity jobs with high wage rates.

2.1.2 When might inequality be bad for growth?

44. The role of the capital markets is also at the centre of a different group of theories which look at links between income distribution and growth. Some theorists argue that financial markets suffer from market failure when it comes to financing investments by those without assets other than their own labour. Hence capital markets may not make funds available to poorer households, even when rates of return (both private and social) are high. This may be particularly true of investment in human capital, where there is no asset which can be reclaimed by a bank (or other financial service provider) in the event of a non-

8 . This argument has received less attention recently, because its focus on the national supply of savings is seen as overly simplistic. Companies or governments seeking to finance investments can draw on international and not just domestic capital markets. On the other hand, whilst this suggests that there need be no correlation between national savings and investment rates, in practice the correlation remains relatively strong (albeit declining over time), as suggested by the 'Feldstein-Horioka' puzzle (1980). A large difference between savings and investment rates implies imbalances in either the current account or in public sector borrowing which may become the objective of policy to limit. Hence, although not strictly limited to domestic sources of finance, an economy may find it easier to sustain high investment without causing imbalances or vulnerability to short-run capital movements where domestic savings are high.

performing loan. Hence a wide income distribution may be associated with lower lending and investment than in an economy with a narrower distribution of final income, as put forward by Saint Paul and Verdier (1992), Galor and Zeira (1993) or Perotti (1993).

45. A second theory which has received some attention recently (e.g. Rodrik (1997)) is to suppose that growth can be increased or retarded through pieces of legislation (such as openness to trade and investment from abroad, but also privatisation, liberalisation, etc) which nevertheless are not directly in the immediate interests of some part of the voting population. For example, there may well be clear-cut net gains from opening an economy to trade, but those who have been working in activities which are no longer viable because of foreign competition, or even who find that their skills are no longer valued, are clear losers from such a policy. They may be able to put together sufficient political strength to block the introduction of such policies. This theory does not address the income distribution directly. The losers from a particular policy may be found throughout the income distribution. However, in practice it is those who have few marketable skills and little capital will find it harder to adjust to job loss than those who have greater skills, so those who are least likely to benefit directly from market opening are likely to be those with low incomes.

46. A wide income distribution may cause social and political unrest, which in turn discourages economic activity and investment, and hence slows growth. This line of argument has been used particularly in the case of Latin America to draw a link being between inequality and radical shifts in government policy and even in the form of government. The consequences may include support for confiscatory policies, including uncompensated land reform, excessive regulation, and even a tolerance of petty corruption. Inequality can also lead to tolerance of socially disruptive behaviour -- crime, strikes, riots, but including in the most extreme form, support for insurgency, separatist movements, and tolerance of drug barons. The work of Perotti (1992, 1994 and 1996) has been particularly important in this area.

2.1.3 What have previous studies found?

47. From the early 1990s onwards, there was a growing consensus amongst academic economists that income inequality was bad for growth (see Perotti 1996 for a survey and more evidence). However, more recently, doubt has been cast upon some of these empirical claims. In particular, Forbes (2000) argues that the estimation techniques that were used in the first series of attempts by researchers to look at links between inequality and growth were flawed. Poor countries have wide income distributions, rich countries much less so. The earlier studies, which often used a cross-sectional OLS approach, were, in effect, asserting that narrowing the income distribution would move a country towards the richer group. But when looking at countries over time (i.e. using panel estimation techniques), allowing for the identification of the effects of income distribution independently of country-specific effects, Forbes found that a narrower income distribution in any one country was associated with lower, not higher growth.

2.2 Trends in income distribution

48. The theories described above about the effects of income distribution on growth suggest that different aspects of the distribution of income might be important:

- To the extent that it is the aggregate level of savings which affects growth, and savings in turn are expected to rise the greater is the inequality of income, the variable which needs to be tested is (changes in) the final income distribution of the whole population.

- To the extent that the argument is about the ability of those low income households to make investments in their human capital, it is most likely to be found among the working age population (on the assumption that the retirement age population is not likely to be investing in their human capital, at least for the purposes of generating market income[9]).

- If the argument is instead that a wide income distribution leads the population to vote against growth-enhancing policies or in favour of policies which might adversely affect growth, the variable which needs to be tested is the income distribution of the whole population prior to taxes and transfers.

49. This section therefore describes the trends in both the market and final income distribution. It draws heavily on the recent OECD study of income distribution trends (see Förster, 2000).

50. One of the great dilemmas in looking at income distribution is that there is no unique measure which does not implicitly involve value judgements when comparing the incomes of one person against another. The most commonly-used measure -- the gini coefficient -- is particularly sensitive to changes in the middle of the income distribution. Yet the discussions of theories above suggests that changes at the extremes of the distributions are likely to be more important for growth: it seems unlikely that changes in the middle of the distribution are likely to lead to big changes in savings rates, for example, and if either the capital market constraints argument or the social disruption arguments are important, a measure more sensitive to changes at the bottom of the distribution may be more appropriate. For that reason, four measures of inequality are reported in Table 2.1 and used in the regression analysis.[10]

51. Overall, there has been no clear general trend in total income in OECD countries. In the ten countries for which a relatively long time period can be considered, from the mid-1970s to the mid-1990s, there are four countries where the income distribution widened, three countries where it narrowed, and it remained stable in the remaining three. However, there *are* signs of a more general trend across OECD countries in more recent times (see Table 2.1). From the mid-1980s to the mid-1990s inequalities decreased slightly in four of the 20 countries for which data are available, remained stable in another five, but inequalities increased in the other 11 countries, in half of them by considerable amounts.[11]

52. Trends in, and indeed levels of income inequality *before* taxes and transfers are not as familiar to most people as changes in final income distribution, and they in fact differ markedly. Overall, there is much *less* variation in market incomes across countries than there is in final incomes. There is not, for example, much difference in the market income distributions of Sweden and the United States. There is, however, a general trend in the distribution of market income within the population as a whole (Table 2.1), and it is towards greater inequality.

Table 2.1: Income distribution trends: entire population

53. Notwithstanding one or two differences (for example, the distribution of income of the working age population is stable in Denmark, whereas it was possibly declining somewhat over the whole

9. They may well do so in order to have a fuller life, of course. See OECD (1998) and OECD (2000a).

10 . The most commonly used (the Gini coefficient) gives particular weight to changes around the middle of the income distribution; the squared coefficient of variation and the mean log deviation overweight changes at both extremes; and the ratio of the income of the 90th percentile to the 10th percentile ignores any income changes other than those which affect these two points. Despite these differences, changes over time are generally (but by no means universally -- hence the case for using a variety of measures of inequality in empirical investigations) in the same direction, regardless of which measure is used.

11 These results are consistent with the various national studies which have been undertaken (see Förster 2000 for a comparison).

population) Table 2.2 suggests that trends in the income distribution of the working age population are not hugely different from that of the entire population. Market income of the working age population, however, has polarised to an even greater extent than when looking at the whole population. The polarisation of market income has been particularly sharp in the Nordic countries, no doubt reflecting the loss of employment of people at the bottom of the income distribution (employment rates in the mid 1990s being significantly lower than in the mid 1980s) -- Förster (2000) provides a discussion of these trends in more detail.

Table 2.2: Income distribution trends: working-age population

2.3 Empirical results

54. This sections tests the hypothesis that the income distribution affects growth. By comparing the results from regressions including the various measures of income inequality described in section 2.2 above with results from the basic model outlined in section 1, two things can be inferred. First, does adding income inequality help us 'explain' more of the changes in growth across countries and over time? Second, does a wider income distribution increase or reduce growth rates? The Box describes the income inequality variables used.[12]

Box: Income inequality variables

The income distribution variables used in this study come from the *OECD Questionnaire on Trends in Income Distribution and Poverty* described in Förster (2000). Data were provided by national experts using the same income concept across countries. Variables are available before and after taxes and transfers (market vs. final income distribution). Income has to be adjusted to take account of family size by assuming an equivalence scale of 0.5. Precise definitions are given in page 57 of Förster (2000). Several alternative measures of inequality were tested as follows:

- *'Gini' coefficient*: a statistical measure which has a value of '0' if every person in the economy has the same amount of income, and '1' if one person had all the income, and everybody else had no income at all. An increase in the Gini coefficient represents an increase in inequality.
- *Mean Log Deviation*: the average of the log difference between the arithmetic mean of disposable income per equivalent household member and the disposable income of each household member.
- *Squared Coefficient of Variation*: the variance of the disposable income of individuals divided by the squared arithmetic mean of disposable income per equivalent household member.
- *Ratio of the 9^{th} to the 1^{st} decile*: the ratio of the (upper bound value of the) ninth income decile to the (upper bound value) of the first income decile.

These indices have different ranges. All indices have a lower bound of zero but the upper bound is unity only for the Gini index: it is infinity for the SCV and (1+log(100))log(mean) for the MLD. Changes of similar magnitude can then indicate different changes in the degree of inequality depending on the indicator used. In addition, each index differs in its sensitivity to changes in income at various points on the income distribution.

2.3.1 The effects of final income distribution

55. Constrained by the availability of data on inequality -- just three points in time for some countries, only two for others, reflecting the situation at the middle of each of the last three decades -- it is not possible to use annual data on growth, investment, etc when looking for the effects of final income distribution on growth. Instead, ten-year period averages of the (rest of) the variables in the annual sample

12 . It seems reasonable to suppose that while the presence of some inequality may be positive for growth, a lot of it is likely to be detrimental. In other words, one could envisage a non-linear relationship between the rate of growth and inequality. In order to account for this relationship, a set of regressions was run including additional powers of the (log of the) inequality measures as regressors. Allowing for this change in specification had no sensible impact on the regression results and diagnostic statistics.

are constructed (as described in Annex 2). When data is of this form, the best estimation technique to use is known as the Fixed Effects Model (see Box).

Box: Estimation techniques (1)

Ordinary Least Squares (OLS), Fixed Effects Panel Regression (FE) and Instrumental Variables Two-Stage Least Squares (IV 2SLS)

OLS

Until relatively recently, the most common approach in other studies has been to estimate a cross-section regression -- mostly OLS (ordinary least squares) -- on a large sample of countries usually including developing and developed ones and averaging the growth rate over a long period of time (usually of around twenty or twenty-five years). The independent variables are either 'stock' variables (such as the initial level of income at the beginning of the period) or 'flow' variables (such as the average rate of investment over the period). Such a simple specification allows for straightforward testing of different models.

The most important drawback of this approach arises, however, from the treatment of the country-specific effects. The use of OLS assumes that the estimated coefficients are totally unrelated across countries and that the set of regressors is exogenous (the standard cross-section estimator is only consistent as long as the individual effect is uncorrelated with the rest of the independent variables).

Concerning the first issue, not controlling for differences across countries may carry a misleading message regarding, for instance, catch-up effects (tending to bias downwards the estimated coefficient on that variable). In particular, because the income distribution in developing countries tends to be wider than in developed countries, such studies often found that 'inequality is bad for growth'. It may well be so, but such a conclusion cannot be drawn from such a simplistic approach which implicitly assumes that countries differ in no aspect other than those variables included in the equation. As regards the second assumption, in most models at least a subset of the independent variables may be conceptually endogenous (for instance, the average rate of investment, which is determined simultaneously with the rate of growth).

See, for instance, the studies of Baumol (1986), Mankiw, Romer and Weil (1992), Barro and Sala-i-Martin (1992), Persson and Tabellini (1994), among many others.

FE

Concerns about simultaneity or endogeneity in cross-section regressions can be -- at least partially -- accounted for by using panel data. The standard method used when estimating panel-data models is a fixed-effects model. The fixed-effects model computes the estimates from differences within countries across time. The problem of endogeneity is corrected by using panel data but only on the assumption that the individual effects are correlated over time but unrelated to the other regressors. The presence of a lagged dependent variable when working with an annual dataset -- lagged income -- automatically invalidates this assumption.

The standard way of producing a panel to overcome endogeneity is to split the period of analysis into different sub-periods (usually five or ten years) and use the variables measured at the beginning of the period as a substitute for the lagged dependent variable, hence aiming at eliminating the presence of correlation between the error term and the independent variables. This has the effect that any yearly serial correlation from business cycles -- is much reduced -- see, for instance, Caselli et al. (1996) and Forbes (2000). On the other hand, as pointed out by Temple (1999), attempting to deal with simultaneity using this technique does not solve additional problems such as the omitted-variable bias. Furthermore, this procedure of averaging across extended periods and taking initial variables results in a considerable loss of information, diminishing the availability of degrees of freedom for the estimations. Nevertheless, despite being far from unassailable on theoretical grounds, this approach is widespread and because inequality measures are available for only three points in time at decade intervals, will therefore be used in this study.

Some contributions to the analysis of growth using panel data-sets and fixed-effects estimation include Barro and Lee (1994), Barro and Sala-i-Martin (1995) and Islam (1995). These studies use averages of the data and, as pointed out by Bassanini *et al.* (2001) only a few use annual data (see, for instance, Cellini (1997)) .

IV 2SLS

Two-stage least squares is a regression technique which uses Instrumental Variables to estimate systems of simultaneous equations. An important advantage of this estimation technique is that it allows the estimation of a single equation of a simultaneous equation system without imposing a functional form on the remaining equations.

The two steps involved in the procedure can be summarised as follows. In the first stage of the 2SLS technique, new dependent or endogenous variables are created to substitute for the original ones. For that purpose, all of the current endogenous explanatory variables of a system of simultaneous equations are regressed on the instruments. In the second stage, the regression is computed with OLS but with the new variables. Each equation is estimated by OLS after all of the endogenous variables appearing on the right-hand-side of the equation have been replaced by their fitted values from the first-stage regressions. Thus, for each structural equation of the simultaneous system, the left-hand-side endogenous variable is regressed on a set of regressors that consist of the exogenous and predetermined variables that appear on the right-hand side of the equation, plus the fitted values from the first-stage regressions for the endogenous explanatory variables in that equation.

See Block (1999) and Bloom *et al.* (2000) for an application of this technique within the framework of growth equations.

56. The first column of Table 2.3 presents the estimation results for the 'baseline model' (i.e. the model which includes all the variables suggested by the MRW approach, *before* adding income distribution variables). These can be compared with subsequent columns, which show the effects of including several measures of after tax and transfer inequality for the whole population: the Gini coefficient, the Squared Coefficient of Variation (SCV), the Mean Log Deviation (MLD) and the ratio of the 9th to the 1st decile of the income distribution (P9/P1).

57. These regression results reported in Table 2.3 have to be interpreted cautiously because diagnostic statistics indicate that none of these models performs well.[13] In fact, in all of these model specifications the F-test does not reject the hypothesis that the estimated coefficients are all zero or does so only at the 10 percent level. Although the estimated coefficients have a positive sign, neither the inequality variable nor any other independent variable is significant in specifications (2), (4) and (5) while the inequality variable is significant only in specification (3). Put simply, the estimates as a whole are either so poor that they cannot reliably be said to explain any of the differences across countries or over time, or else the equations do explain some of the differences, but the effects of inequality are so unclear that we cannot be certain whether they are positive or negative.

Table 2.3: The effects of final income distribution (whole population)

58. Table 2.4 presents results of adding the final income distribution for the working age population alone to the basic MRW model using a fixed-effects regression on the sample of ten-year averages. As above, column (1) shows the results for the baseline model -- which can be used as a benchmark for comparison -- while columns (2) to (5) display the estimated coefficients for the baseline model including the set of inequality measures.

Table 2.4: The effects of final income distribution (working age population)

59. As with the estimates based on the whole population, the diagnostic tests suggest that none of these models perform adequately (an F-test of the set of regressors rejects their joint significance for the different model specifications). None of the variables of the model are significant. For what it is worth -- and it is not much -- the inequality variables have a positive sign.

2.3.2 The effects of the market income distribution on growth.

60. Table 2.5 uses measures of the market income inequality (i.e. income inequality *before* taxes and transfers) in an augmented MRW equation. Most variables are insignificant, and the regressors in the equation using the squared coefficient of variation as the measure of inequality are not jointly significant, as reported by the F-test, so can be disregarded. However, the estimated coefficient on the Gini variable in column (2) and the MLD measure in column (4) are significant at the 10 percent level and the regressors of both equations are jointly significant.

Table 2.5: The effects of market income distribution

13. An additional set of cross-section OLS regressions was also run for comparative purposes. Detailed results of these are not presented in the current document although they are along the lines of those obtained using fixed-effects except that none of the variables appear to be significant except for the catch-up effect.

2.4 Interpreting the results

61. According to the above-mentioned argument put forward by Lewis (1954), Kaldor (1956), and Stiglitz (1969) more final income inequality should be 'good' for economic growth. Because the elderly save as well as the working age population, if there were any such effect, then it would be most likely to have shown up in Table 2.3. Yet the results were not supportive of the theory, because the variables taken as a whole explained no more than a small proportion of the variation in growth rates across countries and time. The theory underlying the Galor and Zeira (1993) argument is that the poor cannot borrow and invest because of credit market imperfections. Because those who have retired from the labour market are unlikely to wish to undertake growth-enhancing human capital investment, this theory is best tested using measures of the income distribution of the working-age population -- Table 2.4. Again, however, the results were so poor that there is no evidence for or against such a hypothesis. Although no theory in particular suggests that *market* income distributions should affect growth, the results were not much more satisfactory (Table 2.5). Whilst market income inequality does just manage to be significant when measured by the Gini coefficient and by the mean log deviation, the estimates as a whole remain poor and unconvincing.

62. Hence it is possible to conclude that there is no evidence in support of any income distribution being either good or bad for growth, despite using the most appropriate econometric techniques and the most comparable income distribution data for OECD countries which is available for a reasonably long time period.

63. However, saying that there is 'no evidence' is not quite the same as saying that there is 'no effect' of income distribution on growth. There are two reasons why Tables 2.3 and 2.4 might be failing to show a signficant effect on growth. First, the econometric technique which has to be used because of the nature of the data -- the fixed effects model -- risks underestimating any effect, as discussed in Annex 3.

64. The second problem is more subtle. The 'Kaldor-type model' suggests that a wider income distribution will lead to more savings and hence investment, promoting growth. However, as the estimates in Tables 2.3-2.5 already have investment as a variable, all that the income distribution variable might be picking up is any affect *additional* to that which is already embodied in the investment variable. Similarly with the 'Galor/Zeira-type model'. A wider income distribution is suggested to reduce investment in human capital, but in Tables 2.3-2.5 there already is a measure of human capital -- the average years of schooling of the working age population. So again, it might be that no effect is showing up from income distribution because the baseline model already has the effect embodied within it.

65. Various tests were tried to see if this second hypothesis might be true. In particular, by (seperately) instrumenting the investment and human capital variables (using 2SLS -- see the box on estimation techniques above), it is possible to *endogenise* these two variables. In principle, this should show if income distribution is affecting growth *indirectly* by affecting the investment and human capital variables. In fact, it does not show any such effect.

66. A more extreme way of testing for endogenity is, however, to drop the variable in question. If either investment or human capital is dropped, then inequality becomes borderline significant at the 10 per cent level. If both are dropped at the same time, then inequality becomes comfortably significant at the 10 per cent level. Taking these results at face value, it becomes just about possible to conclude that income inequality is good for growth.[14] However, although this approach of dropping variables certainly solves

14. This is precisely the approach followed by Forbes (2000), and may explain why that study found a positive coefficient on inequality.

the endogeneity problem, it leaves a very obvious 'omitted variable' bias. It is, after all, difficult to imagine that inequality explains more than a small proportion of investment or human capital.

67. As mentioned above, these estimates should be interpreted as falling between the two extremes of short-term and very long term. If inequality affects labour supply, savings or the general efficiency with which resources are allocated, then such effects should show up in the estimates. But there may well be other reasons underlying the changes in the income distribution, and these may take longer before they become evident in the data. A widening of income inequality may, for instance, improve the allocation of resources in the economy, and promote growth in the short term, but this may harm growth in the longer term, through one or other of the mechanims described in the first part of this section. At the start of the empirical discussion, two issues were raised: first, did adding income distribution as a variable to a growth regression help us to explain more of differences in time and across countries in growth rates? And second, is inequality good or bad for growth? The answer to the first hypothesis is a clear 'no', and this makes the second question become almost irrelevant, unless it is possible to show that inequality affects growth indirectly through variables included in the baseline model. As no evidence was found that this was so, the preliminary conclusion referred to above seems most reasonable, namely, that we do not find any evidence that suggests that a wider income distribution is either good or bad for growth, but nor can we be so confident in the results that we can conclude that there is in fact no such effect.

SECTION 3: SOCIAL PROTECTION AND GROWTH.

3.1 Theories

3.1.1 When might social protection be bad for growth?

68. The previous section discussed how income distribution might affect growth. It might be inferred from them that social protection might affect growth through altering the distribution of income, but this is implicit in the theories, not explicit.

69. There are, however, several groups of theories which do directly relate social protection and growth. The most familiar just refer to the potential for a trade-off between equity and efficiency in systems of social protection. If benefit systems discourage people from working, the amount of labour supplied in the economy is cut, so reducing the level of output and, in some circumstances, the level of capital investment and hence growth. If social provisions discourage people from saving, then unless public saving rises by an equivalent amount there is a reduction in the capital available for reinvestment. There are many more such examples which could be given, with perhaps the classic evocation of the problem being that of Mirrlees (1971).[15]

70. In reviewing the experience of the Scandinavian approach to social protection, Lindbeck (1975) suggested a link between social protection and growth which appears at first sight to be a variant of the 'equity/efficiency' trade-off but which when pursued in greater depth, turns out to depend on quite a

15 . Atkinson (1999) examines the theoretical and empirical implications of this line of reasoning, shedding light on the nature of the relationship between the welfare state, economic growth and overall societal welfare. His analysis finds no irrefutable evidence on the effects of the welfare state on economic growth.

different mechanism. His argument is that the universality of the Scandinavian welfare state has 'politicised' the return to economic activity, so encouraged people to pursue material gain through the political process -- by passing redistributive legislation -- rather than through economic activity. The result is, over time, a loss of entrepreneurial and innovative capacity.

3.1.2 When might social protection be good for growth?

71. The idea that social protection can be good for growth is reflected in a series of official statements at the national or multinational level. Examples of the sorts of arguments that are made include: that social protection may lead to a more cohesive society, better able to take 'difficult' political and economic decisions, so promoting structural adjustment; that social protection prevents a group or class of society falling so far behind the 'mainstream' that they are unable to participate in the market economy, causing permanent loss of potential output; that keeping children out of poverty may have long-term benefits on their social and intellectual developmentetc. Often referred to as 'social investments', or treating social protection as being a 'productive factor', such sentiments have become increasingly commonplace in official communiques and statements about the objectives of social protection systems.

72. Furthermore, the welfare-enhancing role of social security in a economy where annuity markets are absent (see, for instance, Hubbard and Judd, 1987) and individuals face borrowing constraints (as in Imrohoroglu et al., 1995) may be important. In those circumstances, a system of social security is good for overall welfare, carrying out a dual function: first, promoting efficiency whilst substituting for the missing markets; and second, encouraging individuals to be less risk averse insuring them against risks which would otherwise remain uncovered. In addition to better management of individual risks, systems of social protection can also help in the more efficient administration of 'societal risks'. This may foster investment -- for instance, in technological progress and innovation -- and ultimately growth (Ahmad et al., 1991).

3.1.3 What have previous studies found.

73. Previous studies which have found that social protection *increases* growth include Cashin (1994), Castles and Dowrick (1990), Korpi (1985), McCallum and Blais (1987) and Perotti (1992, 1994). The Perotti results have been particularly influential. The interpretation given by Perotti emphasises the importance of imperfect capital markets and political instability. This study, as most of the other studies which have found a positive coefficient, have data sets dominated by less developed countries. These results have been contradicted by Gwartney et al (1998), Hansson and Henrekson (1994); Nördstrom (1992) and Weede (1986, 1991). Annex 1 provides more details.

3.1 Data sources

74. The OECD social expenditure database (SOCX) identifies all expenditures which fall under a definition of 'social' expenditure which is broad enough to incorporate active labour market policies and health expenditures, as well as cash income transfers and social services, including child care. SOCX is preferred to the national accounts estimate of social spending because it has proved very difficult to identify what items of social spending different national accountants include under the relevant heading. Furthermore, SOCX permits a more refined measure of the effects of social policy on income distribution and growth than has been generally attempted in the past. For example, it becomes possible to identify spending on the working age population and the whole population separately.

75. There is, however, one important drawback to using SOCX as the source of social spending data: the length of time series. SOCX itself covers the period 1980-1997 for all the OECD countries other than

those of central Europe and the other new OECD members (Korea and Mexico). This is not a very long time period (and to make matters worse, the key element of active social expenditures, discussed in the next section, -- active labour market policies -- has only been collected on a systematic basis since 1985, although earlier data for some countries is available).

76. An alternative data source exists for the period 1970-1980. This data (OECD 1994b), matches relatively closely the data included in SOCX in aggregate, but does not permit a disaggregation of the data.[16] Because the data was collected using a different methodology from SOCX, there is a risk that it is less reliable. For that reason, when undertaking the empirical estimates described below, tests were carried out to see if excluding the 1970s affected the results. In no case did any significant variable become insignificant, or vice versa, suggesting that the long time period data can indeed be used with some confidence (see Annex 3). Data on health expenditure, included in OECD *Health Data,* is reliable back to 1970. *Health Data* is not entirely compatible with SOCX: there is a theoretical risk, in some countries, of double-counting spending for the long-term care of the frail elderly. However, such data inconsistencies, if they exist, are unlikely to be large.

77. The data used are gross public social spending and gross public health spending. As is well-known, in some countries a significant proportion of health spending is private. As is less well-known, private social spending (on pensions, sickness and insurance against occupational injury and disease) can amount to several percentage points of GDP (Adema, 1999). Furthermore, some countries tax social transfers, others do not, giving the impression that spending is higher in the former case even though net transfers are the same (Adema, 1999).

3.2 Trends in total public social expenditure

78. Since 1970, social expenditure (including health but excluding education) in OECD countries has increased by around 10 percentage points of GDP on average (Table 3.1). This growth has not been confined to any one region of the OECD; it has been perhaps a little less rapid in the non-European OECD countries, but not to any significant extent. The European region has social expenditures which are significantly in excess of those of non-European countries. The non-European country with the highest total public social expenditure -- New Zealand -- has a spending to GDP ratio which is lower than all but four European countries in 1997.

Table 3.1: Public Social Expenditure: 1970-1997

79. Within each country or regional grouping of countries, changes in the level of social spending are positively correlated with GDP per capita (Chart 3.1). One way of interpreting such a relationship is that social expenditure shows a positive income elasticity of demand -- the richer we are, the more we are prepared to spend in order to protect our health, our standard of living in retirement, or our current consumption levels, were we to lose our livelihood through unemployment or sickness. However, this relationship does not hold *across* countries or regional groupings, with expenditures in Japan and the United States,[17] for example, being well below the level that a European country with their level of GDP per capita would be expected to have. Nevertheless, the strong correlation between GDP per capita and social expenditure within regional groupings does suggest a need to control for endogeneity in any study of empirical effects of social expenditure and growth.

16. It does not, however, include data for Iceland, Luxembourg, Portugal, Spain or Turkey, or any of the new OECD Member countries (the Czech Republic, Hungary, Korea, Mexico, Poland, Slovakia).

17 . Spending in Japan and the United States tends to be lower than the European average in each of the main categories of spending -- on cash transfers to the elderly, unemployment, disability, etc.

Chart 3.1: Public Social Expenditure and GDP per Capita

3.2.1 Trends in spending on the elderly

80. A distinction between expenditure on the elderly and that on the rest of the population is useful, because spending on the elderly is unlikely to affect incentives to supply labour as much as cash income transfers to the working age population (the different trends of active and passive spending will be described in section 4). Population ageing has led to strains on systems of public income support for the retired population in a number of (particularly European) OECD countries (OECD 1998, 2000a). Table 3.2 shows the rapid rise in expenditures in the EU between 1980 and 1995.

Table 3.2: Public social spending towards the retired population, 1980 - 1997

81. Nevertheless, spending on the elderly shows no particular trend towards becoming a more important element in total social spending. Spending on the younger population has increased at a similar rate (on average) to that on the retirement-age population. Unemployment benefits, although only a small element in total social expenditure, doubled as a percentage of GDP between 1980 and the early 1990s. Furthermore, health expenditure has increased steadily. Understanding the role played by public health expenditure in the various theories about social protection and growth requires a consideration of whether it is best considered a redistribution from the rich and healthy to the sick and poor, or whether it promotes a healthy labour force and promotes labour supply, an issue which is considered in section 4.

3.2.2 Trends in redistribution

82. Much social expenditure is 'churned' -- people pay taxes at the same time as receiving benefits. The aggregate amount of money which can be classified as being 'social' may be a rather poor proxy for the amount of redistribution from rich to poor which is taking place. The OECD work on income distribution has developed a measure of how much net redistribution is performed by tax/transfer systems which can be used when assessing theories about growth and social protection: the increase in the share of total income received by the bottom half of the income distribution due to taxes and transfers. Table 3.3 shows how this variable has changed over the time period covered in the study.

Table 3.3: Share-gains of the bottom half of the income distribution

83. As is apparent from Table 3.3, the changes in share gains over time have been very substantial. For example, in the 1970s, the share of *final* income of the bottom half of the distribution was just two per cent more than their share of *market* income in Australia. By the 1990s, the difference was 8 per cent more. Increases (albeit, usually less rapid) have taken place in other countries. The net effect of taxes and transfers has been to redistribute more income to the lower half of the income distribution, either because more is spent, or because benefits are more targeted than previously.

3.3 Empirical estimates.

84. This section tests the hypothesis that social protection expenditure affects growth. As with the discussion of income distribution above, there are two hypotheses that are considered: first, does including a measure of spending on social protection help us explain more of differences in growth rates across countries and over time, and second, is the effect of more social spending positive or negative? The Box provides definitions and sources of the variables used.

Box: Social expenditure variables

These variables come from the *OECD Social Expenditure database* (SOCX), 2000, and the *OECD Questionnaire on Trends in Income Distribution and Poverty* described in Förster (2000), respectively.

- *Social spending* is the provision by public institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer. Such benefits can be cash transfers, or can be the direct ("in-kind") provision of goods and services (see OECD (1996)). Because of data limitations (see Adema 1999), the variable used here is limited to *public* social expenditure -- i.e. the expenditure must be made by an institution which as classified as being general government in the system of national accounts.

- *Share gains*: the share gain for a given decile is defined as the increase in the income share of that decile as transfers take place. These variables capture how the income share of the bottom half and of the bottom quintile of the distribution of market income for the working age population increase as redistribution takes place, i.e. as tax/transfers have effect. In computing these share gains, it is necessary to define them across the same set of people. The variable used below reflects the share gain of the bottom 50% of the income distribution.

85. The hypotheses are tested by adding measures of social protection spending to the baseline MRW growth model. This approach does implicitly assume that all social spending affects incentives equally. One important reason why this might not be so -- because some spending can be considered 'active' -- is considered in section 4. This section, however, does test three different measures of total social spending: total social expenditure including health spending; total social expenditure excluding health spending (because health spending may have different effects from general social spending), and total social expenditure excluding expenditure on the elderly (because several of the various ways in which social spending might promote or retard growth is through changing labour supply, and such spending is unlikely to affect the elderly one way or another). In addition, as argued above, it may actually be the amount of *redistribution* which matters, rather than the amount of money which is 'churned' through the system, so a second set of estimates of the are included, based on the share gain of the bottom half of the income distribution.

3.3.1 The effects of social protection spending

86. The empirical estimates of the effects of *income distribution* on growth were tested using a fixed effects model. However this reflected the relative paucity of data on income distribution. As described above, social expenditure data is available for every year since 1980, and a less reliable but still useful data set allows data back to 1970 to be used. This permits the use of other econometric techniques which are more powerful than the fixed effects model. In particular, it is possible to use Pooled Mean Group (PMG) regressions, as pioneered when looking at growth in OECD countries by Bassanini *et al.* (2001). The Box describes this technique; annex 3 contains the formal description.

Box: Estimation techniques (2)

Pooled Mean Group (PMG)

PMG

Two different methodologies are commonly used for estimating panel datasets. On one hand, fixed-effects estimations allow the intercepts to differ across countries while the rest of the variables are constrained to be the same ('pooling' methods). On the other hand, one can estimate single equations for each country and then examine the distribution of the estimated coefficients across them ('averaging' methods). Estimating a model via PMG involves both pooling and averaging.

The PMG estimation introduces short-run dynamics in the growth equation (captured by the first differences of the independent variables) and allows for short-run coefficients to differ across countries, imposing homogeneity on the long-run coefficients. It also allows the speed of adjustment and error variances to differ across countries. See Pesaran *et al.* (1999) for a detailed explanation of the method.

As pointed out by Pesaran *et al.* (1999) and Bassanini *et al.* (2001), separating short-run dynamics from long-run effects is justified for OECD countries. While there are good reasons to believe that OECD countries will have similar long-run coefficients due to the fact that they have access to similar technology, have intensive intra-trade etc., there is no particular reason to believe that, for example, the process of convergence will be done at the same speed across countries. Estimation of the long-run parameters is then performed with a pooled mean group method, leaving the short run heterogeneous dynamics unconstrained. Separating short-run dynamics from long-run effects is intuitively an added bonus in dealing -- at least, partially -- with endogeneity. Simultaneity is usually expected to play a fundamental role in the short-run while concerns over the long-run become less severe.

In their pioneering contribution, Bassanini *et al.* (2001) apply the PMG technique of Pesaran *et al.* (1999) to the growth framework.

87. Table 3.4 adds the various possible ways of measuring total social expenditure to the basic MRW model. Column (1) of the first panel gives the results for the baseline model calculated using the PMG approach for the sample 1970-1998; Column (2) presents the estimated coefficients when the equation is augmented by total social expenditure, column (3) shows the results using for the same measure, adjusted to exclude expenditure on health. Columns (6) and (7) exclude expenditure on the elderly, where it can be separately identified, on the grounds that it might influence incentives somewhat differently from expenditures on the working age population. All these models have also been estimated on a sample excluding the 1990s, reflecting the fact that the baseline model gives much less satisfactory results when the 1990s are included, and on a sample excluding the 1970s, in recognition of the fact that data from the 1970s comes from a slightly different data source and might not be as reliable. The results obtained over either of the shorter periods were generally not significantly different from those obtained over the long period time periods.

Table 3.4: The effects of aggregate social expenditure

88. The models perform well and the basic growth model variables are individually significant and have the expected sign. These results are, in other words, much more convincing than those obtained using the fixed effects model.

89. The coefficient on total spending on social protection is negative and significant. If health expenditure is excluded in the measure of total social expenditure, the coefficient falls to two-thirds of the value found for total social spending (and if the 1990s are excluded, becomes insignificant), suggesting that the effects of health expenditure on growth are different from the effects of other social expenditure --

an issue which is returned to below. Excluding expenditure on the elderly also reduces the coefficients, and when the measure of social expenditure excluding growth is used the coefficient is insignificant.[18]

3.3.2 The effects of redistribution

90. Table 3.5 tests whether a measure of net redistribution -- the share-gain of the bottom half of the income distribution, both in general and when looking just at the working-age population -- has a significant effect on growth.[19]

Table 3.5: The effects of redistribution

91. Because the data comes from the income distribution project which gives data points at decade-wide intervals, the model is estimated using the fixed-effects regression technique on the sample of ten-year periods. Although the signs on the share-gain variables are negative -- as would be expected were redistribution to harm growth -- misspecified models are obtained whether including the share-gain for the working-age or the entire population, despite the fact that the baseline model is well-specified. In other words, whereas the basic model managed to explain nearly half of all the differences in growth rates across countries and over time, adding a measure of redistribution *reduces* the ability of the model to explain such differences. Hence these estimates cannot be interpreted as providing any evidence in favour of the Mirrlees hypothesis.

3.4 Interpreting the results

92. Taken at face value, the data is consistent with the theoretical argument put forward by Mirrlees that social expenditure reduces growth, and is inconsistent with the idea that social expenditure, taken as a whole, was an investment which had a positive impact on growth rates. Spending on health apparently reduces this effect, a topic returned to in section 4. The results do not give evidence in favour of the hypothesis that spending on the elderly has a lesser or no effect on growth. On the contrary, estimates which focus only on the working age population are less well defined and apparently smaller than when spending on the whole population is included.

93. The results suggest that social protection has a moderate effect on growth in the long term -- it is not a negligible effect, but it is by no means a driving force in growth rates. Partial elasticities suggest that an increase in spending from approximately 18.5% of GDP (the mean over the whole period considered) to 19.5% of GDP would reduce GDP in the long term by 0.7 percent.[20] This can be compared with the effects of other variables on GDP: a one per cent of GDP increase in investment would increase GDP by 1.3%; increasing the initial level of GDP by $1000 per person would reduce eventual GDP by 0.6%, and an

18 . The GMM-IV approach described in the following section was also used to test this hypothesis. The basic of variables are significant with the exception of the investment variable. The social expenditure variable comes out as positive, but insignificant in both specifications. However, the *m2* statistic suggests that there may be serial correlation, suggesting that the GMM results are unreliable in this particular case. Notice, however, that this is less clear-cut when the sample excludes the 1990s. In that case, the *m2* statistic rejects the null hypothesis of absence of serial correlation only at the 10 percent level.

19. These variables capture how the income share of the bottom half of the distribution of market income increases due to taxes and transfers. In computing these share gains, it is necessary to define them across the same set of people.

20 . A one percentage point increase in spending takes several years to have its full-scale impact on growth. The long-run elasticity of 0.7 should be interpreted as being the cumulative impact on GDP.

increase of half of one year in the average years of schooling in the working-age population would increase long-run GDP by over six percentage points.[21]

94. One way of interpreting these results is that the effect on growth is not from social protection *per se*, but from taxation. In other words, as social protection spending increases, so does taxation have to rise, and it is taxation which affects (reduces, according to these estimates) growth, rather than social expenditure reducing growth directly. There are a number of studies which have looked at the effects of taxation on growth. Generally, they find that the tax to GDP ratio negatively affects growth -- more taxation, less growth (see e.g. Bassanini *et al.*, 2001).

95. Such an interpretation implies that it is reasonable to consider the effects of social spending as being somehow separable from the financing of social expenditure. Yet even if there were *no* effects on growth from social expenditure, but the financing of social expenditure reduced growth, it would still be reasonable to assert that the social expenditure *caused* the increase in taxation and reduction in growth. In fact, increased social spending accounts for most if not all, of the increase in tax pressure in OECD countries since the mid 1960s. In other words, it is just as likely that the studies which find an effect from taxation on growth may in fact be picking up an effect from social protection expenditure -- because it is not possible to have social protection expenditure without an assumption of increased taxation either now or in the future, it is not really possible to separate a tax effect from a social expenditure effect. Regardless of which interpretation is correct, including a measure of tax pressure in the equation does not alter the coefficient on social expenditure.[22]Overall, therefore, there is evidence which is consistent with the argument that more social expenditure is associated with lower growth. It is the aggregate amount of expenditure which appears to matter: no evidence was found in favour of the idea that it is redistribution, rather than expenditure, which may have an effect on growth. However, for a variety of reasons,[23] the estimation technique used to assess the effects of redistribution (the fixed effects model) is less likely to pick up a relationship than is the main methodology used to look at aggregate social expenditure (the PMG), so the relative importance of the two possible effects -- aggregate expenditure and the extent of redistribution -- cannot be reliably assessed.

21 . The results in this paragraph are obtained from the estimates of total social spending, including health, estimated over the full time period, using the PMG model. All effects are calculated at the mean.

22. For the 18 countries where it is possible to include both social expenditure and tax pressure, estimates using the PMG technique show that all coefficients (including social expenditure) remain approximately the same as when tax pressure is not present. Furthermore, the Hausman test calls for the coefficient on tax pressure to be unrestricted. The unrestricted estimate on tax pressure is insignificant.

23. In particular, the PMG methodology allows the estimates to be based on several hundred observations, whereas the fixed effects model rests on some 40. Furthermore, the downward bias in fixed effects estimations in the presence of the lagged dependant variable may have some effect.

4 THE EFFECTS OF ACTIVE AND PASSIVE SOCIAL SPENDING ON GROWTH

4.1 Theories and evidence about active and passive social expenditure

96. The previous section considered the effects of social protection expenditure as a whole on growth. Social expenditure consists of somewhere between one half and three fifths of total government spending in OECD countries, and accounts for up to 30% of GDP. But it is not a homoegeneous mass, including as it does expenditures ranging from cash income support to the unemployed to capital investment in the health care sector. It is reasonable to consider whether different sorts of social spending might affect growth differently.

97. SOCX permits a distinction to be made between different types of spending. In particular, it is useful to make a distinction between active and passive spending:

- *active* policies are introduced in order to encourage increased employment by the beneficiaries of such spending

- *passive* policies are pure transfers of consumption from one group in society to another, either in the form of cash transfers or services.

98. This distinction is potentially important because the two types of expenditure may have different effects on income equality measures:

- Active policies can be expected to reduce both *market* income inequality and *final* income inequality.

- Passive policies have complex effects on market income inequality. If nobody changes their behaviour when such programmes are introduced, market income inequality will be unaffected. If, however, they do cause behavioural changes (people work less, or save less) then they will widen market income inequality. Whether final income inequality is reduced or not depends on whether the taxes and transfers offset the widening, if any, in the market income distribution.

99. Furthermore, they may also have different effects on growth. The previous section identified some circumstances when passive social spending could be good for growth. Active policies may be beneficial in all these circumstances, but in addition they can also increase the quantity of labour supplied in the economy, so promoting growth. In other words, to the extent that this latter mechanism is important, the more active spending in the total of social spending, the more positive or less negative should be the effects on growth.

100. Health spending is clearly not all ‘active’ or ‘passive’ according to the definitions outlined above. There have been some attempts to determine whether health status and health spending affects growth rates. For example, Bhargava *et. al.* (2000) find that increased health status is associated with more rapid growth. Devarajan et al (1993) also found that some categories of health and education spending promoted growth. In addition, a working party of the WHO Commission on the macroeconomics of health is looking at whether health spending has an affect on growth. However, these studies, as with most others in this field, focus on developing countries, where improvements in health status are much more likely to be felt amongst those of working age than in the OECD area, where improvements in morbidity and mortality are more likely to be in the retired population.

101. No empirical estimates separating active from passive social expenditure have been included in a growth equations. However, Vanhoudt (1997) found that spending on active labour market policies was effective in raising the income levels of the lowest quintile, but did not affect the gini coefficient and Martin (2000) surveys the extensive literature on the effectiveness of ALMPs in increasing employment, finding that there were positive experiences for some groups and types of spending, but not for others.

4.2 Trends in spending on active social policies.

102. Unfortunately, whilst a clear definition of social spending being either entirely active or passive is very appealing, reality is not so obliging. Most social programmes are *not* unambiguously active or passive. They may be mainly active, with passive elements (a labour market programme, which also provides income support and may requalify the recipient for unemployment insurance); they may be mainly passive, with active elements (a cash transfer programme, which has job-search requirements). As most social programmes lie between the two extremes of activity and passivity, any classification of them into active spending or passive spending is arbitrary.

103. For the purposes of looking at the effects of social spending on growth, this failure to generate a clear and clean distribution of social spending into active and passive categories is not *that* important. After all, the objective is not to rank countries by their 'active' effort, but rather to see if different composition of expenditure can affect growth. To that extent, it is reasonable to test a variety of definitions of 'active' and 'passive', in order to see which, if any, of them appear to influence growth (or more accurately, to influence growth in a different manner to the rest of social expenditure).

104. The narrowest possible interpretation of 'active' social spending is to focus on active labour market policies. These are designed, broadly, to help jobless persons find and retain paid employment. They may include training programmes; help with job-search activity; rehabilitation services for disabled workers; and wage subsidies.[24] Table 4.1 shows that spending on active labour market programmes as a percentage of GDP has been on an upwards trajectory, but that the levels remain relatively low, only recently approaching 1 per cent of GDP on average. It is significantly higher in Nordic countries, France, Germany and New Zealand.

Table 4.1: Spending on Active Labour Market Policies, 1980 - 1997

105. A broader interpretation of 'active' social spending might include those programmes which seek to increase labour supply through reducing barriers to participation in the formal labour market. This would suggest that in addition to spending on active labour market policies, two other items of expenditure should be included. First are those payments made to low income households who nevertheless do have earnings. Schemes such as the Earned Income Tax Credit in the United States, the Working Families Tax Credit (formerly Family Credit, formerly Family Income Supplement) in the United Kingdom, and the Family Income Supplement in Ireland are all designed to 'make work pay' (MWP) by supplementing family incomes with payments from government. Second, expenditures on family care, and child care in particular, may reduce the costs of parents going to work, so increasing (particularly female) labour supply.

106. Table 4.2 shows that, as with ALMPs, there has been an upward trend in spending on family services and MWP policies. Spending in European countries, particularly Nordic countries, has been high throughout the period. The growth in such spending in the United States and the United Kingdom reflects the increase in spending on MWP policies.

24 . This may be the narrowest possible definition, but even so it is not without problems. As noted by Martin, (2000), some active measures are really passive ones in disguise.

Table 4.2: Spending on Family Services and 'Make Work Pay' policies, 1980 - 1997

107. In addition to the intrinsic benefits of reducing sickness and promoting health, health expenditure also ensures that a greater percentage of the population will be available for work by preventing sickness, reducing the intensity of symptoms, and ensuring that people get well quickly. Obviously, not all health expenditure can be seen as being likely to have an effect on growth. Perhaps 40 per cent or even more of health care expenditure is spent on treating older persons.

108. Table 4.3 suggests that there has been an increase in spending on health, though it has hardly been dramatic since 1980, amounting, on average to just 0.6 percentage points of GDP. Much more rapid increases have been experienced in Belgium, France, Germany, the United States, Switzerland and Portugal. Declines in health expenditure as a percentage of GDP have taken place in several countries.

Table 4.3: Public expenditure on Health, 1970 - 1997

4.3 Empirical estimates

109. The hypothesis tested in this section is that some part of social expenditure, broadly conforming to the 'active' definition outlined above can be defined and found to have a statistically different effect on growth from other forms of social expenditure.

110. One form of active social spending -- active labour market policies -- can only be identified in the OECD SOCX database for the period 1984-1997. Despite the short time period, the availability of annual data means that PMG estimation techniques can be used (see Section 3 and Annex 3 for a description). In addition, GMM-IV estimation is also used (see the box and Annex 3).

Box: Estimation techniques (3)

Generalised Method of Moments with Instrumental Variables (GMM IV)

GMM IV

In an attempt to deal with both the correlation of country effects and the endogeneity problem Arellano and Bond (1991), proposed a technique based on the generalised method of moments (GMM) with instrumental variables (IV). This technique offers an alternative procedure to estimate the growth equation with a lagged dependent variable. The GMM-IV approach corrects for the bias introduced by the lagged dependent variable, allowing for a certain degree of endogeneity in the other regressors (Caselli (1996) and Forbes (2000)). The GMM estimation is run on a model in first-differences to eliminate country-specific effects and all possible lagged values of the regressors are used as instruments. This approach has the advantage of permitting some diagnostic tests to assess the validity of the underlying assumptions, i.e. the lack of serial correlation in the error term and the exogeneity of the explanatory variables. As pointed out by Temple (1999), an additional advantage of using a GMM IV estimation technique is that it helps in dealing with measurement errors which are not thought to be persistent by using the lagged values of the variables as instruments. Hence the GMM-IV estimator simultaneously addresses the issues of endogeneity and correlated individual effects.

First, country-specific effects are eliminated via first-differencing each variable. However, OLS cannot be used because there is a lagged dependent variable which is now correlated with the error term. Estimating the equation via instrumental variables using the generalised method of moments (GMM) is then necessary. While the differencing removes the omitted-variable bias, the instrumental variables GMM procedure corrects for the endogeneity of the explanatory variables.

See Caselli *et al.* (1996) and Forbes (2000) for applications of the Arellano and Bond (1991) estimator to growth theory.

111. Estimating the effects of active spending defined narrowly as being ALMP spending (column (2a) of Table 4.4) gives a *positive* and significant coefficient. Expanding the definition of active spending

to include both family services and spending on MWP policies (2b) increases the coefficient which remains strongly significant.

112. Adding in health (column 2c) leads to an insignificant coefficient on 'active' spending. Given the relative size of the health expenditure to the active expenditure included in column 2b, it is reasonable to infer that health expenditure cannot be said to have a positive effect on growth. This does not, of course, mean that all health care expenditure is bad for growth.

Table 4.4: Active and Passive social expenditure

113. Non-active spending (here defined in column (3) as being total social spending minus ALMP spending) has a negative sign but is insignificant. In an attempt to define 'passive' spending more closely (by excluding cash transfers to the elderly, and by excluding health) give similar results (not reported here). Hence, although overall social spending is associated with lower growth, it has not proved possible to identify which parts of social spending are particularly responsible for this result.

114. Column (4a) includes both active (strictly, the narrow ALMP definition) and non-active (total social spending minus ALMP) variables as regressors in the same regression. However, the model in column (4) is estimated as a partial adjustment or lagged dependent variable model due to the fact that the available data sample is so short that the full set of independent variables cannot be included to obtain the long-run coefficients whilst controlling for short-term dynamics (see Annex 3 for a detailed explanation of the PMG model used in this case).

115. Although, as reported above, individually it is not possible to identify 'non-active' spending which has a negative effect on growth, in the presence of active spending such a negative coefficient is found. There is a positive significant coefficient for active social spending and a negative significant coefficient for non-active spending in column (4a). The sensitivity of these results to different definitions of non-active spending are explored in columns (4b) and (4c). The coefficient on active spending remains unchanged in sign, level and significance. Excluding spending on cash transfers to the elderly reduces the negative coefficient on non-active spending, and also excluding health reduces it even further. However, it remains significant.

116. The reliability of these results is confirmed by estimating the same model specifications using the GMM-IV technique (second panel of Table 4.4).[25] The results obtained estimating both active (narrow definition) and other social expenditure in the same equation are analogous to the ones achieved by using the Pooled Mean Group technique. When regressing growth of the two variables separately, the coefficient on active policies in column 2 has a positive sign but is insignificant (it was significant in the PMG equation). The coefficient on non-active expenditure in column 3 is negative and significant (it was insignificant in the PMG equation). When including both variables in the same regression, a positive significant coefficient is obtained for active spending, and a negative significant coefficient on other social spending (as was the case in the PMG partial-adjustment equation).

25. The model is well specified and both tests for serial correlation -- the Sargan test and the *m2* statistic -- indicate its absence. In this case, the GMM-IV technique finds no evidence of the two sources of inconsistency usually encountered in empirical work on growth: correlated individual effects and endogenous explanatory variables.

4.4 Interpreting the results.

117. The hypothesis being tested was that active spending had a significantly different impact on growth than passive social spending. The most reasonable interpretation of the estimates is that not only are the effects of the two sorts of spending significantly different, they have significant effects in the opposite direction to each other. More *passive* spending may be associated with a poor growth performance, but more *active* spending is actually good for growth. This result appears broadly to be supported by the two different econometric techniques used (which correct for different sorts of statistical problems).

118. Active spending which has this affect includes at least ALMP spending, spending on family services, and spending on MWP policies. This does *not* mean that all other expenditure is bad for growth. The general trend within OECD countries has been to encourage a more active approach within spending programmes. Hence, unemployed people are required to search for jobs more actively than before; lone parents may be encouraged or required to attend counselling sessions as to how best to go about looking for work; and programmes for disabled persons may emphasise what people can do, not what they cannot. It is not possible, in general, to break-down expenditures within programmes into an active or passive component. Hence there may well be items of expenditure in many different social expenditure fields which have a positive effect on growth.

119. It is not clear which items of non-active expenditure are particularly associated with low growth. This is somewhat surprising and perhaps justifies some caution when drawing policy conclusions.

120. It follows that the correct interpretation of these results is *not* that *only* expenditures on ALMPs, policies to make work pay and family services are good for growth. Rather, it is that where it is possible to identify active spending, it seems to have a positive effect on growth, and that this is supportive of efforts to make combine other sorts of social expenditure, particularly cash transfers, with efforts to promote employment.

121. The estimates suggest that increasing active spending from 0.63% of GDP (the average over the period and countries covered) to 0.73% of GDP would increased long run GDP by nearly 1% of GDP. The 'passive' estimate (in reality, total social spending minus active spending) suggests that an increase from 20.7 to 20.8 per cent of GDP would reduce long run GDP by 0.2 per cent of GDP. The effect of active spending on GDP in particular seems very large. Much caution needs to be used when interpreting results which are so dramatic, and factors such as diminishing marginal returns to additional active spending have to be taken very seriously when attempting to use such figures to draw policy conclusions.[26]

122. As mentioned above, previous evaluations of ALMPs have given 'mixed' results. Do these results provide evidence that in fact the ALMPs have been effective? The answer depends on what is meant by 'effective'. What is found is that increased spending on active policies increases growth. If increased employment were to be the mechanism by which active spending promoted growth, it might be expected that there would be a clear impact on intermediate variables. For example, the employment to population ratio might be expected to rise in the presence of a high rate of 'active' spending. Existing microeconomic evidence on the effectiveness of ALMPs suggest that it would be surprising were such an impact of active social spending on labour force participation rates to be found. However, increased employment is not the only possible explanation of how active spending might be positively related to growth. For example, the reason why ALMPs have often been assessed as being only moderately

26. The effects referred to in this paragraph are based on the estimates obtained in column 4a of Table 4.4. Changes are based on increases in the mean value of parameters for those countries included in the estimates.

successful is that participants on labour market programmes displace others from employment, or give products produced with subsidised labour a competitive advantage in the market, reducing demand for workers in other areas, etc. Hence the *net* effect on employment may be small. However, there are social policy advantages even in these circumstances -- those who participate in programmes usually see their incomes increase, at least for a time, and participants are less likely to drift away into permanent exclusion from the labour market. If any of these effects in turn have a feedback on growth performance, it is possible that active policies can increase growth even without increasing employment in the short term. The next section discusses possible links between social expenditure and income inequality in more detail.

123. There may be alternative explanations of why such a high parameter is found on the 'active' spending variable. For example, high active spending may be an indicator that a government has undertaken other growth-enhancing reforms. What is being identified may not be so much an effect from active spending, but rather the impact of an entire policy stance.[27] Such hypotheses are difficult to prove or disprove. The most reasonable interpretation of the results is that this study provides some evidence that active spending might be good for growth, but that further evidence is required before such an assertion can be made with confidence.

5: LINKS BETWEEN INCOME INEQUALITY AND REDISTRIBUTION

124. Previous sections have found no evidence that income distribution affects growth, that social expenditure in general is associated with lower growth, but some social expenditure have a positive effect on growth. However, social expenditure alters the income distribution. This section stops treating social expenditure and income distribution as if they were entirely unrelated, and examines whether the manner in which they are linked can affect growth.

5.1 Theories about links between income inequality and redistribution

125. A group of theories based around the political economy of redistribution assume that 'the median voter' makes an assessment of potential gains in personal or household income from voting for redistribution. In economic models of democracy, the behaviour of the median voter is the key in determining government policy. Of course, unless income is completely evenly distributed, the median voter will always have an income less than the mean income of the country. The fact that the majority does not always vote for redistribution presumably reflects the assessment of the median voter that the costs in lost output following redistribution offset any gains in his or her personal or household income. The more that the mean exceeds the income of the median voter, however, the more likely is the voter to believe that the financial rewards from redistribution can exceed any loss of income due to reduced economic activity. Hence, Persson and Tabellini (1994) and Alesina and Rodrik (1994), among others, suggest that the greater is inequality as measured by the difference between mean and median incomes, the greater the level of political action to redistribute funds.

27 . The correlation between the two measures of active spending tested (ALMPs and ALMPs plus spending on make work pay policies and family services) is 0.84.

126. Previous sections (and empirical studies refered to above and in annex 1) have used the inequality and social protection variables as if they were 'choice' variables. It is as if a dictator of each country had chosen to have such-and-such a level of inequality, and/or this-or-that level of social protection expenditure. If in reality the amount of redistribution which takes place in a country is not some philosophical choice based on a set of first principles, but rather is a response to the set of preferences of voters which in turn reflects the level of inequality and the rate of growth of the economy, then the links between social protection and growth cannot be separated from the relationship between growth, inequality and social protection. In other words, more social protection may reduce growth, but voters decided on that level of social protection because of the level of growth and degree of inequality in their country.

127. The most widely-known empirical test of whether a wide income distribution is associated with slower growth because of policies to promote redistribution is that of Persson and Tabellini (1994). They used historical data going back to 1830 for a group of countries which subsequently became members of the OECD, and more recent data going back to 1945 for a broader range of countries. They find evidence from both groups of countries that a wider income distribution led to slower growth because voters (where voting existed) adopted policies to narrow the income distribution but which had the side effect of slowing growth. However, some of their key coefficients are insignificant. Alesina and Rodrik (1994) also argue that their estimates support this view.

128. Milanovic (1999) provided evidence that the wider is the distribution of income inequality *before* taxes and transfers, the greater is the extent of redistribution, as measured by the share gain and the gini coefficient, though the effects are much smaller once pension expenditures are excluded.[28] Kristov and Lindert (1992) find that the bigger is the gap between the rich and the middle classes, the more redistribution takes place, but that a wider gap between the middle and the bottom of the income distribution reduces redistribution.

5.2 Empirical estimates

129. This section tests the hypothesis that a wider distribution of income before taxes and transfers (i.e. a wider market income distribution) leads to more social expenditure which, as suggested by section 3, at least in aggregate, may be associated with lower growth.

130. Market income distribution data are taken from Förster (2000), as described in section 3 above, and data on social expenditure has been taken from SOCX, as described in section 4. Because the income distribution data is at decade-wide intervals, the social expenditure data is here used in ten year averages.

131. The econometric techniques used are described in the box. The two estimation techniques (Seemingly Unrelated Regression Estimator (SURE) and three-stage least squares (3SLS)) which are used in this section allow for the simultaneous calculation of two equations: the extent to which the level of social expenditure in an economy depends on the level of (market) income inequality and growth, and how growth in turn depends on the level of social protection.

28 . These results are consistent with the theoretical findings of Tabellini (2000) and Casamatta et al. (2000), among others, in which the greater the inequality of pre-tax income within each generation (and the proportion of elderly people in the population), the larger the size of social security expenditures.

Box: Estimation techniques (4)

Zellner's Seemingly Unrelated Regression Estimator (SURE) and Three-Stage Least Squares (3SLS)

SURE

A simultaneous equation model is postulated and estimated using two different techniques: Zellner's Seemingly Unrelated Regression Estimator (SURE) and a Three-Stage Least Squares (3SLS) estimation.

It seems a reasonable supposition that the unobserved features of economies are related at each point in time. In this situation, it is desirable to estimate the system of simultaneous equations using the SURE method proposed by Zellner (1962). Estimating a model with SURE implies treating the explanatory variables as exogenous and estimating jointly two regression equations each of them including a different error term via 'feasible' generalised least squares. These regressions are related because the contemporaneous errors associated with the dependent variables are correlated. As shown by Zellner (1962) estimating a SURE system will yield more efficient estimates than estimating each equation separately.

The SURE technique requires estimating the cross-equation covariance matrix from the residuals of an OLS estimation and then performs a feasible generalised least squares estimation based on that matrix.

3SLS

As an alternative to SURE, the 3SLS procedure estimates systems of equations where the dependent variables are both considered as endogenous. As in SURE, the error term is correlated with the dependent variables -- endogenous in the 3SLS framework -- violating the standard assumption of OLS. Since one of the explanatory variables acts as dependent in the other equation and vice-versa, the error terms are expected to be correlated among equations.

The technique involves using the IV approach to produce consistent estimates and the GLS method to account for the correlation structure in the disturbances across equations.

For an application of simultaneous equation systems to growth, see Alesina *et al.* (1992), Fagerberg *et al.* (1997), Block (1999) and Fan *et al.* (2000).

132. The SURE estimates are reported in columns 1 and 2 of Table 5.1, and three-stage least squares (3SLS), are reported in columns 3 and 4. Estimation takes place on the basis that growth is influencing the level of social expenditure at the same time that social expenditure is influencing growth. In each case the results indicate a well-specified model. The coefficients on the standard set of variables in the growth equation behave as in the baseline model (see Annex 4). The coefficient on the inequality variable in the redistribution equation is positive and significant. The estimated coefficients on growth and redistribution are both negative and significant. The Chi squared statistic in the SURE estimator shows that what is being found is not just 'noise' -- there is a genuine relationship between social expenditure and growth which goes in both directions. Finally, the results of the two techniques are very similar, suggesting that the results are quite robust.

Table 5.1: Social expenditure, market income inequality and growth: a simultaneous equation approach

5.3 Interpreting the results

133. In the light of the results from Section 3 showing that social expenditure can reduce growth, the hypothesis tested in this section was whether social expenditure itself in turn depended on market income inequality and the rate of growth. The results show that the data is consistent with (but does not prove the

validity of) the argument that a wider market income distribution leads to more redistribution which in turn reduces growth.

134. In particular, the coefficients on the parameters suggest that if the gini coefficient on market income increased from 0.42 to 0.43, the associated rise in social expenditure would eventually be of the order of 2 per cent of GDP. On the other hand, if a country grows 0.1% of GDP more rapidly every year than previously, the eventual level of social spending will be over 2.5% of GDP lower than it otherwise would have been. And finally, each 1% increase in social expenditure as a percentage of GDP is associated with a reduction in eventual GDP per working age population of 0.6% (a similar order of magnitude to the estimates made using the PMG technique reported in section 3).

135. Note that this interpretation, if true, provides an additional explanation of why *active* spending might be growth-enhancing. The traditional argument is that labour supply be enhanced by such spending, so directly affecting growth. In addition, the estimates reported here suggest that if such active spending is effective, the distribution of market income is narrowed, so reducing the demand for redistribution. Increased active spending *indirectly* promotes growth by reducing the demand for redistribution to offset an unacceptably wide distribution of market income.

136. The consequences of this interpretation of the results may at first sight seem somewhat confusing. A narrow distribution of market income is good for growth because it reduces the demand for redistribution. But the main government policy for reducing income inequality -- redistribution -- is bad for growth. As Rodrik (1998) says: "While equality is good for growth -- if equality is inherited or as a result of historical or exogenous factors -- policies that aim at achieving more equality are bad for growth". In practice, what is meant is that measures which redistribute market income are bad for growth, but measures which encourage a narrowing of the distribution of income before taxes and transfers may be good for growth.

137. However, the data are only consistent with this argument. They do not prove it, and other interpretations of the results are possible. In particular, more social expenditure may substitute for market income. For example, if there is a reasonably generous publicly-provided pension, individuals will not accumulate private wealth to finance their retirement (see OECD 1998, 2000a). Similarly, high rates of benefit payments may cause behaviour to change which leads to fewer people in work. In each case, market income inequality will increase (as well as growth rates falling). In other words, the causal connection would not be: *market income inequality causes high social spending which reduces growth*, but rather *high social spending causes market income inequality and reduces growth*.

138. Obviously this second interpretation of the results would lead to very different policy conclusions from the first interpretation. It would mean, for example, that 1% GDP of social expenditure reduces eventual GDP by 0.6%, and increases market income inequality gini coefficient by around half a point. It is not, unfortunately, possible to use the results presented here to say which interpretation fits the data best.

6. CONCLUSIONS

139. When looking at detailed income distribution data over an extended period, the most striking fact is that there has been an increase in market income inequality (almost) everywhere in the OECD. This is

not (only) related to demographic ageing -- the widening of the market income distribution is apparent for the working age population, as well as for the entire population. However, the trend in *final* income distribution is not quite so general. Whilst it is true that the final income distribution has widened in more countries than it has narrowed, at least since the mid 1980s, there are nevertheless counter-examples.

140. The fact that changes in the market income distribution have sometimes been offset by changes in the tax and transfer system reflects either a greater targeting of taxes on high incomes and/or benefits on low incomes, or else there must have been a greater amount of cash transfers. When examining trends in social expenditure it is apparent that the latter of the two effects is at least partly responsible. The trend towards greater social expenditure persists, at least up until the early 1990s. Since then any growth in social expenditure as a percentage of GDP appears to have stabilised.

141. These changes in income distribution and social protection expenditures are not trivial. Over an extended period, income before taxes and transfers has become more concentrated than before, and the government redistributes much more than before. This paper has had as its goal the objective of deciding whether there was any evidence that these changes altered the rate of growth in the economy.

142. The empirical results can be interpreted as follows.

143. How does the final income distribution (after taxes and transfers) affect growth? On the basis of this study, it is not possible to say one way or another. This is not the same thing as saying that there is no effect; still, if there were a strong effect of income distribution on growth (in whatever direction), it should have been apparent in one or more of the approaches tried. At first sight it looks as if evidence is leaning towards a hint of a suggestion that a wider income distribution is good for growth. But on closer analysis, the estimate as a whole explains so little of differences in growth rates across countries and over time that in fact nothing can safely be concluded from the regression. This is true regardless of whether the theory being tested is one which requires looking at the whole income distribution, or just that of the working-age population.

144. How does social protection expenditure taken as a whole affect growth? The balance of evidence is that more social protection expenditure is bad for growth (but see the next point).

145. Does it matter what sort of social spending takes place? The balance of evidence is that it does indeed matter. In a rather crude way, 'active' social spending -- which attempts to change the distribution of market income by promoting the labour market participation of part of the population that would have lower-than-normal market incomes -- was identified. The estimates in this study suggest that more active spending is good for growth, whereas other social spending is associated with lower growth. In other words, on the basis of what is found here, cutting transfer payments might in some circumstances promote growth, but cutting attempts to help the disadvantaged support themselves would reduce growth.

146. So should we conclude that the study supports cutting cash transfers to promote growth? The message is in fact more subtle. Some theories argue that the wider is the distribution of market income, the more likely is the population to wish for redistribution to leave a 'fairer' distribution of final income. As noted in a previous point, redistribution does appear to be associated with lower growth. Hence a wider market income distribution would be associated *indirectly* with lower growth. When tested using simultaneous equation regression techniques which jointly estimate whether a wider market income distribution is associated with more redistribution and whether the resultant redistribution is associated with slower growth, the data is consistent with this theory. To the extent that this is a correct way of interpreting the results, the level of social expenditure is not a pure or exogenous 'choice' variable. It is (at least in part) a response by voters to the level of inequality which would otherwise prevail. Saying that "the estimates show that cutting cash transfers would promote growth" misses the point: voters want

growth, but they want equity too. The way to get both is through shifting the focus of social spending towards active measures, not mindlessly cutting passive expenditures.

147. However, the data is also perfectly consistent with an entirely different view, which *does* support cutting cash transfers to promote growth. High social spending may cause people to change their behaviour, relying on cash transfers from the government rather than generating market income themselves. To the extent that this interpretation of the results is correct, cutting social spending would boost growth but would also *narrow* the market income distribution, as people would work more and save more in response to less generous benefits. Because the approach used here does not permit a choice to be made between the two interpretations on statistical grounds, it leaves a key social and economic policy question unanswered. But both interpretations are consistent with the argument that the dilemma can be lessened by emphasising active, rather than passive, social spending.

148. The policy implications of these results depend to a great extent on the policy freedom which is available to governments. For example, it has been argued that increases in spending on social protection for the elderly is 'crowding out' spending on younger generations (Gruber and Wise, 2001). If some of the expenditure which is 'displaced' is active social spending, then there might be consequences for future growth rates. But there is little room for manoeuvre in changing spending on the elderly, at least in the medium term, because individuals have made their work and savings' decisions over their life on the basis of a particular set of public pension parameters. The 'choice' about the level of spending on the elderly is either hypothetical or very long term.

149. These conclusions are based on estimates using the most reliable data on OECD countries which is available (not just on social protection and income distribution, but also on investment, GDP growth and human capital investment). This makes them the best available estimates, but does not necessarily make them good. In particular, it is not possible to say whether these factors are robust in the presence of other influences on growth which have been found to be important, such as, for example, indicators of entrepreneurial environment, innovation, quality of education, R&D, macroeconomic stability, openness to trade, geographical position, religious affiliation, etc. In other words, all the tentative conclusions given above are based on estimates which do not take into account all these other factors that we think might be important.

150. Finally, it should be noted that all estimates are of the effects of *marginal* changes. To the extent that the estimates presented are considered reliable, they suggest that a bit more active spending is likely to be good for growth, and a bit more passive spending bad for growth. It cannot be concluded that, say, a doubling of active spending would still be good for growth and a halving of passive spending still bad for growth. Common-sense suggests that the former might well result in wasteful spending, and the latter lead to resentment at an 'unfair' distribution of final income.

151. Hence the overall policy conclusion reflects the 1998 social policy ministerial (and in the report *A Caring World: the new social policy agenda*): far from there being any intrinsic contradiction between an efficient dynamic economy and one that places social justice at its core, the achievement of the former requires the latter. However, the best way to achieve the latter is to help individuals and families to help themselves by investing in their capacity to participate in the modern economy, by stressing active, rather than passive, interventions.

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ANNEX 1: SUMMARY OF EMPIRICAL STUDIES

Studies on the link between economic growth, income inequality and social protection

Authors	Period, method, sample and data sources	Dependent Variables	Independent Variables	Results
Alesina and Rodrik (1994)	Period: 1960-1985 and 1970-1985. Method: OLS and 2SLS. Samples: High-quality and low quality samples, 46 and 70 countries. Includes OECD countries and developing countries Sources: some existing data-sets, see Fields (1993) and Persson and Tabellini (1991).	Average per capita growth rate of GDP over the period 1960-1985.	Per capita GDP level in 1960. Primary school enrolment rates in 1960. Gini coefficient of income inequality, in 1960. Gini coefficient of land distribution in 1960. Democracy dummy.	The more unequal the distribution of resources is, the lower is the rate of economic growth. This link is explained by redistributive politics. Significant and negative coefficients are obtained for both Gini variables.
Cashin (1994)	Period: 1971-88 (sub-periods 71-75, 76-80, 81-85). Method: Time-series cross-section estimation using OLS and GIV with one-factor error structure for panel estimation (group dummy variables). Sample: 92 country observations, on 23 developed countries. Data sources: IFS, World Tables, GFS, Summers and Heston and OECD LFS data.	Rate of growth of real GDP per worker.	Average value of change in the stock of public capital as a share of GDP. Natural logarithm of real GDP per worker in 1985 prices. Average rate of social security and welfare expenditure to GDP. Average rate of secondary school enrolment. Average value of each sup-period's current revenue. Average share of total population over 65. Average level of GDP of each sub-period. Average value of each sub-period's interest rate. Average value of CPI in each sub-period.	Increased government spending on those items which enter private production functions enhances economic growth. Example of such spending include transfer payments and public investment. Both of these generate positive externalities raising private investment and growth. Positive and significant coefficients on social security spending. Positive and borderline significant on public investment.
Castles and Dowrick (1990)	Period: 1960-1985 Method: Pooled time-series cross-section. OLS (endogeneity is tested) using controls for investment and employment and period dummies. Sample: 18 OECD countries. Sources: OECD Historical Statistics and National Accounts.	Real per capita GDP.	OECD social expenditure (excluding health and education)	Positive coefficients but not significant (if controlling). With no control: irregular signs and not-significant.

Devarajan et al. (1993)	Period: 1970-1990. Method: OLS. Sample: 69 countries. Sources: IMF GFS.	Moving average of per capital real GDP.	Continental dummy variables. Current net of interest public expenditure over total expenditure. Capital expenditure over total expenditure. Defence expenditure over total expenditure. Health expenditure over total expenditure. Education expenditure over total expenditure. Transportation and communication expenditure over total expenditure. Premium in the parallel market for foreign exchange. Terms of trade, interest rate shocks.	Investigating the relationship between the composition of public expenditure and growth, the authors claimed that a change in the policy mix in favour of productive activities can lead to a higher rate of growth of the economy. The results explained, however, that only current expenditure and some categories of health and education expenditure seemed to play a relevant role, with positive and significant coefficients.
Easterly and Rebelo (1993)	Period: 1970-88 (and 1870-1988). Method: OLS. Cross-section regressions. Sample: 125 (28 countries for the historical estimation), including developed and developing ones. Sources: Summers and Heston (1991), Barro and Wolf (1989), GFS, IFS and Easterly et al. (1993).	Growth rate of per capita GDP Ratio of private investment to GDP	Government expenditure in agriculture, education, health, housing, infrastructure, industry. All as a share of GDP. Investment by general government and public enterprises. Marginal income tax rate. 1960: GDP per capita, primary enrolment and secondary education enrolment rates. 1970-1985: assassinations per million, revolution and coups, war casualties per capita. Ratio of individual income to personal income. Ratio of domestic taxes over (consumption and investment).	(1) The share of public investment in infrastructure is correlated with growth. (2) Budget surplus is also correlated with growth and investment. (3) The link between most other fiscal variables and growth is statistically fragile. (4) High levels of income inequality prior to 1970 were associated with higher levels of public spending in education 70-88.
Gwartney, Lawson and Holcombe (1998)	Period: 1960-1996 and 1980-1995. Method: OLS regression. Sample: 23 OECD countries. Sources: OECD Historical Statistics and OECD Economic Outlook.	Investment as share of GDP Annual rate of growth real GDP	Share of government expenditure in GDP at the beginning of period and change in government expenditure during the period Investment as a percentage of GDP Property rights* Standard deviation of the inflation rate Change in years of schooling 80-95* *: controls for pooled OECD and developing sample	Excessively large government expenditure has reduced economic growth. There is a strong negative relationship between: (1) size of government and GDP growth and, (2) increases in government expenditure and GDP growth.

Hansson and Henrekson (1994)	Period: 1970-87. Method: Cross-country and cross-industry OLS, controlling for investment and employment. Sample: 14 OECD countries. Sources: OECD Historical Statistics.	Real private output in 14 industries.	OECD social security transfers/GDP	Negative and significant effect for subperiod 1965-82.
Keefer and Knack (1995a)	Period: 1960-1985. Method: OLS. Sample: developing countries.	Gini. Land Gini. -Q3, the 3rd quintile of the income distribution.	GDP shares of social security, welfare, government transfers, taxes, expenditures and consumption. Share of public employment.	Consistent signs but generally not significant for the relationships between Gini coefficients or -Q3 and redistribution.
Keefer and Knack (1995b)	Period: 1960-1985. Method: OLS. Sample: developing countries. Sources: Data from International Country Risk Guide (ICRG) and the Business Environmental Risk Intelligence (BERI).	GDP growth 1960-1985. Average ratio of real private investment to GDP over the period 1970-85.	Initial GDP level in 1960. Secondary and primary school enrolment rates in 1960. Share of government consumption in GDP. Frequencies of coups and assassinations. Magnitude of deviation of SH investment deflator from mean.	Property rights are found to have a larger impact on investment and growth than has previously been found. Rates of convergence to US level incomes increase when property rights are included in the regressions.
Korpi (1985)	Period: 1950-73. Method: Time series and cross-section estimated by unweighted OLS measuring total effects and controlling for the share of agricultural labour force. Sample: 17 OECD countries. Sources: ILO Social Expenditure.	Real per capita GDP	ILO Social expenditure/GDP	Positive and significant coefficients.

Kristov and Lindert (1992)	Period: 1960-1981. Method: Pooled time-series and cross-section. OLS (with Prais-Winsten transformation) and GLS (analysis of the simultaneity bias). Sample: 19 OECD countries. Sources: OECD Historical Statistics, OECD Labour Force Statistics, Summers and Heston (1988), OECD National Accounts.	Social transfers (pensions and other social transfers) over GDP	Logarithm of the unemployment rate Logarithm of the share of population aged 65+ Logarithm of real GDP per capita Logarithm of CPI over GDP deflator. Logarithm of change in direct taxes over GDP. Growth rate of GDP per capita. Logarithm ratio of top quintile to middle quintile income. Logarithm ratio of middle quintile to lower quintile income.	The elasticities of real per capita GDP are significant and positive (government spending is a luxury good). Higher rates of growth weaken the will to help the poor (displays a negative and significant coefficient). Age structure and unemployment affect social transfers (significant and positive coefficients). Price-elastic demand for real social transfers (coefficient less than unity but bigger than zero). Progressive transfers are raised by a wider income gap between top and middle and lowered by a wider gap between middle and low. Pension spending is reduced by a widening of distance between top and middle.
Landau (1985)	Period: 1952-76. Method: Pooled time series and cross-section. Estimated using IV corrected for heteroskedasticity. Sample: 16 OECD countries. Sources: OECD National Accounts.	Real per capita GDP growth	Government Transfers/GDP	Positive but non-significant effects, whether using OLS or IV and regardless of including population weights or not.
Lindert (1996)	Period: 1960-1981. Method: OLS. Sample: 19 OECD countries. Sources: OECD Social Expenditure database, IMF GFS and OECD National Accounts.	Logarithm of the ratio of 5^{th} to 3^{rd} quintile of the income distribution. Logarithm of the ratio of $3^{rd}$to 1^{st} quintile of the income distribution.	Shares in GDP of social security expenditure, welfare, unemployment, health and total transfers.	Consistent and mostly significant relationship for the tax/transfer variables and consistent sign but not significant relationship for the education variable. When the author focuses on investment, the signs are positive and significant. "The dead-weight costs of spending, and the taxes behind it, fail to show the predicted upward spiral". The further the middle pre-fisc income ranks from the poor, the lower the political tendency to spend on any major type of social program.

McCallum and Blais (1987)	Period: 1960-83. Method: OLS. Pooled time-series and cross-section analysis. Sample: 17 OECD countries. Sources: OECD Historical Statistics. Method: IV with controls for employment growth.	Real GDP	OECD Social Security Transfers/GDP	Positive and significant coefficients.
Milanovic (1999)	Period: Four 'waves' of data, mid-70s, mid-80s, early 90s and late 90s. Sample: 24 democracies and 79 observations. Method: OLS. Sources: LIS data-set.	Share of the bottom half in the income distribution. Share of the bottom quintile in the income distribution. Share of total disposable income received by the bottom half or bottom 20 percent. Gini coefficient. Middle class gain generated by moving from factor to disposable income. Using: factor income, factor P income (factor income plus pension transfers), disposable income.	Gini for factor incomes. Share of persons older than 65. Share of total factor income received by the 5^{th} and 6^{th} decile of the population.	Greater *factor* inequality is associated with greater gains of the poor and the very poor, through more redistribution. The age variable is not significant. The Gini coefficient has the expected sign and is significant. Depending on the sample used, the gains may be fairly large for the very poor. Redistribution fully compensates for the differences which might exist between the countries at the factor income level. It is greater in societies starting from a more unequal position. The effects of redistribution become less important if pensions are taken out of transfers and treated as factor income. There is no evidence that the median-voter hypothesis describes collective choice.
Nördstrom (1992)	Period: 1979-89. Method: Modelling the total effect using OLS. Cross section. Sample: 14 OECD countries. Sources: OECD National Accounts.	Real GDP growth	Other current transfers item in OECD National Accounts.	Negative and significant coefficients for different specifications.

Perotti (1992)	Period: 1960-85 and 1970-85. Sample: 72 countries. Method: OLS two-equation model in which the endogenous variables are investment and a variable of socio-political instability. Krasker-Welsch robust estimates for 1970-1985. 3SLS for 1970-85. 2SLS for 1970-85. Sources: Alesina-Rodrik and Persson-Tabellini data-sets.	GDP growth, 60-75 and 60-85. Ratio of real private domestic investment to real GDP. Ratio of gross real public investment to real GDP. Nominal government transfer payments as ratio to nominal GDP.	GDP. Primary and secondary school enrolment rates. Share of third and fifth quintiles of the population. Deviation of PPP value from sample mean. Urban population as share of total. Share of population older than 65. Number of revolutions and coups per year. Number of government crises per year. Dummy: government is made up of coalition. Number of political demonstrations against the government. Number of political strikes. Index of political stability.	Government transfers seem to have a positive effect on growth. This finding, obtained by estimating a structural model complements the work of Devarajan et al. (1993) and Sala-i-Martin (1992). Income inequality fuels social discontent, increasing socio-political instability, uncertainty in the politico-economic environment and reduces investment and economic growth. Income inequality and economic growth are inversely related. Socio-political instability is measured using a composite index of political unrest.
Perotti (1994)	Period: 1960-85 and 1970-85. Sample: 72 countries. Method: OLS and 2SLS. Sources: Alesina-Rodrik and Persson-Tabellini data-sets.	Investment to GDP ratio. Share of government transfers in GDP. Measure of socio-political instability.	Degree of imperfection of capital markets (loan-to-value payment of mortgages in 1960). A measure of equality in the distribution of income in 1960 (share of two bottom quintiles). Primary school enrolment ratio. Deviation of PPP from sample mean. Number of revolutions and coups. Investment to GDP ratio. Share of government transfers in GDP. GDP. Share of 65+ over total population.	The results cast doubts on the empirical validity of the endogenous fiscal policy explanation of the relation between income distribution and investment, while the imperfect capital market approach and the political instability explanation receive more convincing support. There is a positive relationship between redistribution and economic growth, sometimes significant. Political instability has a negative and significant effect on investment. When the share of the middle class increases, so does investment (a positive and significant coefficient is found).

Perotti (1996)	Period: 1960-1985. Sample: 67 countries. Method: OLS, Krasker-Welsch robust estimates, WLS, 2SLS and IV. Sources: Perotti (1992, 1994), Persson and Tabellini (1994), Gastil (various years) and Barro and Lee (1993).	Average yearly growth of GDP per capita. Average marginal tax between 1970-1985. Socio-political instability. Net fertility rate, average of 1965 and 1985 values. Female secondary school enrolment ratio.	Share in income of the 3rd and 4th quintiles, 1960. Share in income of the 3rd quintile, in 1960. GDP per capita in 1960. Average years of secondary schooling, in 1960. PPP value of the investment deflator, relative to US, in 1960. Average share of government expenditure on SS, W health and housing, education in GDP, 70-85. Labour taxation, income taxation in GDP. Average marginal tax rate. Urbanisation rate. Share of population older than 65. Education enrolment ratios. Net fertility rate. Life expectancy at birth. Share of population belonging to an ethnic group.	Strong empirical support linking income distribution to socio-political instability and to the education/fertility decision. Borrowing constraints and investment in human capital also received support by the data. There is less support for explanations on the effects of income distribution on fiscal policy.
Persson and Tabellini (1994)	Period: 1960-1985. Sample: cross section of 13 OECD countries. Method: total effect is measured using unweighted IV estimation. Sources: OECD Social Expenditure series.	Real per capita GDP growth	OECD Social Expenditure over GDP (transfers are measured as the sum of pension payments, unemployment benefits/compensation and other social expenditure)	Negative non-significant coefficients.
Sala-i-Martin (1992)	Sample: 74 countries. Method: OLS. Source: Summers and Heston.	Average annual growth rate of per capita GDP taken from Summers and Heston.	Logarithm of initial per capita GDP. Public investment as a share of GDP. Public transfers (share of social security expenditure over GDP). Investment share in GDP.	Positive and significant coefficient of the regression of growth on public transfers and investment. Transfers to the poor, minimum wages, minimum working-age requirements and other types of public welfare serve to keep workers possessing low human capital out of the labour force.

Vanhoudt (1997)	Period: 1985 (to 1991 when possible). Sample: 13 to 15 countries OECD countries (depending on the dependent variable chosen). Method: OLS cross-section regressions. Sources: Deininger and Squire's (1996) dataset on inequality, the Penn World Tables (PWT5.6), OECD Science and Technology Indicators, OECD Job Study, and OECD Employment Outlook.	Log of Gini. Log of quintile 1's income share Log of quintile 5's income share Log of quintile 5's to 1's income share	Log of average investment share in physical capital, 65-91. Log of average investment share in R&D, 75-85. Log of average growth rate of labour force, 85-91. Log of average share of GDP financing ALMPs, 85-91. Log of average share of GDP financing PLMPs, 85-91. Log of average share of GDP (ALMPs + PLMPs). Percentage change in tax wedge, 85-91.	Spending on LMPs does not have a significant effect on the Gini coefficient but it does affect other measures of inequality. Spending on ALMPs significantly improves the income share at the bottom at the expense of the top. The tax wedge has a significant effect on inequality in all the estimated regressions.
Weede (1986)	Period: 1960-1982. Sample: OECD. Method: pooled time series and cross-section. OLS. Total effect, controlling for share of labour force in agriculture. Sources: OECD Historical Statistics.	Real GDP. Real per capita GDP.	OECD social security transfers/GDP.	Negative coefficients with strong effects.
Weede (1991)	Period: 1960-1985. Sample: 19 OECD countries. Method: pooled time series and cross-section. Total effect, controlling for share of labour force in agriculture and length of democratic period. OLS. Sources: OECD Historical Statistics.	Real GDP Per capita GDP Per worker GDP	OECD social security transfers/GDP.	Relatively strong negative effects.

ANNEX 2. THE MODEL

A2.1 The growth model

152. As noted in section 1, the empirical model proposed by Solow (1956) and Swan (1956) and its 'augmented' version embodying human capital as a factor of production as suggested by Mankiw, Romer and Weil (1992) -- henceforth, MRW -- has become the benchmark for most empirical work analysing the determinants of economic growth (see Temple (1999)), provideing a simple theoretical framework for growth regressions.

153. This theoretical framework is built around a constant returns to scale technology. Production in the economy is described by a Cobb-Douglas production function with three factors of production: capital, labour and human capital, and an exogenous rate of technological progress equal across countries: [29]

$$Y_{i,t} = K^{\alpha}{}_{i,t} \cdot H^{\beta}{}_{i,t} \cdot \left(A_{i,t} L_{i,t}\right)^{1-\alpha-\beta} \qquad (1)$$

where $Y_{i,t}, K_{i,t}, H_{i,t}, A_{i,t}, L_{i,t}$, are output, capital stock, human capital, an efficiency factor, and labour input, respectively. Indices *i* and *t* refer to country and time. The parameter α is the capital share in the production function and β is the elasticity of output to human capital.

154. While technical efficiency is assumed to grow at the same exogenous rate across countries, γ, the labour force grows at different rates, n_i. The initial level of efficiency, A_0, is assumed to vary randomly across countries, and this is used to justify the error term (Temple, 1999).

155. From the production function, and assuming that there are decreasing returns to all capital, i.e. that $\alpha + \beta < 1$, the system of equations can be solved to obtain the steady-state values of physical and human capital, k^* and h^*. Substituting these values into the production function and taking logarithms, gives an equation showing how the steady-state level of income per capita depends on the rate of growth of the population and the accumulation of physical and human capital.

156. The Solow model makes predictions not only about the steady state level of output but also about the speed of convergence to that steady state. Approximating around the steady state, an equation for the speed of convergence of output per worker can be obtained, where this speed of convergence depends on the difference between the steady-state level and its current level. Linearising the equation and substituting for the steady-state level of output per worker using the steady-state path from the equation in levels gives a relationship in which output per worker (defined as $y_{i,t} = Y_{i,t} / L_{i,t}$) evolves according to the following equation in the neighbourhood of the steady state:

29. The presentation of the model follows closely the setup of MRW and its multi-country versions by Brandolini and Rossi (1998), pp. 84-86, and Temple (1999), pp. 121-123. For a detailed derivation of the model equations, see MRW, pp. 416-418, and Appendix 1 of Bassanini *et al.* (2001), pp. 51-52.

$$\ln(y_{i,t}) - \ln(y_{i,t-1}) = \phi_{i,t-1} \cdot \ln A_{i0} + \gamma t - \phi_{i,t-1} \ln y_{i,t-1} - \phi_{i,t-1} \frac{\alpha+\beta}{1-\alpha-\beta} \ln\left(n_{i,t-1} + \gamma + \delta\right) + \phi_{i,t-1} \frac{\alpha}{1-\alpha-\beta} \ln s^{k}{}_{i,t-1} + \phi_{i,t-1} \frac{\beta}{1-\alpha-\beta} \ln h_{i,t-1} \quad (2)$$

where $\phi_{i,t-1} = \left(1 - e^{-\lambda_{i,t-1}}\right)$; the rate of convergence to the steady-state is $\lambda_{i,t-1} = \left(n_{i,t-1} + \gamma + \delta\right)(1-\alpha-\beta)$; $s^{k}{}_{i,t-1}$ denotes the propensity to accumulate physical capital of country *i* at time *t-1*; $h_{i,t-1}$ its stock of human capital; $n_{i,t-1}$ is the rate of growth of the population; and δ is the common rate at which physical capital depreciates.

157. In sum, in this standard growth model, the difference between steady-state output per capita and its current value drives future growth and induces conditional convergence toward the steady-state equilibrium path, the latter given by a linear function of the population growth rate, proxies for the investment rates in physical and human capital, and a time trend. Hence, growth depends on various standard variables: the initial level of income, the rate of investment, a proxy for human capital and the rate of growth of the population. In addition, the 'augmented' version allows for it to depend on an additional set of variables -- in this study, these variables capture the extent of spending on social protection and inequality (see Brandolini and Rossi (1998) and Forbes (2000) for an augmented specification including measures of inequality as independent variables).

158. Testing the model empirically entails estimating the following baseline growth equation: [30]

$$\ln(y_{i,t}) - \ln(y_{i,t-1}) = \alpha_i + \eta_t + \beta_1 \cdot \ln\left(y_{i,t-1}\right) + \beta_2 \cdot \ln\left(n_{i,t-1}\right) + \beta_3 \cdot \ln\left(s^{k}{}_{i,t-1}\right) + \beta_4 \cdot \ln\left(h_{i,t-1}\right) + \sum_{m=5}^{n} \beta_m \ln\left(\Omega^{m}{}_{i,t-1}\right) + u_{i,t} \quad (3)$$

where α_i and η_t denote the country dummies and the period dummies, respectively, and $u_{i,t}$ is the error term. The term $\Omega^{m}{}_{i,t-1}$ denotes the set of possible variables which 'augment' the baseline specification of the model. In this study, these variables are different measures of inequality and social protection spending.

A2.2 The estimation techniques

Cross-sectional OLS and Fixed Effects

159. In a panel data set, a given sample of countries is observed at different time periods and thus provides multiple observations on each country in the sample. While the most common approach to estimating growth regressions on such a dataset is to use the OLS technique -- OLS constrains all estimated coefficients to be equal across countries (exploiting solely the cross-sectional nature of the sample) -- the fixed effects model captures any non-measured differences between countries that do not change over time

30 . A more complicated structure including short-run dynamics is specified for the Pooled Mean Group and Arellano-Bond estimations which run using annual data. See below for more details.

by allowing intercepts to differ across countries (even if constraining all other coefficients and error variances to be equal). [31]

160. The usual approach to estimating a fixed effects regression on equation (3) entails transforming the data-set by splitting it into three ten-year sub-periods. This is done with a view to substituting for the lagged dependent variable, aiming at reducing the correlation between the error term and the explanatory variables.[32] For that purpose, averages were taken on the relevant variables (see section 3 below for a description of the necessary transformations of the data). This leaves a sample of 21 OECD countries and three points in time (1970s, 1980s and 1990s).[33]

161. Estimating equation (3) as a cross-section regression entails running an OLS estimation on that equation. The fixed effects estimation procedure estimates the following reduced form of equation (3):

$$\left(y_{i,t} - \bar{y}_i\right) = \left(X'_{i,t} - \bar{X}'_i\right)B + \left(u_{i,t} - \bar{u}_i\right) \qquad (4)$$

where $\bar{y}_i = \sum_t y_{i,t} / T_i$, $\bar{X}'_i = \sum_t X'_{i,t} / T_i$ and $\bar{u}_i = \sum_t u_{i,t} / T_i$; *y* is the dependent variable, *X* stands for the matrix of independent variables and B is the vector of parameters. The procedure amounts to estimating euqation (4) via OLS.

Two-stage least squares.

162. The two stage least squares technique is based on the use of instrumental variables (IV). It is useful when applying OLS to an equation yields inconsistent parameters due to the fact that the endogenous variables and the error term are correlated. This can be the case because, for instance, the independent variables may be dependent variables in a larger simultaneous system. A 2SLS estimation is a regression of the dependent variables on a set of instrumental variables, these being any independent varaibles useful for predicting the dependent regressors. 2SLS gives consistent estimates by 'purging' the endogenous variable of the component correlated to the error term with the use of IV and then re-estimating the model using OLS. Let $y_1 = Y_1\beta_1 + X_1\gamma_1 + u_1$ be the first equation of a system of two equations which we chose to estimate via 2SLS, where *Y* and *X* are the sets of endogenous and exogenous explanatory variables, respectively.[34]

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31 . The random-effects model also exploits information across periods. Random-effects estimates are more efficient but they produce unbiased estimates only if the country-specific effects are completely unrelated to the set of independent variables, and for that reason fixed-effects models are generally preferred in growth studies.

32 . A slightly more sophisticated version of this approach applies a GLS (generalised least squares) estimator to correct for serial correlation where potentially endogenous variables are instrumented by their lagged values (see, Barro and Sala-i-Martin (1995)). However, this solution is only consistent if the individual effects are 'random' -- correlated over time but unrelated to other regressors. As mentioned above, this is clearly a problem in the presence of a lagged dependent variable.

33 . Some disagree with this approach arguing that the lack of synchronicity in the business cycles of different countries does not necessarily clean ten-year averages from cyclical influences -- see, for instance, Temple (1999) and Bassanini *et al.* (2001).

34 . This explanation follows closely Pindyck *et al*. (1991), pp. 322-324.

163. The first stage entails regressing each of the endogenous explanatory variables on the entire set of exogenous variables as follows: $Y_1 = X_1\pi_1 + X_2\pi_2 + V$. The resulting estimator is $\hat{\pi} = (X'X)^{-1}X'Y_1$, and then the fitted values can be computed for Y_1 as $\hat{Y}_1 = X\hat{\pi}$.

164. The second stage performs an OLS estimation of y_1 on $\hat{Y}_1$ and X_1. The estimated coefficients are the 2SLS estimates of β_1 and γ_1. They can be written as follows:

$$\begin{bmatrix} \hat{\beta}_1 \\ \hat{\gamma}_1 \end{bmatrix} = \begin{bmatrix} Y'_1Y_1 - \hat{V}'\hat{V} & Y'_1X_1 \\ X'_1Y_1 & X'_1X_1 \end{bmatrix} \begin{bmatrix} Y'_1y_1 \\ X'_1y_1 \end{bmatrix} \quad (5)$$

165. 2SLS can be understood as an instrumental variables estimator where the fitted values and the exogenous variables of the first stage are the appropriate instruments.

Generalised method of moments with instrumental variables.

166. The GMM-IV estimator allows to simultaneously addresses the issues of endogeneity and correlated individual effects. and outlined in Box 'Estimation techniques (2)'.[35] In brief, the country-specific effects are eliminated via first-differencing each variable. This allows to get the parameters of interest of the model without making any probabilistic statement about the country effect. The model is then estimated via instrumental variables and not OLS because of the presence of the lagged dependent variable and the fact that the explanatory variables are endogenous. The procedure amounts to estimating equation (6) below via the generalised method of moments (GMM) using all possible lagged values of each of the variables as instruments. The estimator optimally exploits all the linear moment restrictions implied by a dynamic panel data model.

167. The GMM-IV estimator uses $y_{i,1}$ and the stock variables in $X_{i,1}$ as valid instruments for the equation which estimates $(y_{i,3} - y_{i,2})$ on $(y_{i,2} - y_{i,1})$. For the next period, it uses $y_{i,1}$, $y_{i,2}$ the stock and flow variables in $X_{i,1}$ and the stock variables in $X_{i,2}$ in the regression of $(y_{i,4} - y_{i,3})$ on $(y_{i,3} - y_{i,2})$, etc. See Caselli (1996), p. 10 and the Appendix, for a more detailed explanation.

168. The estimated equation is as follows:

$$(y_{i,t} - y_{i,t-1}) = \eta(y_{i,t-1} - y_{i,t-2}) + (X'_{i,t-1} - X'_{i,t-2})B + (u_{i,t} - u_{i,t-1}) \quad (6)$$

where *y* is the dependent variable, *X* stands for the matrix of independent variables and B is the vector of parameters.

Pooled mean group

169. The PMG estimation requires writing equation (3) in a more general form which includes short-run dynamics -- see Bassanini *et al.* (2001) for a detailed presentation of the PMG framework of Pesaran *et al.* (1999) applied to a growth model. The estimated equation is as follows:

35 . See Arellano and Bond (1991), Caselli et al. (1996) and Forbes (2000) for a more detailed description of this technique.

$$\ln(y_{i,t}) - \ln(y_{i,t-1}) = \phi_i \cdot \left(\ln(y_{i,t-1}) + \beta_2 \cdot \ln(n_{i,t-1}) + \beta_3 \cdot \ln(s^k{}_{i,t-1}) + \beta_4 \cdot \ln(h_{i,t-1}) + \sum_{m=5}^{n} \beta_m \ln(\Omega^m{}_{i,t-1}) + \beta_{n+1}\, t + \alpha_i\right) \quad (3')$$
$$+ b_{1,i} \cdot \Delta \ln(n_{i,t-1}) + b_{2,i} \cdot \Delta \ln(s^k{}_{i,t-1}) + b_{3,i} \cdot \Delta \ln(h_{i,t-1}) + \sum_{m=4}^{n} b_{m,i} \Delta \ln(\Omega^m{}_{i,t-1}) + u_{i,t}$$

170. Pesaran *et al.* (1999) present the methodology underlying the PMG estimation in detail. The PMG technique uses both 'averaging' and 'pooling' with a view to separating short-run dynamics from long-run effects.

Simultaneous equation models

171. The SURE technique requires estimating the cross-equation covariance matrix from the residuals of an OLS estimation and then performs a feasible generalised least squares estimation based on that matrix. Using this procedure the efficiency of a simultaneous equation estimation can be improved if cross-equation correlations are taken into account. SURE is simply the application of generalised least squares estimation to a model of simultaneous equations in which these variables are considered as a group because there is a close conceptual relationship among them. Formally, estimating a SURE system of equations entails applying generalised least squares estimation to the equations which are related through the nonzero covariances associated with the error terms across the different equations at a given point in time. In sum, the model can be written in shorthand form as $Y = X\beta + u$. According to the assumptions of the SURE model, there is no autocorrelation within equations but cross-equation correlation is indeed present (all information about error covariances is in the matrix Ω, which is diagonal). Generalised least squares (GLS) is applied, obtaining the following estimates: $\hat{\beta} = \left(X'\Omega^{-1} X\right)^{-1}\left(X'\Omega^{-1} Y\right)$. The elements of Ω have to be estimated and this is done applying OLS estimation to the single equations, *i*: $\hat{u}_i = Y_i - X_i \hat{\beta}_i$, where σ stands for the covariance and $\hat{\sigma}_{ii} = \hat{u}_i \hat{u}'_i / N - K_i$ $\hat{\sigma}_{ij} = \hat{u}_i \hat{u}'_j \Big/ \sqrt{(N-K_i)(N-K_j)}$.[36]

172. The 3SLS technique involves using the 2SLS (IV) approach to produce consistent estimates and the SURE (GLS) method to account for the correlation structure in the disturbances across equations.[37] Let $Y = ZB + u$ be the model in shorthand form, *Z* the matrix representing both the endogenous and exogenous variables and *X* the matrix representing only the exogenous variables. The underlying assumption is that the error terms are correlated.

173. The first-stage of the procedure involves building a set of instrumented variables for the endogenous variables in the system. For that purpose, OLS regresions of *each* endogenous regressor in the simultaneous equation model on all the exogenous variables are performed and predictions are obtained as follows: $\hat{z}_i = X\left(X'X\right)^{-1} X' z_i$. The instruments are built on the basis of the actual values for the exogenous variables and first-stage predictions for the endogenous variables.

36 . See Pyndick *et al.* (1991) for a more detailed derivation of the estimation technique.

37 . See Greene (1997) for further information on the method.

174. The second step involves performing generalised least squares, forming the following estimator for the parameters of the system of simultaneous equations: $B = \left[\hat{Z}'\left(\Sigma^{-1} \otimes I\right)\hat{Z}\right]^{-1}\hat{Z}'\left(\Sigma^{-1} \otimes I\right)y$. For that purpose, a consistent estimate of Σ must be obtained.

175. The third step involves obtaining this estimate from the residuals of 2SLS estimates of each equation in the simultaneous system along the lines presented above. The 3SLS estimates of the parameters are as follows: $\hat{B} = \left[\hat{Z}'\left(\hat{\Sigma}^{-1} \otimes I\right)\hat{Z}\right]^{-1}\hat{Z}'\left(\hat{\Sigma}^{-1} \otimes I\right)y$.

A2.3 The data

176. Table A2.1 below presents the descriptive statistics for the final annual sample, 1970-1998, including 21 OECD countries. Further details on data used can be found in sections 2-4 above.

Table A2.1: Descriptive Statistics

ANNEX 3. THE BASELINE MODEL AND A SENSITIVITY TEST ON SOCIAL EXPENDITURE

A3.1 The baseline model

177. The MRW version of the neo-classical model predicts a negative relationship between the catch-up variable (the initial level of GDP per capita) and growth, implying that countries which start poor grow more quickly. Second, because the capital-labour ratio in the neoclassical model is positively related to the rate of investment and negatively related to population growth, a positive sign is expected on the investment variable and a negative one on the rate of growth of the population. Third, one should expect a positive coefficient on the human capital variable because it is treated as just another factor of production in the MRW approach, hence more human capital means more output. See Annex 2 for details.

178. Table A3.1 presents the results of estimating the baseline model *à la* MRW. Columns 1 and 2 report the estimated coefficients using OLS on the two cross-section samples -- with and without the 1990s -- based on ten-year period averages. Although only the catch-up variable is significant when examining the full time-period, the regressors are jointly significant in all the OLS specifications -- in other words, although individually not terribly informative, taken together this set of variables does indeed 'explain' some part of the differences in growth rates over time and across countries. The coefficients have the signs predicted in the MRW theoretical approach, and indeed are similar to those which MRW found for OECD countries in their empirical estimates (Mankiw et al. 1992): in general, the catch-up effect is negative and so is population growth while the investment and the human capital variables enter the equation with a positive sign.[38] Excluding the 1990s, population growth becomes significant as well and has the expected negative sign. The investment and human capital variables are not significant in any of these specifications. It should be noted that in the original MRW regression for 22 OECD countries,[39] the human capital variable was also not significant whilst the investment variable was barely significant at the 10 percent level.

Table A3.1: The baseline model

179. Columns 3 and 4 provide the estimated equations using the fixed-effects model. Over the whole sample period, only the catch-up variable is significant (and has the expected negative sign). However, if the 1990s are excluded from the equation (so matching the time period of the original MRW empirical results), the investment and the human capital variables become positive and significant and the estimated coefficients are of similar magnitude to those reported in MRW. It seems that the 1990s are 'different' from previous periods.

38. In order to check for consistency of the dataset used in this paper with the one underlying the work of MRW, some additional regressions -- not reported in this paper -- were run transforming the variables of the dataset using exactly the same definitions as in MRW. The only difference being that the period used in the original MRW estimations was for 1960-1985 while the one used for these regressions was 1970-1990. The results are strikingly similar, except for the fact that the population variable is not significant in this paper, although it has a negative coefficient. The estimated coefficient on the human capital variable is still positive and insignificant (.17) and the one on the investment variable is positive and significant at 10 percent (.18) albeit lower than the one reported in MRW for the period 1960-85 (.33).

39. See column 4 of Table V in page 426 of Mankiw et al. (1992).

180. Columns 5 and 6 show the results obtained when estimating the baseline model using GMM Instrumental Variables on the sample of annual data. As described in section 3, the main advantage of this technique is that it addresses both the issues of endogeneity and correlated individual effects. However, this is so only when a key assumption underlying the estimation procedure is satisfied: the absence of first-order serial correlation in the error term. If serial correlation is present in the model specification, business cycle effects bias the resulting estimates. In that case, separating the short-run dynamics from the long-run effects -- using, for instance, the Pooled Mean Group estimation technique -- may prove useful.

181. The Sargan test and the *m2* statistic reported in Table A3.1 test for the absence of serial correlation in the GMM-IV model. While the Sargan test suggests that this is not a concern in the models, the *m2* statistic conflicts with this view.[40] As Arellano and Bond (1991) argue, Sargan's test may be less meaningful than the *m2* statistic if errors are heteroskedastic. Since the growth model is prone is to have heteroskedastic errors -- as pointed out by Caselli *et al*. (1996) and Forbes (2000), among others -- the latter statistic seems more appropriate. It should be noted that in all other model specifications where GMM-IV results are presented in this paper, both the Sargan and *m2* tests point to the absence of serial correlation.

182. The last two columns of Table A3.1 present the results of estimating the baseline model using a Pooled Mean Group (PMG) technique on the sample of annual data for the period 1970 to 1998. The PMG approach models short-run dynamics, so overcoming the potential business cycle problem identified by the *m2* statistic when using the GMM-IV technique. The estimated coefficients are all significant and display the predicted signs as outlined above. The coefficient on the investment variable (0.28) is of a similar order of magnitude to the one reported in MRW (0.33) but the estimated coefficient on the catch-up variable is smaller (-0.15 instead of -.40). These differences may be due to both the choice of a different period and the fact that the standard cross-sectional (OLS) approach has some widely acknowledged flaws (see section 2). The coefficients on the population growth and the human capital are not directly comparable -- the definition of population growth is different in the MRW framework and the PMG one (see the footnote to Table A3.1). Furthermore, the estimates reported here use average number of years of schooling as the human capital variable, this being a much better measure than the percentage of the working-age population in secondary school used in the MRW estimations. All estimated coefficients are significant and have the signs predicted by MRW, except for the one on the investment variable along the lines of the OLS and FE specifications in columns (1) to (4).[41]

A3.2 A sensitivity test on social expenditure

183. Table 3.4 presented the results of testing the hypothesis that social protection expenditure affects growth, adding the various possible ways of measuring total social expenditure to the basic MRW model. As described above, the dataset underlying Table 3.4 puts together two different series of social expenditure data. Albeit data is available for every year since 1980, a possibly less reliable but still useful data set allows to expand the data back to 1970. Thus, more powerful econometric analysis than the fixed effects model can be used, such as the PMG and the GMM-IV estimation techniques.

184. Table A3.2 presents the results of performing various sensitivity tests on the models in Table 3.4: excluding the 1990s, reflecting the fact that the baseline model gives much less satisfactory results when the 1990s are included; excluding the 1970s; and estimating the models using the GMM-IV technique

40 . The null hypothesis in both these tests is the absence of serial correlation. The Sargan test requires that the error terms are i.i.d. (independently and identically distributed).

41 . As opposed to OLS and FE, the estimated coefficients on population growth and human capital are significant when using GMM-IV.

rather than the PMG. Column (1) gives the results for the baseline model calculated using the PMG approach for the sample 1970-1998; Column (2) presents the estimated coefficients when the equation is augmented by total social expenditure and restricted to the period 1970-1989, column (3) shows the results using for the same measure for the same period but adjusted to exclude expenditure on health. Columns (4) and (5) present the same variables as in columns (2) and (3) but excluding the 1970s instead of the 1990s. Columns (6)-(8) of Table A3.2 use exactly the same data, but estimate the equations using the GMM-IV approach on the sample of annual data. Column (6) presents the baseline model for the period 1970-1998, estimated via GMM-IV. Columns (7) and (8) present the results for social expenditure and social expenditure excluding health, restricting the sample to leave out the 1990s.

185. The general conclusion from this sensitivity analysis is that the results obtained over either of the shorter periods were generally not significantly different from those obtained over the long period time periods. The models perform well and the basic variables are individually significant and have the expected sign. [42]

Table A3.2: The effects of different time periods on aggregate social expenditure

42 . In the GMM-IV estimations of columns (6) to (8), the basic set of neoclassical variables is, again, significant with the exception of the investment variable. The social expenditure variable comes out as positive, but insignificant in both specifications. However, the *m2* statistic suggests that there may be serial correlation, suggesting that the PMG results may be more reliable in this particular case. Notice, however, that this is less clear-cut when the sample excludes the 1990s. In that case, the *m2* statistic rejects the null hypothesis of absence of serial correlation only at the 10 percent level.

ANNEX 4. TABLES AND CHARTS

Table 2.1 **Income distribution trends**[a]
Entire population

		Final income distribution				Market income distribution		
		Gini	SCV	MLD	P9/P1	Gini	SCV	MLD
Australia	1970s	0.29	0.33	0.16	4.10	0.35	0.50	0.40
	1980s	0.31	0.36	0.18	4.31	0.43	0.65	0.67
	1990s	0.31	0.37	0.18	3.89	0.48	0.92	0.85
Austria	1980s	0.24	0.20	0.10	2.95	..	..	..
	1990s	0.24	0.21	0.10	3.04	..	..	..
Belgium	1980s	0.26	0.32	0.14	3.28	0.50	1.02	1.04
	1990s	0.27	0.42	0.14	3.24	0.53	1.23	1.12
Canada	1970s	0.30	0.35	0.18	4.47	0.38	0.59	0.44
	1980s	0.29	0.39	0.16	3.87	0.40	0.69	0.47
	1990s	0.29	0.40	0.15	3.71	0.42	0.83	0.54
Denmark	1980s	0.23	0.22	0.10	2.89	0.38	0.64	0.53
	1990s	0.22	0.23	0.09	2.67	0.42	0.67	0.69
Finland	1970s	0.24	0.20	..	3.14	0.34	0.46	..
	1980s	0.21	0.16	..	2.61	0.33	0.40	..
	1990s	0.23	0.24	..	2.75	0.39	0.63	..
France	1980s	0.28	0.34	0.14	3.32	0.45	0.79	0.76
	1990s	0.28	0.40	0.13	3.41	0.49	1.20	0.87
Germany	1980s	0.27	0.35	0.12	3.25	0.43	0.89	1.38
	1990s	0.28	0.32	0.14	3.69	0.44	0.76	0.97
Greece	1970s	0.41	1.03	0.32	6.91	0.45	1.22	0.51
	1980s	0.34	0.56	0.20	4.83	0.43	0.87	0.56
	1990s	0.34	0.57	0.20	4.68	0.45	0.94	0.68
Hungary	1980s	0.29	0.38	0.17	3.58	..	..	..
	1990s	0.23	0.26	0.14	3.40	..	..	..
Ireland	1980s	0.33	0.64	0.20	4.26	..	..	..
	1990s	0.32	0.96	0.17	4.17	..	..	..
Italy	1980s	0.31	0.40	0.17	3.89	0.42	0.75	0.63
	1990s	0.35	0.58	0.24	4.64	0.51	1.19	0.96
Japan	1970s	0.27	..	..	3.20	..	..	..
	1980s	0.25			3.10			
	1990s	0.27	..	..	3.30	..	..	..
Netherlands	1970s	0.23	0.21	0.09	2.68	0.37	0.62	0.43
	1980s	0.24	0.23	0.10	2.77	0.41	0.82	0.58
	1990s	0.25	0.25	0.12	3.15	0.42	0.65	0.60
Norway	1980s	0.23	0.28	..	2.89	0.35	0.34	..
	1990s	0.26	0.31	..	3.00	0.40	0.34	..
Sweden	1970s	0.22	0.17	0.09	2.69	0.40	0.57	0.59
	1980s	0.20	0.14	0.08	2.47	0.41	0.56	0.61
	1990s	0.23	0.22	0.11	2.69	0.49	0.89	0.86
Switzerland	1990s	0.27	0.62	0.26	3.13	0.33	1.23	0.47
Turkey	1980s	..	..	..	6.54	..	..	..
	1990s	0.49	..	..	6.82	..	..	..
United Kingdom	1970s	0.25	0.24	0.11	3.12	0.36	0.49	0.43
	1980s	0.29	0.34	0.14	3.59	0.44	0.72	0.72
	1990s	0.31	0.43	0.17	4.11	0.48	0.92	0.80
United States	1970s	0.31	0.35	..	4.85	0.40	0.61	..
	1980s	0.34	0.43	..	5.65	0.44	0.74	..
	1990s	0.34	0.44	..	5.50	0.46	0.81	..

.. Data not available.
a) See text for definitions.
Source: OECD questionnaire on income distribution.

Table 2.2 **Income distribution trends**[a]
Working age population

		Final income distribution				Market income distribution		
		Gini	SCV	MLD	P9/P1	Gini	SCV	MLD
Australia	1970s	0.28	0.30	0.15	3.79	0.32	0.41	0.31
	1980s	0.30	0.33	0.17	4.32	0.39	0.52	0.53
	1990s	0.29	0.32	0.17	3.89	0.41	0.67	0.60
Austria	1980s	0.23	0.18	0.10	2.90	..	..	..
	1990s	0.23	0.20	0.10	2.98	..	..	..
Belgium	1990s	0.27	0.46	0.15	3.29	0.47	1.02	0.85
Canada	1970s	0.29	0.32	0.17	3.98	0.35	0.50	0.33
	1980s	0.29	0.39	0.16	3.89	0.37	0.61	0.37
	1990s	0.29	0.36	0.15	3.89	0.39	0.67	0.43
Denmark	1980s	0.21	0.20	0.09	2.61	0.32	0.49	0.36
	1990s	0.21	0.20	0.08	2.50	0.36	0.51	0.51
Finland	1970s	0.23	0.20	..	3.05	0.32	0.41	..
	1980s	0.21	0.17	..	2.57	0.31	0.35	..
	1990s	0.24	0.26	..	2.84	0.38	0.61	..
France	1980s	0.27	0.30	0.11	3.17	0.39	0.61	0.39
	1990s	0.28	0.42	0.11	3.35	0.41	0.90	0.35
Germany	1980s	0.26	0.32	0.12	3.15	0.36	0.65	0.75
	1990s	0.28	0.33	0.14	3.72	0.37	0.56	0.54
Greece	1970s	0.41	0.99	0.30	6.45	0.43	1.15	0.45
	1980s	0.33	0.54	0.20	4.52	0.40	0.80	0.46
	1990s	0.32	0.54	0.18	4.29	0.40	0.81	0.49
Hungary	1980s	0.29	0.37	0.16	3.43	..	..	..
	1990s	0.28	0.39	0.14	3.54	..	..	..
Ireland	1980s	0.34	0.66	0.21	4.70	..	..	..
	1990s	0.32	0.95	0.17	4.34	..	..	..
Italy	1980s	0.31	0.40	0.17	3.84	0.39	0.65	0.49
	1990s	0.34	0.59	0.24	4.70	0.46	1.02	0.72
Netherlands	1970s	0.23	0.20	0.10	2.71	0.33	0.49	0.33
	1980s	0.24	0.22	0.11	2.82	0.38	0.66	0.50
	1990s	0.25	0.24	0.12	3.24	0.38	0.53	0.51
Norway	1980s	0.22	0.27	..	2.65	0.29	0.30	..
	1990s	0.25	0.29	..	2.91	0.34	0.31	..
Sweden	1970s	0.21	0.16	0.10	2.57	0.32	0.39	0.33
	1980s	0.21	0.15	0.09	2.62	0.32	0.36	0.32
	1990s	0.25	0.24	0.14	2.63	0.42	0.64	0.62
Switzerland	1990s	0.26	0.47	0.29	..	0.29	0.80	0.33
Turkey	1980s	..	..	..	6.27	..	..	..
	1990s	0.51	..	..	6.69	..	..	..
United Kingdom	1970s	0.24	0.22	0.10	2.97	0.31	0.37	0.28
	1980s	0.28	0.30	0.13	3.65	0.39	0.54	0.53
	1990s	0.30	0.41	0.16	4.06	0.42	0.73	0.61
United States	1970s	0.30	0.32	..	4.41	0.36	0.50	..
	1980s	0.33	0.39	..	5.38	0.40	0.61	..
	1990s	0.33	0.40	..	5.29	0.41	0.66	..

.. Data not available.
a) See text for definitions.
Source: OECD questionnaire on income distribution.

Table 2.3 -- The effects of final income distribution (entire population) on growth
(dependent variable: growth rate of real GDP per working age population in 1993 PPPs)
Ten-year periods -- Fixed-effect estimations [(1)]

	(1) *Baseline*	(2) Gini	(3) SCV	(4) MLD	(5) P9/P1
Catch-up	-0.360	-0.265	-0.224	-0.378	-0.242
	[2.89]**	[1.39]	[1.06]	[1.11]	[1.24]
Population growth	-0.300	0.486	0.017	1.174	0.407
	[0.49]	[0.56]	[0.02]	[1.16]	[0.47]
Investment	0.039	0.056	0.015	0.371	0.040
	[0.33]	[0.31]	[0.08]	[1.33]	[0.22]
Human capital	0.290	0.209	-0.070	0.740	0.221
	[0.94]	[0.38]	[0.12]	[0.86]	[0.40]
Inequality	--	0.428	0.205	0.066	0.288
	--	[1.59]	[2.12]*	[0.43]	[1.61]
Constant	3.020	0.755	2.778	1.204	0.280
	[2.92]**	[0.46]	[1.58]	[0.64]	[0.16]
Observations	62	43	40	32	40
Countries	21	18	17	14	18
R-squared	0.43	0.37	0.35	0.36	0.33
F-test	7.02**	2.35+	1.93	1.47	2.37+

[(1)] All inequality variables are after tax/transfer and include the entire population.

Table 2.4 -- The effects of final income distribution (working-age population) on growth
(dependent variable: growth rate of real GDP per working age population in 1993 PPPs)
Ten-year periods -- Fixed-effect estimations [(1)]

	(1) *Baseline*	(2) Gini	(3) SCV	(4) MLD	(5) P9/P1
Catch-up	-0.360	-0.203	-0.234	-0.454	-0.129
	[2.89]**	[0.86]	[1.04]	[1.35]	[0.57]
Population growth	-0.300	0.352	0.114	1.265	0.527
	[0.49]	[0.37]	[0.12]	[1.19]	[0.58]
Investment	0.039	0.101	0.046	0.440	0.036
	[0.33]	[0.48]	[0.22]	[1.32]	[0.18]
Human capital	0.290	0.123	0.008	0.972	-0.046
	[0.94]	[0.20]	[0.01]	[1.07]	[0.08]
Inequality	--	0.303	0.159	0.009	0.340
	--	[1.13]	[1.62]	[0.06]	[1.89]+
Constant	3.020	2.017	2.563	1.097	1.034
	[2.92]**	[1.04]	[1.32]	[0.52]	[0.60]
Observations	62	39	39	31	38
Countries	21	17	17	14	16
R-squared	0.43	0.24	0.30	0.35	0.33
F-test	7.02**	1.09	1.43	1.31	1.66

[(1)] All inequality variables are after tax/transfer and include *only* the working age population.

Table 2.5 -- The effects of market income distribution (entire population) on growth
(dependent variable: growth rate of real GDP per working age population in 1993 PPPs)
Ten-year periods -- Fixed-effect estimations [(1)]

	(1) *Baseline*	(2) Gini	(3) SCV	(4) MLD
Catch-up	-0.360	-0.454	-0.403	-0.727
	[2.89]**	[2.43]*	[1.98]+	[3.93]**
Population growth	-0.300	-1.585	-1.520	-0.707
	[0.49]	[1.73]	[1.52]	[0.90]
Investment	0.039	0.004	0.035	0.351
	[0.33]	[0.03]	[0.19]	[2.06]+
Human capital	0.290	-0.149	0.113	0.576
	[0.94]	[0.30]	[0.22]	[1.27]
Market Inequality	--	0.450	0.059	0.191
	--	[1.92]+	[0.64]	[2.02]+
Constant	3.020	5.553	3.958	5.192
	[2.92]**	[2.90]*	[2.06]+	[3.16]**
Observations	62	36	36	28
Number of country	21	15	15	12
R-squared	0.43	0.52	0.43	0.74
F-test	7.02**	3.49*	2.37	6.33**

[(1)] All inequality variables are before tax/transfer and include the entire population.

Table 3.1 **Public social expenditure**
Percentage of GDP

	1970	1975	1980	1985	1990	1995	1997
Australia	6.5	11.2	11.3	13.5	14.3	17.7	17.4
Austria	18.4	20.4	22.6	24.3	24.1	26.8	25.4
Belgium	15.4	21.4	24.3	27.1	25.5	27.0	27.2
Canada	10.5	13.7	13.3	16.6	17.8	18.2	16.6
Czech Republic	..	..	..	..	16.8	18.6	19.4
Denmark	20.8	26.3	29.1	27.9	28.5	31.8	30.8
Finland	13.1	16.1	18.5	22.9	24.8	31.2	28.7
France	16.9	18.6	22.9	26.6	26.5	29.3	29.4
Germany	17.8	23.9	23.4	24.3	22.9	27.2	26.6
Greece	9.4	9.0	11.5	17.7	22.0	21.5	22.2
Iceland	..	..	..	..	..	18.6	18.0
Ireland	10.9	15.7	17.6	22.9	19.4	19.3	17.9
Italy	14.7	18.2	18.4	21.4	24.0	26.0	26.9
Japan	5.0	8.1	10.4	11.3	11.3	14.0	14.4
Korea	..	..	..	..	3.6	4.0	4.8
Luxembourg	..	..	24.2	23.7	22.6	24.3	23.9
Mexico	..	..	..	1.9	3.3	7.3	7.9
Netherlands	22.6	29.8	28.5	28.7	29.1	27.0	25.1
New Zealand	11.6	14.8	19.1	19.4	22.5	19.1	20.7
Norway	14.3	17.2	18.5	19.7	26.0	27.6	25.1
Poland	..	..	..	..	16.2	25.1	24.5
Portugal	..	..	11.3	11.6	14.1	17.8	18.7
Spain	..	..	16.3	18.7	20.0	21.5	20.9
Sweden	19.2	24.3	29.8	31.1	32.2	34.3	33.3
Switzerland	9.1	14.5	14.8	15.9	16.3	20.9	22.4
Turkey	..	..	5.3	4.4	7.6	7.7	10.0
United Kingdom	14.9	17.6	18.5	21.3	19.4	22.7	21.1
United States	10.5	14.6	13.5	13.7	14.2	16.4	16.0
OECD[a]	13.8	17.7	19.3	21.4	22.1	24.1	23.5
OECD[a]	..	..	..	..	..	21.5	21.3
European Union[c]	16.2	20.1	22.1	24.7	24.9	27.0	26.2
European Union[b]	..	..	21.1	23.3	23.7	25.9	25.2

.. Data not available.

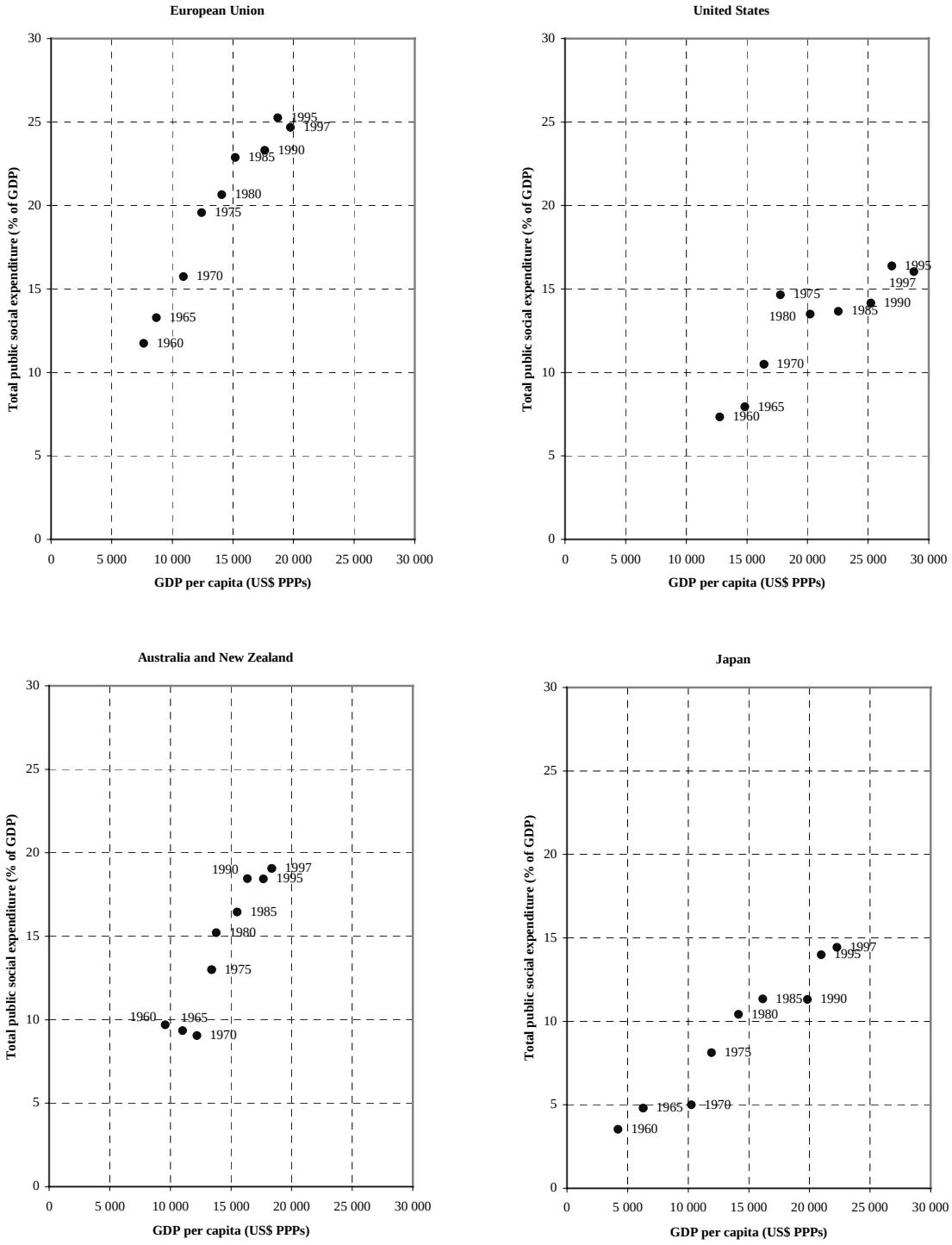
a) Unweighted average, excluding the Czech Republic, Iceland, Korea, Luxembourg, Mexico, Poland, Portugal, Spain and Turkey.

b) Unweighted average.

c) Unweighted average, excluding Luxembourg, Portugal and Spain.

Source: OECD (2000).

Chart 3.1
Public social expenditure and GDP per capita
1960-97



Sources: OECD (2000).

Table 3.2 **Public social spending towards the retired population[a] , 1980-97**
Percentage of GDP

	1980	1985	1990	1995	1997
Australia	3.9	3.7	3.8	5.1	5.1
Austria	11.9	12.8	12.8	13.8	13.4
Belgium	9.4	10.0	9.5	10.4	10.4
Canada	3.0	3.8	4.3	4.8	4.8
Czech Republic	..	..	6.7	6.7	7.8
Denmark	8.6	8.4	9.4	10.5	10.1
Finland	6.5	8.4	8.6	10.5	10.1
France	10.1	11.4	11.6	12.8	13.0
Germany	11.1	11.2	10.5	11.5	11.8
Greece	6.1	9.8	11.5	11.1	11.6
Iceland	..	..	..	6.2	6.3
Ireland	6.0	6.4	5.6	5.0	4.3
Italy	9.2	11.6	13.7	15.5	16.3
Japan	4.1	5.0	5.2	6.5	6.9
Korea	..	..	0.8	1.2	1.3
Luxembourg	10.9	10.2	9.8	10.5	10.2
Mexico	..	0.3	0.6	3.4	4.6
Netherlands	7.4	7.9	7.7	5.8	5.6
New Zealand	8.5	8.4	9.3	8.4	8.0
Norway	6.3	6.6	9.3	9.7	8.9
Poland	..	..	5.9	10.7	10.9
Portugal	4.3	4.7	5.4	7.5	8.2
Spain	6.6	8.0	8.4	9.6	9.8
Sweden	9.2	9.8	10.3	12.3	12.7
Switzerland	6.2	6.4	6.5	7.6	7.5
Turkey	2.0	1.9	3.3	3.8	5.4
United Kingdom	7.4	7.7	7.5	8.2	7.6
United States	6.4	6.7	6.4	6.7	6.6
OECD[b]	7.2	7.9	8.3	9.0	9.1
European Union	8.3	9.2	9.5	10.3	10.3
Non-Europe OECD[c]	5.2	5.5	5.8	6.3	6.3

.. Data not available.

a) Spending on old-age cash benefits, survivors and services for the elderly and disabled.

b) Excluding the Czech Republic, Iceland, Korea, Mexico and Poland.

c) Including Australia, Canada, Japan, New Zealand, and the United States.

Source: OECD (2000).

Table 3.3 **Share-gains of the bottom half of the income distribution**[a]
Working age population

	1970s	1980s	1990s
Australia	0.02	0.05	0.08
Belgium	..	..	0.11
Canada	0.04	0.05	0.06
Denmark	..	0.05	0.08
Finland	0.05	0.06	0.09
France	..	0.05	0.06
Germany	..	0.04	0.04
Greece	0.00	0.01	0.02
Hungary	..	0.08	0.10
Ireland	..	0.09	0.10
Italy	..	0.04	0.05
Netherlands	0.04	0.07	0.07
Norway	..	0.04	0.06
Sweden	0.06	0.05	0.08
Turkey	..	0.01	0.01
United Kingdom	0.04	0.07	0.07
United States	0.04	0.04	0.04

.. Data not available.
a) See text for definitions.
Source: OECD questionnaire on income distribution.

Table 3.4 -- The effects of aggregate social expenditure
(dependent variable: growth rate of real GDP per working age population in 1993 PPPs)

Annual data -- Pooled Mean Group estimations[(1)]

	Entire population			*Working Age Population*	
	(1) *Baseline*	(2) SOCX	(3) (SOCX - Health)	(4) SOCX	(5) (SOCX- Health)
Catch-up	-0.085	-0.147	-0.151	-0.112	-0.126
	[5.52]**	[-4.14]**	[4.36]**	[2.25]**	[2.35]**
Population growth	-15.505	-2.834	-2.811	-6.789	-6.604
	[5.74]**	[-2.89]**	[2.78]**	[9.44]**	[8.66]**
Investment	0.200	0.345	0.319	0.242	0.256
	[3.65]**	[9.54]**	[9.82]**	[6.94]**	[7.48]**
Human capital	0.857	1.280	1.240	1.780	1.723
	[5.96]**	[11.66]**	[11.70]**	[23.51]**	[23.21]**
Social Expenditure	--	-0.134	-0.090	-0.099	-0.037
	--	[-2.57]**	[2.14]**	[2.52]**	[1.56]
Constant	0.674	0.981	1.007	0.635	0.702
	[5.66]**	[4.40]**	[4.60]**	[2.30]**	[2.42]**
Observations	533 (1970-1998)	533 (1970-1998)	533 (1970-1998)	340 (1980-1998)	340 (1980-1998)
Log likelihood	1563	1603	1601	1127	1122
Countries	21	21	21	20	20

[(1)] All PMG estimations include short-run dynamics. The figures presented in this table are the long-run coefficients.

Table 3.5 -- The effects of redistribution
(dependent variable: growth rate of real GDP per working age population in 1993 PPPs)

Ten-year periods -- Fixed Effect estimations

	(1) *Baseline*	(2) Entire population	(3) Working age population
Catch-up	-0.360	-0.143	-0.272
	[2.89]**	[0.58]	[1.15]
Population growth	-0.300	0.053	0.485
	[0.49]	[0.05]	[0.49]
Investment	0.039	0.078	0.099
	[0.33]	[0.35]	[0.45]
Human capital	0.290	0.442	0.114
	[0.94]	[0.73]	[0.18]
Share gain	--	-0.095	-0.352
	--	[1.31]	[1.36]
Constant	3.020	0.066	1.861
	[2.92]**	[0.03]	[0.94]
Observations	62 (1970-1990)	36 (1970-1990)	36 (1970-1990)
Number of country	21	15	15
R-squared	0.43	0.26	0.27
F-test	7.02**	1.15	1.19

Table 4.1 **Spending on active labour market policies, 1980-97**
Percentage of GDP

	1980	1985[a]	1990	1995	1997
Australia	..	0.4	0.3	0.8	0.5
Austria	..	0.3	0.3	0.4	0.5
Belgium	..	1.3	1.2	1.4	1.2
Canada	0.3	0.7	0.5	0.6	0.5
Czech Republic	..	..	..	0.1	0.1
Denmark	0.4	0.9	1.1	1.9	1.7
Finland	1.0	0.9	1.0	1.5	1.5
France	0.5	0.7	0.8	1.3	1.4
Germany	..	0.9	1.1	1.3	1.2
Greece	..	0.2	0.4	0.4	0.4
Iceland	..	..	..	0.1	0.1
Ireland	..	1.5	1.4	1.6	1.6
Italy	..	..	..	1.1	1.0
Japan	..	0.1	0.1	0.1	0.1
Korea	..	..	0.1	0.1	0.1
Luxembourg	0.3	0.5	0.3	0.2	0.3
Mexico	..	0.0	0.0	0.1	0.1
Netherlands	0.7	1.0	1.1	1.3	1.4
New Zealand	0.6	0.9	0.9	0.7	0.7
Norway	..	0.6	0.9	1.3	1.0
Poland	..	..	..	0.4	0.5
Portugal	..	0.4	0.6	0.8	0.7
Spain	0.2	0.3	0.9	0.8	0.6
Sweden	1.2	2.2	1.7	2.4	2.1
Switzerland	0.1	0.2	0.2	0.5	0.8
Turkey	..	0.1	0.0	0.0	0.1
United Kingdom	0.6	0.7	0.6	0.4	0.4
United States	0.2	0.1	0.2	0.2	0.2
OECD[b]	..	0.6	0.7	0.9	0.8
European Union[c]	..	0.8	0.9	1.1	1.1

.. Data not available.
a) 1986 for Portugal and Turkey; 1987 for Japan and Mexico.
b) Excluding the Czech Republic, Iceland, Italy, Korea, and Poland.
c) Excluding Italy.

Source: OECD (2000).

Table 4.2 **Spending on family services and 'Make work pay' [a] policies 1980-1997**
Percentage of GDP

	1980	1985	1990	1995	1997
Australia	0.1	0.1	0.2	0.4	0.4
Austria	0.4	0.4	0.4	0.5	0.6
Belgium	0.1	0.1	0.1	0.1	0.2
Canada	0.0	0.0	0.0	0.6	0.6
Czech Republic	. .	. .	0.0	0.0	0.0
Denmark	1.8	1.7	1.9	2.0	2.2
Finland	0.8	1.1	1.4	1.4	1.4
France	0.3	0.4	0.3	0.4	1.2
Germany	0.5	0.5	0.5	0.8	0.8
Greece	0.0	0.0	0.8	0.7	0.7
Iceland	. .	. .	. .	0.9	1.0
Ireland	0.1	0.1	0.1	0.2	0.2
Italy	0.1	0.1	0.4	0.3	0.3
Japan	0.2	0.2	0.2	0.2	0.3
Korea	. .	. .	0.0	0.1	0.1
Luxembourg	0.2	0.2	0.3	0.4	0.4
Mexico	. .	0.0	0.2	0.3	0.2
Netherlands	0.5	0.4	0.5	0.4	0.2
New Zealand	0.0	0.0	0.0	0.1	0.1
Norway	0.6	0.6	0.9	1.4	1.3
Poland	. .	. .	0.0	0.0	0.0
Portugal	0.1	0.1	0.3	0.3	0.3
Spain	0.0	0.0	0.1	0.1	0.2
Sweden	2.3	2.5	2.5	1.7	1.9
Switzerland	0.0	0.0	0.0	0.0	0.0
Turkey	0.0	0.0	0.0	0.0	0.1
United Kingdom	0.5	0.5	1.1	1.6	1.6
United States	0.4	0.3	0.4	0.6	0.6
OECD [b]	0.4	0.4	0.5	0.6	0.7
European Union	0.5	0.5	0.7	0.8	0.9
Non-Europe OECD [c]	0.1	0.1	0.2	0.4	0.4

.. Data not available.

a) Child tax benefit in Canada, Family Income Supplement in Ireland United Kingdom, and Earned Income Tax Credit in the US.

b) Excluding the Czech Republic, Iceland, Korea, Mexico and Poland.

c) Including Australia, Canada, Japan, New Zealand, and the United States.

Source: OECD (2000).

Table 4.3 **Public expenditure on Health, 1970-1997**
Percentage of GDP

	1970	1975	1980	1985	1990	1995	1997
Australia	2.9	5.1	4.3	5.3	5.3	5.5	5.7
Austria	4.0	4.8	5.3	5.1	5.3	6.4	5.8
Belgium	3.7	4.7	5.4	5.9	6.6	7.3	7.7
Canada	4.8	5.5	5.2	6.2	6.8	6.6	6.2
Czech Republic	..	..	..	..	4.8	6.8	6.5
Denmark	6.8	7.9	8.0	7.4	7.0	6.8	6.8
Finland	4.1	4.9	5.0	5.6	6.4	5.7	5.5
France	4.1	5.2	5.8	6.4	6.7	7.5	7.3
Germany	4.6	6.8	6.9	7.2	6.7	8.2	8.1
Greece	2.2	2.6	3.7	4.7	4.8	4.9	5.0
Iceland	..	..	..	..	..	6.9	6.7
Ireland	3.5	5.3	7.1	6.0	5.0	5.4	5.3
Italy	4.5	5.5	5.6	5.5	6.3	5.4	5.7
Japan	2.8	3.9	4.6	4.7	4.6	5.6	5.7
Korea	..	..	..	..	2.2	2.0	2.5
Luxembourg	..	..	5.7	5.4	5.9	6.0	5.9
Mexico	..	..	..	1.0	1.6	1.8	1.6
Netherlands	4.6	5.3	5.9	5.9	6.1	6.7	6.2
New Zealand	4.8	6.1	6.9	5.6	6.1	5.8	6.3
Norway	4.2	5.9	5.9	5.7	6.5	6.7	6.7
Poland	..	..	..	..	4.8	4.6	4.6
Portugal	..	..	3.7	3.4	4.2	5.1	5.3
Spain	..	..	4.5	4.6	5.4	5.7	5.7
Sweden	6.3	7.1	8.7	8.1	7.9	7.2	7.2
Switzerland	2.9	4.2	4.3	4.8	5.3	6.6	7.3
Turkey	..	..	1.8	1.3	2.2	2.5	2.4
United Kingdom	3.7	4.8	4.9	5.0	5.0	5.8	5.5
United States	2.9	3.8	3.8	4.3	5.1	6.5	6.5
OECD[a]	4.1	5.2	5.7	5.8	6.0	6.3	6.3
OECD[b]	..	..	..	..	..	5.8	5.8
European Union[c]	4.3	5.4	6.0	6.1	6.1	6.4	6.4
European Union[d]	..	..	5.8	5.7	5.9	6.3	6.2

.. Data not available.

a) Unweighted average, excluding the Czech Republic, Hungary, Iceland, Korea, Luxembourg, Mexico, Poland, Portugal and Spain.

b) Unweighted average, excluding Iceland.

c) Unweighted average, excluding Luxembourg, Portugal and Spain.

d) Unweighted average.

Source: OECD (2000).

Table 4.4 -- The effects of active social policies
(dependent variable: growth rate of real GDP per working age population in 1993 PPPs)

Annual data -- Pooled Mean Group estimations [a]

	(1) *Baseline*	(2a) Active	(2b) Active	(2c) Active	(3) Non-active[b]	(4a) Active (2a) and non-active	(4b) Active (2a) and non-active	(4c) Active (2a) and non-active
		ALMPs	(2) + Family Services	(2b) + Health			(Excluding spending on elderly)	(4b excluding health)
Catch-up	-0.220	-0.233	-0.208	-0.105	-0.089	-0.299	-0.316	-0.335
	[2.54]**	[3.60]**	[2.25]**	[1.22]	[1.08]	[4.44]**	[4.33]**	[4.27]**
Population growth	4.056	2.525	2.204	2.262	3.914	3.230	3.969	4.264
	[6.53]**	[3.97]**	[7.97]**	[2.96]**	[7.09]**	[4.91]**	[5.83]**	[5.51]**
Investment	0.202	0.323	0.594	0.385	0.309	0.151	0.211	0.160
	[9.00]**	[14.74]**	[31.68]**	[10.89]**	[11.19]**	[6.28]**	[8.47]**	[6.18]**
Human capital	1.647	1.984	1.198	1.461	1.465	2.468	2.547	2.266
	[20.62]**	[30.98]**	[11.60]**	[12.44]**	[15.92]**	[32.91]**	[32.10]**	[33.60]**
Active spending	--	0.067	0.102	0.008	--	0.065	0.078	0.067
	--	[8.67]**	[5.44]**	[0.22]	--	[10.00]**	[10.57]**	[8.77]**
Non-active spending	--	--	--	--	-0.061	-0.426	-0.351	-0.249
	--	--	--	--	[1.20]	[13.06]**	[12.81]**	[12.80]**
Constant	1.315	1.138	1.208	0.649	0.630	1.554	1.398	1.617
	[2.56]**	[3.53]**	[2.36]**	[1.29]	[1.15]	[4.52]**	[4.35]**	[4.29]**
Observations	204 (1984-1997)	204 (1984-1997)	204 (1984-1997)	204 (1984-1997)	204 (1984-1997)	204 (1984-1997)	204 (1984-1997)	204 (1984-1997)
Log likelihood	688	720	720	726	744	613	610	605
Countries	17	17	17	17	17	17	17	17

[a] PMG estimations of models (1)-(3) include short-run dynamics. The long-run coefficients are reported in this table. Model (4) is estimated as a partial adjustment model. [b] Total social spending-Active spending including ALMPs.

GMM- Instrumental Variables (Arellano-Bond technique)

	(1) *Baseline*	(2) Active	(3) Non-active	(4) Active and non-active
Catch-up	-0.150	-0.211	-0.246	-0.241
	[29.00]**	[6.00]**	[4.24]**	[4.08]**
Population growth	-0.565	-0.519	-0.604	-0.623
	[7.02]**	[3.40]**	[4.00]**	[4.26]**
Investment	-0.002	-0.012	-0.041	-0.046
	[0.14]	[0.25]	[0.68]	[0.71]
Human capital	0.256	0.449	0.737	0.618
	[3.42]**	[1.45]	[1.66]+	[1.41]
Active spending	--	0.010	--	0.018
	--	[1.16]	--	[2.07]**
Non-active spending	--	--	-0.094	-0.103
	--	--	[2.38]**	[2.21]**
Observations	518 (1970-1998)	244 (1980-1997)	244 (1980-1997)	244 (1980-1997)
Wald-test	99.52**	79.52**	16.73**	72.18**
Sargan test	20.69	17.51	16.72	17.35
m2 statistic	-3.051**	-0.883	-0.719	-0.934
Countries	21	19	19	19

Table 5.1 -- The links between income distribution and social expenditure

	Simultaneous Estimation of Growth and social expenditure			
	Ten-year periods SURE estimation[1]		Ten-year periods 3SLS Instrumental Variables[4]	
	(1) SOCX	(2) Growth	(3) SOCX	(4) Growth
Growth	-2.772		-2.893	
	[3.98]**		[2.82]**	
SOCX		-0.114		-0.110
		[2.91]**		[2.08]**
Catch-up		-0.113		-0.103
		[1.45]		[1.21]
Population growth		-0.713		-0.392
		[1.67]+		[0.62]
Investment		0.026		-0.005
		[0.40]		[0.07]
Human capital		0.111		0.083
		[0.83]		[0.62]
Inequality[2]	0.807		0.845	
	[1.96]*		[2.08]**	
Constant	4.163	1.342	4.247	1.383
	[11.07]**	[2.27]*	[12.00]**	[1.89]*
Observations	36	36	27	27
Chi2 test [3]	25.99**			

Absolute value of z statistics in brackets (+ significant at 10%; * significant at 5%; ** significant at 1%)
[1] Zellner's Seemingly Unrelated Regression Estimator.
[2] The inequality variable is the before tax/transfer Gini coefficient for the entire population.
[3] Chi2 statistic testing that the coefficients on the endogenous variables (growth and redistribution) are simultaneously different from zero.
[4] Lagged values of the endogenous and exogenous variables used as instruments.

Table A2.1 Descriptive statistics: annual dataset, 1970-1998

	Mean	Standard deviation	Minimum	Maximum
Growth	1.99 %	2.43 %	-9.20 %	11.28 %
Investment	21.50 %	1.21 %	14.26 %	37.66 %
Human capital	9.97	1.20	5.71	12.94
Population growth	0.80 %	0.63 %	-1.13 %	5.34 %
Total social spending	18.47 %	1.42 %	4.98 %	37.98 %
Gini coefficient before taxes and transfers (*entire population*)	42.0 %	5.1 %	33.1 %	52.7 %
Gini coefficient after taxes and transfers (*entire population*)	27.6 %	4.6 %	20.0 %	41.2 %

Table A3.1 -- Baseline model (dependent variable: growth rate of real GDP per working age population in 1993 PPPs)

	Ten-year periods[1]				Annual data[2]			
	OLS (1)	OLS (2)	FE (3)	FE (4)	GMM-IV (5)	GMM-IV (6)	PMG (7)	PMG (8)
Catch-up effect [3]	-0.203	-0.278	-0.360	-0.635	-0.150	-0.212	-0.081	-0.147
	[2.84]**	[3.71]**	[2.89]**	[4.12]**	[29.00]**	[24.60]**	[5.25]**	[3.91]**
Population growth	-0.231	-0.798	-0.300	-0.934	-0.565	-1.85	-15.703	-9.078
	[0.59]	[2.05]*	[0.49]	[1.74]	[7.02]**	[4.88]**	[5.76]**	[4.88]**
Investment	0.074	0.101	0.039	0.301	0.002	0.027	0.192	0.284
	[1.13]	[1.52]	[0.33]	[1.96]+	[0.14]	[0.92]	[3.50]**	[5.53]**
Human capital	0.065	0.146	0.290	1.046	0.256	0.355	0.856	1.231
	[0.65]	[1.52]	[0.94]	[2.62]*	[3.42]**	[4.00]**	[5.92]**	[8.88]**
Constant	1.854	2.364	3.020	3.245	--	--	0.646	0.988
	[2.77]**	[3.27]**	[2.92]**	[2.38]*	--	--	[5.38]**	[3.89]**
Observations	62 (1970-1990)	42 (1970-1980)	62 (1970-1990)	42 (1970-1980)	518 (1970-1998)	357 (1970-1989)	560 (1970-1998)	399 (1970-1989)
R-squared	0.31	0.50	0.43	0.79	--	--	--	--
F-test	6.55**	9.29**	7.02**	15.54**	--	--	--	--
Wald-test	--	--	--	--	99.52**	47.47**		
Log likelihood	--	--	--	--	--	--	1583	1140
LR statistic	--	--	--	--	--	--	158**	156**
Sargan test	--	--	--	--	20.69	20.28	--	--
m2 statistic	--	--	--	--	-3.051**	-2.946**	--	--
Countries	21	21	21	21	21	21	21	21

Notes:
Absolute value of t-statistics in brackets (+ significant at 10%; * significant at 5%; ** significant at 1%).
[1] The ten-year period growth rates of GDP and population are computed as ((log(y1)/log(y0))^(1/(T1-T0))-1)*100. The annual rates of growth are obtained as log(y1)-log(y0). Hence, the different magnitude of the estimated coefficients.
[2] The PMG equations include short-run dynamics. The figures presented in this table are the long-run coefficients.
[3] The catch-up variable is the initial level of GDP for the ten-year periods and the lagged dependent variable for the annual data.

Table A3.2 -- The effects of different time periods on aggregate social expenditure[1]
dependent variable: growth rate of real GDP per working age population in 1993 PPPs)

	Annual data -- Pooled Mean Group estimations[2]					Annual data GMM Instrumental Variables (Arellano-Bond technique)		
	(1) *Baseline*	(2) SOCX	(3) (SOCX-Health)	(4) SOCX	(5) (SOCX - Health)	(6) *Baseline*	(7) SOCX	(8) (SOCX - Health)
Catch-up	-0.081	-0.211	-0.196	-0.119	-0.129	-0.150	-0.250	-0.258
	[5.25]**	[3.30]**	[5.01]**	[2.17]**	[2.27]**	[29.00]**	[11.74]**	[13.11]**
Population growth	-15.703	-1.993	-3.701	-6.442	-6.157	-0.565	-1.296	-1.109
	[5.76]**	[2.35]**	[3.50]**	[10.04]**	[9.40]**	[7.02]**	[2.28]**	[2.29]**
Investment	0.192	0.345	0.262	0.236	0.255	-0.002	0.058	0.048
	[3.50]**	[5.82]**	[4.56]**	[6.34]**	[7.15]**	[0.14]	[1.30]	[1.27]
Human capital	0.856	1.154	1.026	1.842	1.744	0.256	0.408	0.427
	[5.92]**	[7.65]**	[9.82]**	[21.32]**	[19.54]**	[3.42]**	[2.99]**	[3.55]**
Social Expenditure	--	-0.139	-0.025	-0.158	-0.075	--	0.034	0.029
	--	[3.03]**	[1.04]	[3.14]**	[1.80]*	--	[1.34]	[1.43]
Constant	0.646	1.454	1.410	0.685	0.729	--	--	--
	[5.38]**	[3.46]**	[5.15]**	[2.30]**	[2.34]**	--	--	--
Observations	560 (1970-1998)	361 (1970-1989)	361 (1970-1989)	323 (1980-1998)	323 (1980-1998)	518 (1970-1998)	337 (1970-1989)	337 (1970-1989)
Log likelihood	1583	1094	1095	1077	1075	--	--	--
Countries	21	19	19	19	19	21	21	21
Wald-test	--	--	--	--	--	99.52**	14.58**	17.82**
Sargan test	--	--	--	--	--	20.69	20.64	18.01
m2 statistic	--	--	--	--	--		-2.389*	-2.437*

[1] Social expenditure for the entire population.
[2] All PMG estimations include short-run dynamics. The figures presented in this table are the long-run coefficients.

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