Lars Osberg
Dalhousie University

23

Economic and Social Aspects of Productivity: Linkages and Policy Implications

INTRODUCTION

THERE IS A VERY LARGE LITERATURE ON PRODUCTIVITY, most of which has historically focused on the role played by input accumulation, technical change and factors (such as research and development or entrepreneurship) that are traditionally labelled as subject to influence by economic policy. In recent years, however, the discussion of productivity issues has broadened to include consideration of the potential impacts of inequality, social capital, health, education and other societal aspects that have conventionally been viewed as the domain of social policy. Hence, joint consideration of social and economic aspects of productivity is increasingly recognized as important. But since originally the reason for separate consideration of these issues was the complexity of their interactions, joint consideration is far from straightforward.

In this chapter, our task is to review the papers of Harris (2001) and Sharpe (2001), pull together the main findings, integrate the results of other Canadian and international researchers, and identify research gaps in this area. The chapter therefore begins by asking how productivity should be defined, before proceeding to a consideration of Harris' and Sharpe's papers, and then asking: i) What is missing from standard analyses of productivity? and ii) How should one incorporate social concerns in an analysis of productivity?

WHAT IS PRODUCTIVITY?

PRODUCTIVITY IS SOMETIMES DEFINED IN VAGUE, or even circular terms. The *Concise Oxford Dictionary*, for example, defines productivity as: "Capacity to produce; quality or state of being productive; production per unit of effort; effectiveness of productive effort."[1] The *Houghton Mifflin Dictionary* is at least fairly clear about *what* is being produced, defining productivity as "... of or involved in

the creation of goods and services to produce wealth or value." A similar focus on goods and services is apparent in the work of Harris (1999, p. 2), who defines productivity as "A measure of how effectively the economy's resources are translated into the production of goods and services." However, Barrell, Mason and Omahony (2000, p. 3) take a more general view: "We would define (productivity) to mean output per unit of productive input."

Leaving aside the frequent use of qualifiers such as *productive* in the definition itself, productivity is certainly about the effectiveness of the process that creates goods and services. However, there is nothing in these definitions that necessarily restricts the idea of output to those goods and services sold in formal markets. And although, in practice, attention is often restricted to marketed goods and services, there is a certain vagueness in many definitions about what is being used up in the process — an imprecision reflected in the continuing controversy over whether labour productivity or multifactor productivity is the appropriate subject of analysis. In the more general definitions, productivity is about the ratio of outputs to inputs. Perhaps because this approach invites questions about what to label as an output and what to consider an input, economic discussions of productivity often restrict attention to outputs that can be exchanged for cash in market transactions — the goods and services counted as part of Gross Domestic Product (GDP). However, even in this case an accurate specification of the inputs used up in production is essential if changes in the level of productivity are to be correctly gauged.

In theoretical discussions of productivity, the assumption is often made that all inputs and outputs of the productive process have market prices that are determined in perfectly competitive markets, without externalities. In this case, the aggregate private and social values of outputs and inputs are identical and can be obtained by summation of the market values of inputs and outputs. However, in the section entitled *Social Issues and the Measurement of Productivity*, we argue that if one is to be concerned with the real world, one must take seriously the possibility that some inputs[2] in the productive process may not have market prices.

In the same section, we return to the distinction between output and inputs of goods and services and of *marketed* goods and services. For now, it suffices to note that Harris and Sharpe differ in their basic conception of what it is that society wants to maximize. Harris focuses solely on GDP and the role that social policy may or may not play in retarding or speeding the rate of growth of GDP per capita. Sharpe, on the other hand, has the idea that policy makers may want to maximize economic well-being, which is a broader concept than GDP per capita.

HARRIS: SOCIAL POLICY AND PRODUCTIVITY GROWTH

WHAT IS THE OVERALL LINK BETWEEN INEQUALITY AND PRODUCTIVITY?

AS HARRIS (2001, p. 5) PUTS IT: "My main conclusion is a non-conclusion." Although there is a long history of arguments about the connection between productivity (in the sense of GDP per capita) and various measures of the extent and outcomes of social policy, the *general* case remains unproven. Some have argued that greater inequality and a diminished role for the welfare state would encourage productivity growth, while others have defended the reverse proposition. In the 1970s, the dominant view in economics was that an equity /efficiency trade-off existed, but in the 1990s it was noticed that, in many cases, more equal societies had higher rates of growth than unequal nations.[3] Since the late 1980s, a variety of theoretical models have been used to explore the arguments in favour of the complementary role of the state in social and economic policy — particularly the endogeneity of economic growth to investments in human capital, when poor parents and imperfect capital markets would otherwise imply an underinvestment in the skills of poor children.[4]

However, it is asking enormously from the data to expect cross-country regressions to resolve this issue with any finality. The data are highly imperfect and the sample size is small. It is not clear what structural process is relevant and how it can be estimated. Theory does not provide a satisfactory guide as to functional form, and non-parametric methods are susceptible to differing interpretations.[5] Even if one could get straight answers to general questions, it is not clear how that would assist decision-making on particular policy issues. Hence, a non-conclusion is quite reasonable.

Authors who want to do an econometric examination of the relationship between inequality, or the welfare state, and an outcome such as GDP growth or productivity must choose a sample of countries and a set of statistics to summarize inequality or the welfare state. In addition, the choices made regarding the estimation technique, functional form, control variables and measures of productivity are important. In practice, inequality statistics are reliable and frequent only for a limited number of high-income countries, and even then rarely extend before 1950. Hence, the only way an econometrician can get a reasonably large data set is to pool together developed and developing countries.

However, it takes some courage to argue that regression results dominated by the measured inequality in countries such as Pakistan or Chad have much relevance for the policy choices of a country like Canada. Not only do we know that the measurement of inequality in developing countries raises a daunting number of statistical problems, but we have good reason to believe that economic development is all about structural and institutional change, and the

processes that determine productivity growth are highly likely to change as development occurs.[6] When one restricts attention to the twenty or so OECD countries that do have reliable statistics on the distribution of income over a significant period of time, one is left with very few degrees of freedom to control for the multiplicity of influences on productivity, the varying time lags of their influence, and the reciprocal causation and simultaneity of economic and social processes. As Harris notes, empirical growth regressions are very sensitive to the set of explanatory variables used. Some processes (like tax policy) may have an impact within a few years while others (such as education) influence flows at the margin and only affect the stock of human capital slowly, as new cohorts enter the labour market and older cohorts retire. Correlation is not causation, and one can often tell a story either way — perhaps higher income growth countries buy more nice things like education and income equality, and perhaps more income equality and education enable more rapid growth.

Harris could also have noted that it is not entirely clear whether country fixed effects should be differenced out (as per Forbes, 2000), or whether they are at the heart of the issue. Business cycle effects on both inequality and social spending are also viewed as important, and business cycles are correlated to some degree across some OECD countries, so country/year observations are not independent.

Furthermore, a continuing annoyance to those who have studied economic inequality is the fact that the recent inequality/growth literature has been dominated by macro-econometricians who appear to have no knowledge of the complexity and ambiguity inherent in the measurement of inequality. Although Atkinson's seminal article of 1970 pointed out that differing summary measures of inequality (such as the Gini index, the Theil ratio, coefficients of variation, etc.) emphasize different parts of the distribution of income, and are therefore frequently at odds in the inequality ranking of countries, the subsequent extensive literature on inequality measurement has been largely ignored by macro-econometricians of the growth/inequality genre. In the literature on inequality,[7] a great deal of attention is paid to which income concept is used, the time period over which income flows are calculated, the definition of the recipient unit, and the social welfare and ethical properties of the summary statistics chosen. These measurement issues matter a lot. Country rankings do change, depending on measurement choices.[8] But the current crop of macro types charge on in ignorance.[9]

Moreover, some of the proposed models for the interaction of inequality and growth/productivity are much more relevant for some measures of inequality than others.[10] If the propagation mechanism for the growth/inequality linkage is thought to be the rewards to entrepreneurship or the incentives to private savings, then presumably we would like to focus on differences in income in the

middle to upper range of the income distribution. If the issue is the liquidity constraint facing poor families as they invest in childhood human capital, then it is the characteristics of the lower part of the income distribution that matter. In any event, we should use a measure of inequality that has the minimal feature of increasing when income is transferred from poorer to richer individuals (which is not true of the 90/10 ratio).

Measurement of the aggregate size of government is no less problematic. There appears to be an implicit assumption, in many quarters, that the alternative to a large government role (measured by public expenditures as a percentage of GDP) is a smaller role for government in social policy and a greater role for market forces. However, the relevant alternative may be a different *type* of state intervention, rather than no intervention.

In general, government can try to achieve a given objective (in social or economic policy) by direct expenditure, by creating incentives through the tax system, or by regulation. These policy tools are likely to be substitutes, since mandated private provision can replace public provision, and the absence of one type of intervention (e.g. a public pension plan) can increase political pressure for tax expenditures to subsidize alternative mechanisms (such as employer-paid pension plans). Measuring *direct expenditure* on a social policy is therefore measuring a particular policy tool, not measuring social intervention *per se*. *A priori*, it is not clear whether regulation or tax expenditures will generally have a lower efficiency cost than direct expenditure. If the alternative to public delivery of, for example, health care services is tax expenditures and regulation, a smaller share of direct expenditure for the state may be accompanied by higher levels of state intervention in other ways, and these other policy intervention modes will have their own effects on the efficiency of aggregate outcomes.

To take the example of the United States, the government is involved in the health care system in a variety of ways — paying directly for the provision of health care to senior citizens and social assistance recipients through MediCare and MedicAid, providing support through the tax system to employer-sponsored health insurance plans, and governing the provision of health care by regulating health care insurers, Health Maintenance Organizations (HMO) and hospitals. As problems with health care delivery (e.g. with HMO) have proliferated, regulations and legislation have been suggested in response. Arguably, the regulation of health care insurers and providers has the most direct impact on the practice of medicine, and tax expenditures on health care insurance are larger than the direct budgetary cost. However, although all these initiatives are driven by the politics of health policy in the United States, neither the costs of tax expenditures nor the burden of regulation are included in most measures of the size of the U.S. social policy effort — and it is hard to argue

that the system as a whole is either more efficient or more equitable than a direct expenditure system.

Finally, cross-country evidence cannot be thought of as representing entirely independent policy experiments. The nations of Europe have been gradually converging toward a common legal and institutional framework over the past forty years. One of the express purposes of organizations such as the OECD is to facilitate learning from policy lessons across countries — and whether or not they are true lessons, OECD initiatives such as the 1995 Jobs Study attempt to disseminate a common policy message. To the extent that international policy coordination is successful, this has the effect of reducing cross-country policy differences.

In the productivity literature, there are often heated debates about the appropriate measure of productivity. The relatively small degree of identifying variation in OECD data, the alternative possibilities for potential dependent variables, the very imperfectly measured independent variables, and the small sample of observations all conspire to frustrate macro-econometricians who try to find a robust link between productivity and inequality or social policy.

However, it is not entirely clear what would be the pragmatic use of a general finding, even if it were robust. Although one can agree that it would be useful to ideologues of both the left and the right to find a general relationship congenial to their own point of view, pragmatic policy makers know that a *general* econometric relationship is not very useful for any *particular* issue. To estimate econometric relationships, one has to use data from the past, and if it is believed that a paradigm shift in production technology is under way, then past data is not necessarily of much use in predicting the impact of future policy choices.

In the last section of his paper, Harris explores the implications of the *new economy* for inequality, growth and productivity. He argues that the computer and telecommunications revolution is an example of a new general purpose technology (GPT) and that, in recent decades, trends in productivity growth and inequality have been driven by the transition process of adjustment to the new technology. He distinguishes between the growing pains associated with transition and the steady state outcomes of the new technology, which will be increasingly dominant as the technology becomes embedded.

However, sceptics have questioned each major element of this story. The assertion that there has been a *general* increase in inequality in capitalist countries has been contested by Atkinson (1998), Brandolini (1998) and Osberg (2000), among others. Everyone agrees that the United States and the United Kingdom have experienced greater inequality since about 1980, but other nations display a diversity of experience — which casts some doubt on the generality of a technology-driven story. Although Harris accepts the argument that

skill-biased technical change has been an important element in the rising U.S. inequality, that argument has been severely criticized by Handel (2000a,b) and Howell (2000). On the issue of whether or not a new age of high-productivity growth is at hand, Gordon (2000) has been a prominent sceptic. He emphasized the importance of measuring quality change in computers and telecommunications for disentangling the trends in real output growth in that sector, which has dominated the increase in overall productivity growth. If the sceptics are right, there has been no structural break in the determinants of productivity and inequality, and macro-econometric results based on data from earlier periods retain their validity.

However, if the *new economy* story is correct, then estimates of the relationship between inequality, social policy and productivity in the *old economy* era are primarily of interest to economic historians. Social commentators either on the left or on the right of the political spectrum are then free to make whatever conjectures seem plausible as forecasts of the relationship between inequality, social policy and productivity, and any errors in such forecasts cannot be disproved for several years hence.

But even if we were to find a general relationship to suit either a leftist or a rightist predilection, what would we do with it? Unless ideology were to be the determining factor in policy choices, one would still have to look at the costs and benefits of specific policies. Harris concludes by arguing that the justification of any particular social policy must rest on the cost-effectiveness with which it can achieve its stated social goals. However, in an important sense, *that would be true whatever the general relationship, or lack thereof, found in cross-country macro data.*[11]

WHICH POLICIES ARE LIKELY TO INCREASE PRODUCTIVITY MOST?

HARRIS ARGUES THAT:

> The policies which have been proven to most likely increase productivity are those which focus on the proximate economic levers of productivity growth, i.e. those that stimulate investment and innovation, promote competition, and facilitate the international diffusion of knowledge.
> (Harris, 2001, p. 49)

This conclusion appears reasonable and plausible enough on first reading, but it fits poorly with Harris' fourth conclusion that the *new economy* perspective provides a coherent explanation based on accelerating technological change. If it is really the case that GPTs create new, more productive patterns of work organization that are structurally different from the *old economy* being

replaced, then macro-econometric regressions using historic data on which this conclusion is based may not predict particularly well *new economy* relationships.

It is at least arguable that the autonomous work group in a flat organizational structure is an form of organization particularly suited to the distributed processing of knowledge, and that this type of *Internet age* organization depends heavily on human capital formation, social cohesion and minimal inequality within work groups. If so, it is unclear whether such historically important issues as capital formation will retain their primacy. Although concepts such as social cohesion or social capital are difficult to measure clearly, the fact that it is difficult to prove empirically their important influence on productivity does not necessarily imply that they are insignificant.

Productivity and Education

THE CONCLUSION DRAWN HERE IS THAT:

> The one social policy for which there is ample evidence demonstrating positive productivity effects is education. A substantial portion of Canadian economic growth appears to be attributable to the high levels of educational attainment in Canada.
> (Harris, 2001, p. 49)

This conclusion seems a bit harsh, since the evidence from health economics is also very strong. But the basic point made is that evidence on the positive impacts of education comes from both macro-econometric cross-country and time-series regressions *and* from a very large body of micro-econometric evidence. Indeed, that evidence is stronger than Harris makes out. He could have referred to some impressive evidence on the externalities of education to buttress his conclusion that a public role in the financing of education is desirable.

Like much of the economics literature, Harris focuses on the monetary returns to education for individuals. Certainly this is an important point for productivity, if measured narrowly in terms of marketed output — and there is very strong evidence that education directly yields a significant private and social rate of financial return. (Harris summarizes the micro evidence by indicating a rate of return of 8 percent at the median of estimates, while the macro impact of an additional year of schooling would be a 6 percent increase in per capita output.)

However, education also affects many other facets of behaviour. Because the number of years of schooling is a variable recorded in almost all micro data sets, researchers in economics, politics and sociology routinely include it as a regressor (often, education is not the main focus of interest, but even if the intention is to examine something else while controlling for education, the coefficient

on the years of schooling is a valid estimate). People with more education have better health outcomes, smoke less, buckle their seat belts more often, are less likely to be involved in criminal activity, are more effective consumers, exhibit less prejudiced attitudes toward members of other ethnic or racial groups, are more likely to vote, are less likely to have children out of wedlock, or to have children who have children while unmarried, give more to charity, are less likely to rely on social assistance — to name only a few (see Wolfe and Haveman, 2000, for a partial listing). In every instance that we are aware of, the behavioural difference associated with education is in the right direction, but it is notable that the benefits of this behavioural change accrue to others in many cases.

In a recent paper, Wolfe and Haveman (2000) have assembled estimates of the behavioural effects of education. By comparing the size of the education effect with the impact of purchased inputs, they have estimated the shadow value of the impact of education on behaviour. They come to the conclusion that "... a conservative estimate of the value of non-labour market influences is of the same order of magnitude as estimates of the annual market earnings-based effects of one more year of schooling." (2000, p. 14)

The conclusion that the social rate of return to education is approximately twice the private return (in the form of increased earnings) is rather important for policy purposes. Historically, the case for public financing of education rested on two main pillars. The equality-of-opportunity argument has both an equity dimension and an efficiency dimension, since social output will rise if poor children are enabled to reach their potential (Osberg, 1995). The social insurance risk-pooling perspective recognized that when human capital investments represent undiversifiable risk for each person, risk-averse individuals who bear the full cost will underinvest, but a society with progressive income taxation and public education shares in both the costs and returns of individually uncertain investments, and has higher incomes on average. Wolfe and Haveman's quantification of the externality benefits of education in the form of better behaviour adds a third important reason for public funding, since the benefits of more education they mention in their study (and others they could not quantify) accrue to the public at large.

For the analysis of productivity, one can note that these external effects of education will have an impact on measured growth performance, but that in the conventional mode of estimation it will typically be captured as greater productivity or faster growth of other factors of production. If, for example, additional years of education reduce the probability of criminal activity, GDP growth will be faster since more people will be working rather than spending time in jail, and more capital will be available for investment as enforcement,

crime avoidance and incarceration activities absorb fewer resources. However, the background role played by education will not be apparent.

In short, the positive role played by education is understated in Harris' paper.

THE *NEW ECONOMY*

HARRIS CONCLUDES THAT:

> The *new economy* perspective provides a coherent explanation of both recent growth and inequality trends as endogenous reactions to a common cause — the acceleration of technological change.

As noted earlier, each facet of the *new economy* story has been contested, and it remains an important but unproven hypothesis. Although arguing for this approach, Harris does note that since the hypothesis is that we are in the middle of a period of change toward a new set of GPTs, it is in the nature of the event that we will not know for sure until the transition process has occurred.

However, it is not clear what direct implications for social policy flow from the *new economy* scenario, other than a general predilection toward a greater importance of human and social capital.

THE LINK BETWEEN ECONOMIC WELL-BEING AND PRODUCTIVITY

THIS SECTION EXAMINES SHARPE'S DISCUSSION of the relationship between economic well-being and productivity. Sharpe uses the *Index of Economic Well-being* (Osberg and Sharpe, 1998; Osberg, 1985) as a framework for his discussion. As he notes:

> The four components or dimensions of economic well-being in the Index of economic well-being developed by the Centre for the Study of Living Standards are the following:
>
> - Effective per capita flows of consumption that include consumption of marketed goods and services, and effective per capita flows of household production, leisure and other unmarketed goods and services;
> - Net societal accumulation of stocks of productive resources, including net accumulation of tangible capital, housing and consumer durables, net accumulation of human capital and R&D capital, net changes in the value of natural resources stocks, the cost of environmental degradation, and net change in the level of foreign indebtedness;

> - Poverty and inequality, including the intensity of poverty (incidence and depth) and inequality of income; and
> - Economic insecurity from job loss and unemployment, illness, family break-up, and poverty in old age.

In this perspective, the aggregate economic well-being derived from a given stock of wealth and flow of consumption of goods and services depends partly on how the current consumption of goods and services is distributed and partly on how insecure individuals are in anticipating their future income flows. However, productivity is an aggregate concept. More precisely, *productivity* is a concept that refers only to *aggregate* ratios — the ratio of outputs to inputs. If the objective is to maximize economic well-being, then presumably one would think of *outputs* as whatever increases in economic well-being, and *inputs* as whatever sacrifices of well-being are necessary for production. If we adopt this perspective, then a wide range of social policy initiatives will affect productivity since they affect inequality and insecurity.

However, we noted in the first section that, typically, productivity is more narrowly defined — in general terms, as the ratio between the aggregate value of *goods and services* produced and the aggregate value of *goods and services* used as inputs in that production. If we use the term productivity in this sense, then its analysis becomes not only easier (because it relies solely on easily measured magnitudes) but less important (because these easily measured magnitudes may not be what people care all that much about). In the narrow definition of the issue, inequality and insecurity can then affect productivity only to the extent that they affect aggregate goods and services, either in a measurement sense or in actual outcomes.

In the section entitled *What Is Productivity?*, we argue that if specific factors affect the level of output of goods and services produced, it is often useful to think of the issue in terms of inputs to the production process, even if these inputs do not now have market prices. (For example, if low-trust societies have to write complex legal documents to guard against possible fraud in any minor economic transaction, the labour and capital used to create such documents will be subtracted from the net output of desirable commodities. In this case, one could think of social capital as an unpriced input in the production process.) Accurate measurement of productivity should include consideration of all the costs of production of goods and services, both priced and unpriced.

If all costs are counted, improving productivity levels would necessarily increase the aggregate value of resources produced in any given period, which could then be divided between current consumption and accumulation in whatever proportion deemed desirable by the current generation of decision-makers. Improving productivity does not, however, guarantee that current output is divided in optimal proportions between consumption and accumulation[12]

— indeed, if a change in working relationships or technology produces a sufficiently large change in the consumption-accumulation ratio, it is quite conceivable that it might outweigh any productivity gain.

Clearly, incorrect measurement of productivity means that we can no longer be nearly as sanguine about the relationship between productivity and aggregate consumption and accumulation. Measuring labour productivity alone has long been criticized on the grounds that it ignores the influence of both physical and natural capital. It is easy to construct models in which labour productivity rises with the accumulation of physical capital, but consumption (and well-being) decline with the depletion of natural capital, if the price mechanism for natural and environmental resources is deficient. Comparison of the virtues of multifactor productivity and labour productivity is a special (extreme) case of the more general case for including measures of all productive inputs. In the analysis of multifactor productivity, when only a subset of actual inputs is considered in the measure of productivity, there is no guarantee that trends in economic well-being, measured productivity and actual productivity will coincide.

As Sharpe (2001, pp. 2-3) correctly notes, increasing productivity (in the sense of GDP accounting conventions) is a key determinant of trends in marketed per capita consumption — both private and public — which is an important part of total consumption, and therefore of economic well-being. However, Sharpe raises some issues in his discussion of the impact on well-being of productivity improvements in unpaid work that I think are misleading. In principle, technological change certainly affects the value of output of each hour of time spent in unpaid labour. Of course, technological change will affect *both* the market wage and non-market productivity. Since, at the margin, individuals may trade off market and non-market uses of time and can be expected to equalize marginal returns from different uses of time, the issue is how to value each hour of non-market work performed (or leisure enjoyed). By using the opportunity cost of time (i.e. the net after-tax wage for market work) as the shadow price of hours on unpaid labour (or leisure), one implicitly accounts for productivity change in unpaid labour.

On a number of specific issues that are addressed in the calculation of the Index of economic well-being (e.g. the underground economy, average household size, life expectancy), Sharpe points out that there is no clear prediction on the impact of greater measured market productivity. Regrettables like pollution or crime are, however, examples of unpriced inputs in the production of market goods and services. Expenditure on pollution abatement or crime suppression are, in the narrow GDP accounting sense, an increase in input costs with no increase in marketed output (see below however). Hence, a decrease in

these efforts results in an increase in GDP per capita, even if that corresponds to a decrease in economic well-being.

Social Issues and the Measurement of Productivity

Economists like to think of productivity as an issue that is separable from the arbitrary institutional differences observed in different societies. In principle, economists would like to have measures of productivity that reflect differences in the technical relations of production, not differences in institutional or legal arrangements. Whether or not a particular production process is judged highly productive should not, in principle, be dictated by whether or not inputs entering its production are priced in the market.

However, the fact that the boundary between market and non-market transactions depends on the institutional structure of society injects an unavoidable interaction between social issues and the measurement of productivity. At one level, the institutional context may only affect the measured productivity of private industry. If, for example, meat packing firms in one country have to hire quality control inspectors, while in another country food standards inspectors in meat packing plants are government employees, the lower labour requirements (either measured as employees per unit of output, or as paid hours per unit of output) of firms in the latter country is a misleading indicator of labour productivity (at the firm level) in the meat packing industry.

More generally, whether or not labour services are priced depends on the institutional boundary between market relationships and services provided by government and the household sector. As already noted in the section entitled *What is the Overall Link Between Inequality and Productivity?*, societies can generally choose among public policy alternatives that involve either regulation or public expenditure, or they can even choose non involvement. Table 1 illustrates how three possible institutional arrangements for child care might affect measured productivity. It compares the scenarios of private provision within the family using unpriced labour, private provision at the work site (if legislation or regulation establishes day care as an employer responsibility), and public sector provision. If both the latter alternatives use day care workers, who are paid less than factory workers, output per employee will fall in either of the last two scenarios, even though aggregate output rises.

This example has been constructed so that the impact on total GDP per worker is the same under either formal daycare alternative scenario — but the impact on measured private sector productivity depends on whether regulation or direct public provision is chosen (even though scenarios B and C are identical in actual technical productivity). However, the main point of the example

TABLE 1

PRODUCTIVITY – OUTPUT AND EMPLOYMENT IN ALTERNATIVE CHILD CARE SCENARIOS

SCENARIO	FACTORY	ON-SITE DAYCARE	PUBLIC SECTOR DAYCARE	FAMILY LABOUR	LABOUR PRODUCTIVITY VALUE OF OUTPUT/ PAID EMPLOYEES: PRIVATE SECTOR	LABOUR PRODUCTIVITY VALUE OF OUTPUT/ PAID EMPLOYEES: MARKET SECTOR
A	$10,000 10 workers			$0 10 workers	1,000	1,000
B	$15,000 15 workers	$3,000 5 workers		$0 0 workers	900	900
C	$15,000 15 workers		$3,000 5 workers	$0 0 workers	1,000	900

Assumptions: 10 Families – 2 parents, 2 children.
Factory workers earn $1,000.
Daycare workers earn $600.
4:1 ratio in daycare implies daycare frees up 5 workers for factory.

Scenarios: A=Family childcare; B=Firms required by law to provide daycare; C=Public daycare.

is to illustrate how GDP per capita may move in a different direction to GDP per employed worker, when the institutional boundary between market and non-market activity changes.

In general, the number of employees (and measures of labour productivity derived from it) depends crucially on institutional structure — implying that changes in institutional structure will influence the trend in labour productivity growth. It is clear that over the last thirty years, the changing role of women in paid work and household production has been one of the most profound transformations in Canadian society. When half of the country's population changes its mix of daily activities from activities that are unmeasured in GDP to measured activities, we have to expect a substantial impact on the measured trends of marketed output productivity. Since changes in the paid labour force participation of women have not been similar in all OECD countries, the comparison of market productivity trends will depend partly on the relative differences in institutional change.

However, in principle we would like to have measures of labour productivity that are not artefacts of the institutional structure. An accurate measure of labour productivity would not, for example, be affected if the system of wage labour in a capitalist economy were replaced by slavery. In a slave society, workers do not get wages and the stream of current labour services does not

generally have a market price.[13] As a consequence, labour usage is therefore not reflected in the variable monetary cost of production. However, the fact that some labour input is unpriced should not, in principle, affect measures of labour productivity.

The deficiencies of relying on output per employee or output per paid working hour as a measure of productivity have been much rehearsed in the literature on multifactor productivity. Measured multifactor productivity growth is a residual, after accounting for the impact on output of changes in specifically considered inputs, and it is clear that the stock of machinery and equipment generates a stream of services that we should measure as an input. A surge in output today, at the cost of neglected maintenance and a depleted capital stock tomorrow, is widely recognized as an inaccurate indicator of productivity.

However, although changes in the stock of purchased machinery and equipment can be estimated with the aid of (contentious) estimates of service life and market depreciation, there are a number of other stocks whose level is affected by the production process. Furthermore, plant and equipment is not the only stock whose level determines the level of output obtained. Whether or not these stocks have market prices depends, again, on the (possibly) arbitrary nature of a nation's institutional and legal structures.

Accurate estimation of productivity trends should, in general, account for unpriced inputs used up in production, and should not be sensitive to institutional changes that affect whether or not productive inputs have market prices. In the analysis of multifactor productivity, for example, the measured productivity of the resource sector should, in principle, reflect its effectiveness in the use of natural resource stocks. In Canada's resource industries, there are many anecdotes of past wasteful production practices that made economic sense only because firms had to pay for labour and machinery, but not for the impacts of these practices on natural resource stocks. Such production practices are not reasonably considered examples of greater productivity.[14] Measures of sectoral productivity should not depend on the proportion of the resource stock that is private, or on the mode of public sector taxation and royalty collection on natural resources.

The definitions of productivity cited earlier do not limit their conception of input to the category of purchased inputs. Hence, accurate measures of productivity should not depend on the pricing mechanism in place for the use of environmental assets. Whether a firm has to pay for a pollution permit, or releases its exhaust gases into the atmosphere at no cost, should not affect its measured level of technical productivity. A full measure of multifactor productivity should count environmental assets used in production, irrespective of the

institutional mechanisms that determine whether or not firms have to pay a market price for the depletion of these assets.

In the section entitled *The Link Between Economic Well-being and Productivity*, we reviewed Sharpe's discussion of the impacts of rising productivity levels on economic well-being. That section relied on the discussion in Osberg and Sharpe (1998, 2000) of trends in economic well-being as a weighted average of trends in average consumption, aggregate accumulation, income distribution and economic insecurity. The measure of trends in the various components of economic well-being attempts to be comprehensive in nature. Aggregate accumulation, for example, is thought of as encompassing the accumulation of human capital stocks, as well as net changes in the value of plant and equipment, and changes in consumption per capita are defined to include the value of increases or decreases in leisure, as well as the consumption of market goods.

For purposes of analyzing productivity, the issue is whether an exact measure of the costs of production of goods and services should consider costs incurred along all four dimensions of economic well-being, whether accurately priced in economic markets, or not. The production of goods and services has implications for all four dimensions of economic well-being, all of which could legitimately be considered costs of production, but only some of which are priced (depending on the institutional structure).

Thus, accumulation for the benefit of future generations can occur either in the form of produced capital in machinery, equipment and structures (which are typically priced in capital markets), or in the form of changing levels of natural resource stocks (which are imperfectly priced) or in changing levels of environmental degradation (generally unpriced). An accurate measure of multifactor productivity should account for all resources employed in the current production of goods and services which could have been passed to future generations for their benefit. The Index of economic well-being attempts to be comprehensive in its assessment of aggregate accumulation over time, regardless of whether the underlying assets are priced in the market.

The costs of changes in inequality and insecurity can also be seen as unpriced inputs to the production process, in both a direct and an indirect sense. In a direct sense, the risk of loss of an asset is a cost of many production processes, so in principle we would want the costs associated with a change that increases risk to be reflected in productivity measures, regardless of the allocation of the costs of that risk. For example, if a firm adopts a production process that carries a higher risk of fire, it may decide to self-insure or to buy insurance against loss. Either way, the greater probability of loss is an economic cost associated with that production process — whether borne by firms in the industry or offloaded to the insurance sector.[15]

As well, one could imagine a change in workplace technology that implies both an increase of 10 percent in output per able-bodied employee and a 5 percent probability of permanently-disabling workplace injury. It is possible to imagine an institutional structure in which conventional productivity statistics fully capture both the benefits and costs of this change in technology — i.e. if firms were legally prevented from discharging disabled workers, so that both disabled and healthy workers continue to be booked against that technology. However, this is not the way things are done in Canada and, generally, the institutional structure of a society will determine the allocation of costs — whether disabled workers can be discharged without compensation, whether they can purchase insurance or receive compensating differentials in the form of higher wages for the greater *ex ante* risk, or else. Each of these institutional arrangements has different implications for the share of total injury costs borne by firms, either *ex ante* or *ex post*. The costs borne by workers will be reflected by a change in the observed income distribution, and in the insecurity experienced by workers about their future income stream.

In the workplace injury example, technological change increases the aggregate level of risk, but generally the impacts of a change in the aggregate level of risk and the allocation of the existing level of risk among individuals are often mingled. For example, changes in production processes that reallocate labour often have the effect of changing the value of human capital stocks. To the extent that these changes simply reallocate the returns to human capital between different individuals with different types of human capital, the effect is redistributional (among workers).[16]

However, the issue stressed here deals with the cost of changes in the aggregate level of human capital risk. If technological and institutional changes were to increase the degree of churning that goes on in the labour market, but there was no increase in mean income, the utility level of risk-averse workers would fall. The same amount of output would be produced, but at the cost of an increase in the inequality and insecurity experienced by individual workers — a cost that is not necessarily priced in the market. To the extent that this cost is borne by households rather than firms, it will be unrecognized in productivity statistics.

If technological changes increase the risk of unemployment due to layoff, or decrease the extent and credibility of guarantees of employment continuity, their costs are borne by workers. To the extent that firms have to pay severance, or to keep employees and invest in their retraining, these costs are borne by firms. Either way, there is a real cost to changes in the production process that is being borne by some economic agents — but in the latter case, one can at least expect that firms will consider these costs in making their technology decisions. To the extent that firms have to internalize the human capital impacts of

their decisions, one will be more likely to observe actual changes that reflect social costs — but in general, if such costs occur they ought to be considered in analyzing whether such changes improve productivity. Depending on the allocation of costs between workers and firms, one will observe different patterns of *ex post* inequality and poverty outcomes and *ex ante* insecurities about the future. However, these changes in inequality and insecurity outcomes are unpriced consequences of the change in production process — unrecognized costs that should be reflected in productivity measures.

As well, changes in inequality and insecurity can be seen as having an indirect impact, in the sense that trends in their levels can be seen as affecting stocks. Although variously labelled in the literature as *industrial relations climate*, *workplace culture*, *social capital* or *social cohesion*, there is a common perception in a number of disciplines that *something* inherited from the past influences the general level of morale, innovative behaviour, work effort, propensity to strike, likelihood of theft, desire to satisfy customers, willingness to cooperate with other workers, etc. of individual workers. Whatever label one affixes, it is clear that no firm pays a market price for the services of the general level of this input, although its level does affect the amount of output that can actually be obtained from any given amount of capital and number of workers.

It is clear that in workplaces, people tend to watch how other people behave, and adjust accordingly — hence norms of behaviour in workplace culture are very important to individual behaviour. Furthermore, although very important to firm productivity, these aspects of worker behaviour are notoriously hard to measure and to reward at the individual level (*incentivize* in the current jargon). Although the *potential* productive capability of individuals may depend on the skill set enabled by their education, health status and on-the-job experience, what individuals *could* do is generally different from what they *actually* do. If the level of output depends on workplace culture, or social capital or the industrial relations climate, measurements of productivity trends that ignore the cost of unpriced changes in these stocks will be misleading.

Impact of Social Capital on Productivity

AMARTYA SEN HAS ARGUED that technology is often considered in highly restricted terms, for example, as particular mechanical, chemical or biological processes used in making one good or another. The extremely narrow view of technology that emerges from such a limited outlook does little justice to the social content of technology or what Marx called *combining together* various processes into a social whole.[17] The making of things involves not merely the relationship between, say, raw materials and final products, but also the social organization that permits the use of specific techniques of production in factories or workshops or on land. (1990, p. 128)

In much of economic theory, the household side of the economy is modelled as a set of isolated utility-maximizing individuals who care only about their private consumption of market goods and services. Firms are modelled as black boxes that absorb as inputs the labour and capital supplied by individuals and somehow generate market goods and services as output. Economic modelling often dismisses as too complex the twin facts that individuals (including economists) also care about other issues, and that firms need managers because the social relations that maximize the effectiveness of the production process are not inherently obvious.

However, there is a growing literature stressing the importance of social relations surrounding production. Why have social capital and social cohesion become such hot topics in economics in recent years? Neither term fits the normal economics mold. Economics is a discipline that prides itself on precision, but both ideas are hard to define, and often confused with each other. Economists usually start from the perspective of a selfish, utility-maximizing individual, whose interaction with others is limited to buying and selling in the marketplace — yet social capital and social cohesion are both about *social* relationships, *group* identity, and the non-market dimensions of life. Nonetheless, the rising concern with social capital and social cohesion is unmistakable.[18]

In part, the impetus for the growing attention paid to social capital and cohesion has undoubtedly come from events in Eastern Europe. When the Berlin Wall fell in 1989, there was a great deal of optimism among economists about the economic prospects of Eastern Europe. Although, in retrospect, that optimism makes for embarrassing reading, at the time it was thought that economic growth would be rapid in the post-Soviet era. Because Eastern European nations had technically-sophisticated, highly-educated labour forces and a great deal of capital, many analysts expected that the elimination of the dead hand of communist central planning would unleash the pent up potential of Eastern European nations for rapid growth. These expectations were based on the simple notion that economic production occurs when capital, labour and human capital are combined in the workplace. Since many economists thought (and continue to think) that the price signals of an unregulated market are the most effective way of coordinating economic activities, they concluded that as soon as Eastern Europe acquired a market system, good things would happen. And if this was all there was to it, history would have turned out differently.

During the 1990s, the decline in living standards that has occurred in these nations and the rise of gangster capitalism in much of the old Soviet bloc have lead many to ask what went wrong. There is a new recognition of the importance of the social context surrounding market processes. As Sen put it: "Although capitalism is often seen as an arrangement that works only on the basis of the greed of everyone, the efficient working of the capitalist economy is,

in fact, dependent on powerful systems of values and norms. Indeed, to see capitalism as nothing other than a system based on a conglomeration of greedy behaviour is to underestimate vastly the ethics of capitalism, which has richly contributed to its redoubtable achievements." (1999, p. 262)

Social capital and *social cohesion* may be new jargon, and events in Eastern Europe may have recently boosted the popularity of these concepts, but they are not really new in social sciences. Within Western nations, there is a long history of concern with the social framework of market processes. Adam Smith noted in the *Theory of Moral Sentiments*, ch. V[19] (1986, pp. 110-12):

> The regard to those general rules of conduct, is what is generally called a sense of duty, a principle of the greatest consequence in human life, and the only principle by which the bulk of mankind are capable of directing their actions. Upon the tolerable observance of these duties depends the very existence of human society, which would crumble into nothing if mankind were not generally impressed with a reverence for these important rules of conduct.[20]

Thus, there has long been a concern in Western nations about the issues raised by the social capital and social cohesion literature, even if early writings tended to be broader in focus, and less quantitative in nature, than the modern social science tradition. Although much of the concern with social capital is motivated by larger political and *quality of life* issues, one can also expect impacts on productivity, narrowly conceived as the ratio of output to inputs.

The desired outputs of the social system can be thought of as a set of strict subsets. Economic well-being is a strict subset of well-being, because however ambiguous the distinction is between social and economic issues, some things cannot be labelled as economic under any reasonable definition of *economic*. The set of issues that individuals care deeply about, and that contribute to their well-being, is broader than the set of economic issues.

However, economic well-being also involves a broader set of issues than the production and consumption of marketed goods and services. Since the distribution of income, insecurity and accumulation for the benefit of future generations also affect the economic well-being of individuals, but are not captured in GDP measures, they represent a larger concept than the latter. Finally, the set of goods and services produced for the market include some expenditures (e.g. commuting to work) that do not contribute directly to economic well-being.

Different forms of capital affect well-being, economic well-being and GDP. Physical capital in plant, equipment and inventory is now well measured in conventional national income accounting and routinely included in estimates of multifactor productivity levels. It has already been argued in this paper

that the services generated by natural capital, although often unpriced in economic markets, should be included in assessments of productivity trends.

How should productivity measures recognize the role of the human element in production? By some criteria, one would include measures of health as an element of human capital, since both cognitive and physical skills (whether produced by education or on-the-job training) and health status are specific characteristics of individuals.[21] Both health and human capital are clearly important to labour quality, and hence to productivity, even in its narrowest sense.

Many now argue that social capital represents an important part of productive wealth (World Bank, 1997). There is a vigorous debate about how best to define social capital, but for our purposes let us refer to it as norms and networks that facilitate collective action. In the recent literature, Knack and Keefer (1997) provide an example of studies suggesting that measures of trust could be seen as a useful operationalization of the concept of social capital originally proposed by Putnam (1993). Social capital is a characteristic of communities, and can be expected to increase productivity by broadening the range of transactions that people can engage in with confidence, and also by decreasing the transaction costs associated with trade. For example, if people can credibly trust other market participants, they can expend less resources on lawyers, pay for fewer anti-theft measures, and obtain credit more easily. Knack and Keefer find that measures of social capital are positively correlated with the rate of economic growth.

Organizational capital can be seen as somewhat distinct, in the sense that it is specific to particular organizations such as firms, governments, etc. rather than to society as a whole. But the importance for productivity of expectations and patterns of behaviour within organizations built up from the past is apparent to any real-world manager. Indeed, case studies have shown that the soft technology of workplace organization and motivation is the major focus of many real-world managers, because it is so crucial to realized productivity at the firm level (Osberg, Wien and Grude, 1995). Institutions and social arrangements can be separately identified in order to highlight the importance of formal structures, as well as the more informal norms and networks already discussed. A large part of the problems of transition economies has been traced to the sorry state of their institutions (such as the police and judiciary) and their social arrangements (such as unemployment insurance and medicare). Poorly functioning institutions mean that individuals and firms have to develop alternate arrangements (like private security guards) whose costs often appear in productivity measures. Institutions and social arrangements constitute the framework within which people individually acquire productive characteristics

such as human capital. This framework also conditions the interactions of individuals within organizations and the broader community.

All this may be very well, but the sceptical reader in entitled to ask: How much does all this matter in a country like Canada? Hazledine's analysis of the failure of the New Zealand policy experiment is instructive in this regard. As he notes, the adoption of widespread structural reforms in New Zealand during 1984-91 has been followed by a period in which "Macroeconomic performance in nearly all measurable dimensions — GDP and productivity growth, unemployment, income distribution, balance of payments — has been worse than in the previous period in New Zealand and in Australia since 1984" (2000, p. 2). His explanation of the adverse macro trends is that whatever the efficiency gains produced by microeconomic reforms, they were more than compensated by a substantial increase in the proportion of the workforce employed in managerial jobs to supervise more closely an increasingly less cooperative workforce. By his argument, the social impacts of economic reforms — in a country not so very different from Canada — may be large enough to overwhelm any narrowly-defined economic impact on productivity.

Conclusion

This chapter has argued, along with much of the emerging literature on *social capital*, that production processes occur within a social context, whose characteristics heavily influence the amount of labour and capital directly required to produce a given amount of goods and services. One way of thinking about the social framework of economically productive activity is to conceptualize a number of stock variables, whose level influences the level of goods and services production that is possible. From this angle, one can see these stocks as unpriced inputs to the productive process — changes that are an unrecognized cost of decisions about production technologies and social institutions. The priority for future productivity analysis is to more accurately identify and measure these stocks, and their importance for the level of production of goods and services.

Endnotes

1 *Concise Oxford Dictionary of Current English*, 6th Edition, Clarendon Press, Oxford University Press, 1976.

2 By input we mean any variable whose level affects the level of output of goods and services (which may be marketed or unmarketed).

3 Osberg (1995) and Benabou (1996) survey this literature.

4 Early papers were Galor and Zeira (1993); Banerjee and Newman (1994); and Benabou (1994).

5 For example, Banerjee and Duflo (2000) interpret the data as indicating that changes in inequality can affect growth, but that the level effect of inequality is hard to determine precisely.

6 Conditional convergence in technology is an example of changing structure, but the classics of growth theory (such as Kuznets, 1966) had broader processes of structural transformation in mind.

7 See Osberg (1981, 1991 and 2001). A recent survey is provided by Silber (1999).

8 Rankings changes are typically among mid-range countries — one has to really torture the data to displace the United States from its first position in terms of inequality and poverty among OECD nations.

9 As an example, we can cite Forbes (2000, p. 874) who, in an explanatory note, says: "As in Deininger and Squires, I have added 6.6 to Gini coefficients based on expenditure (instead of income)." Although it is true that Deininger and Squires do this and also that their data has been used without reflection by many, it is precisely this sort of casual mixing of quite different types of data that serious students of the issue find astounding.

10 Although Harris is quite in tune with the literature he summarizes in using the Gini index and the 90/10 ratio of annual money income as summary measures of inequality, he is not very specific about whether this is after-tax or before-tax income or whether it is household or individual income. If it is household income, it is very doubtful that the trend in family size distributions has been considered. All these issues matter since country rankings are sensitive to such measurement choices. Furthermore, the appropriate measure to use should depend on the theory being tested. For example, the Gini index is known to be more sensitive to differences in income in the middle part of the distribution, while the Theil index is more low-end sensitive. The argument that the inadequacy of income prevents parental investment in the human capital of their children is not an issue of relevance for the inequality among middle-class families or between the middle class and the highly affluent. This hypothesis is most relevant for families in the low end of the income distribution, and for the inequality of after-tax household income adjusted for family size and measured over a period of years. The Gini index of annual pre-tax incomes would not be a particularly good summary measure of the inequality of income to test the human capital transmission hypothesis, and the 90/10 ratio of individual incomes would be even worse — but the macro-econometric literature is seemingly unaware of these subtleties.

11 For example, both early childhood intervention programmes and pensions for senior citizens are likely to affect inequality (albeit in different senses of the term inequality), but whether or not they are good initiatives depends on their cost and the outcomes associated with specific programs, and not on any general macro-econometric relationship.

12 Osberg (1985) discusses why consumption and accumulation should be separately considered, since there are many reasons to believe that income flows are not always and automatically divided in an optimal fashion between consumption and accumulation.

13 The market price of slaves reflects the net value of future labour services, but it becomes an element of the capital structure of firms. By the current conventions of national income accounting, labour services that are not exchanged for cash (as in household production, or the voluntary sector) are not counted in GDP. Firms and households that employed their own slaves would therefore be counted as employing very little wage labour (overseers, presumably) and as having high labour productivity.

14 Even if the resource base were privately owned, this would not completely solve the problem. Private ownership might imply a system in which either (a) the resource depleted is sold explicitly to extraction firms or (b) the resources are owned by these firms. In the former case, resource rents appear in separate balance sheets from any profits due to greater efficiencies in resource extraction, while in the latter they are mingled. However, measures of sectoral productivity should not be affected by the proportion of private firms in each category.

15 If unlucky firms that suffer fire loss (for example) go bankrupt, while lucky firms are still in business at the end of the reporting period, sample selection bias may contaminate statistics on the productivity of technological change that involves greater risk.

16 One way of thinking about human capital risk is to imagine a two-stage process. In the first stage, people either maintain their human capital value with probability P_{ai} or are assigned to the reallocation pool with probability $(1 - P_{ai})$. Once in the reallocation pool, they draw their new human capital value from a distribution whose mean and dispersion varies with technological change and institutional structure, and with their personal characteristics. A person's human capital risk is a compound probability, but the elements of the process are worth distinguishing.

17 It is often forgotten that Marx himself had a very nuanced vision of the determinants of productivity trends in capitalist society. Although the core of Marx's analysis emphasized the tendency toward greater capital intensity of production and the class conflict between workers and owners, Marx also anticipated, in a generally positive way, modern trends toward the multi-tasked, multi-skilled worker of today. "Modern industry, indeed, compels society, under penalty of death, to replace the detail worker of today, crippled with lifelong repetition of one and the same trivial operation, and thus reduced to the mere fragment of a man, by the fully developed individual, fit for a variety of labours, ready to face any change of production, and to whom the different social functions he performs, are but so many modes of giving free scope to his own natural and acquired powers." (Marx, 1887/1967, p. 488)

18 The ECONLIT DATA base has 200 hits on the term *social capital*, only 46 of which date from 1995 or before. The term *social cohesion* has 59 hits, of which 25 date from 1995 or before.

19 Thanks to my colleague Mel Cross for this citation, and others similar.

20 De Tocqueville devoted Chapter VIII of his second volume to how *The Americans Combat Individualism by the Principle of Interest Rightly Understood*. He claimed that the Americans show with complacency how an enlightened regard for themselves constantly prompts them to assist each other, and inclines them willingly to sacrifice a portion of their time and property to the welfare of the State.

21 The literature on socio-economic determinants of health (e.g. Lavis and Stoddart, 2000; Wilkinson, 1996, 1999) has clearly identified both individual characteristics, like education, and societal characteristics, such as the level of economic inequality, as highly important determinants of individual health — arguably considerably more important than medical interventions are for life expectancy.

BIBLIOGRAPHY

Atkinson, A.B. "On the Measurement of Inequality." *Journal of Economic Theory* 2 (1970): 244-63.

____. "The Distribution of Income in Industrialized Countries." In *Income Inequality: Issues and Policy Options*. A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 25 to 27, 1998, pp. 11-32.

Banerjee, Abhijit V., and Esther Duflo. "Inequality and Growth: What Can the Data Say?" MIT Working Paper, June 2000.

Banerjee, Abhijit V., and Andrew F. Newman. "Poverty, Incentives, and Development." *American Economic Review* 84, 2 (1994): 211-15.

Barrell, Ray, Geoff Mason and Mary Omahony. *Productivity, Innovation and Economic Performance*, National Institute of Economic and Social Research, Cambridge: Cambridge University Press, 2000.

Benabou, Roland. "Human Capital, Inequality, and Growth: A Local Perspective." *European Economic Review* 38 (1994): 817-26.

____. "Inequality and Growth." In *NBER Macroeconomics Annual*. Edited by Ben Bernanke and Julio Rotemberg. Cambridge: MIT Press, 1996, pp. 11-74.

Brandolini, A. "A Birds-eye View of Long-run Changes in Income Inequality." Research Department, Bank of Italy, August 1998. Mimeo.

Forbes, Kristin. "A Reassessment of the Relationship Between Inequality and Growth." *American Economic Review* 90, 4 (2000): 869-87.

Galor, Oded, and Joseph Zeira. "Income Distribution and Macroeconomics." *Review of Economic Studies* 60 (1993): 35-52.

Gordon, Robert J. *Interpreting the One Big Wave in U.S. Long-term Productivity Growth*. NBER Working Paper No. 7752, Cambridge (Mass.), 2000.

Handel, Michael J. *Is There a Skills Crisis? Trends in Job Skill Requirements, Technology, and Wage Inequality in the United States*. Working Paper No. 295. Annandale-on-Hudson (N.Y.): The Jerome Levy Economics Institute, 2000a.

____.*Trends in Direct Measures of Job Skill Requirements*. Working Paper No. 301. Annandale-on-Hudson (N.Y.): The Jerome Levy Economics Institute, 2000b.

Harris, Richard. "Determinants of Canadian Productivity Growth: Issues and Prospects." Paper presented at the CSLS-Industry Canada Conference on Canada in the 21st Century: A Time for Vision, September 17-18, 1999, Ottawa, Ontario, 1999. Final version published in *Productivity Issues in Canada*. Edited by Someshwar Rao and Andrew Sharpe. The Industry Canada Research Series. Calgary: University of Calgary Press, 2002. Chapter 6.

____. "Social Policy and Productivity Growth: What are the Linkages?" Draft Report to Industry Canada, March 8, 2001. Mimeo. Revised version published in *Productivity Issues in Canada*. Edited by Someshwar Rao and Andrew Sharpe. The Industry Canada Research Series. Calgary: University of Calgary Press, 2002. Chapter 24.

Hazledine, Tim. *Agency Theory Meets Social Capital: The Failure of the 1984-91 New Zealand Economic Revolution*. Working Paper No. 207. Department of Economics, Aukland Business School, University of Aukland, New Zealand, June 2000.

Houghton Mifflin. *Canadian Dictionary of English*, Toronto: Houghton Mifflin Publishers, 1982.

Howell, David R. "Increasing Earnings Inequality and Unemployment in Developed Countries: A Critical Assessment of the Unified Theory." New School for Social Research, February 2000. Mimeo.

Knack, Stephen, and Philip Keefer. "Does Social Capital Have an Economic Payoff? A Cross-country Investigation." *The Quarterly Journal of Economics* (November 1997): 1251-88.

Kuznets, Simon. *Modern Economic Growth: Rate, Structure and Spread*. New Haven, (Conn.): Yale University Press, 1966.

Lavis, J., and G. Stoddart. "Social Cohesion and Health." In *Teams Work Better: The Economic Implications of Social Cohesion*. Edited by L. Osberg, University of Toronto Press, 2000.

Marx, Karl. *Capital*, vol. 1. 1887; New York: International Publishers Company, 1967, (English edition).

Osberg, Lars. *Economic Inequality in Canada*, Toronto: Butterworth Publishing Co., 1981.

____. "The Measurement of Economic Well-being." In *Approaches to Economic Well-being*. Edited by D. Laidler. Vol. 26. Prepared for the Royal Commission on the Economic Union and Development Prospects for Canada, Toronto: University of Toronto Press, 1985, pp. 49-89.

____ (ed.). *Economic Inequality and Poverty: International Perspectives*. Armonk, New York: M.E. Sharpe Ltd, 1991.

____. "The Equity/Efficiency Tradeoff in Retrospect." *Canadian Business Economics* 3, 3 (Spring 1995): 5-20.

____. "Inequality – A Contribution to the International Encyclopaedia of the Social and Behavioural Sciences." N.J. Smelser and P.B. Baltes (ed.), Elsevier Science. Forthcoming.

Osberg, Lars, and Andrew Sharpe. *An Index of Economic Well-being for Canada*. Research Paper No. R-99-3E, Applied Research Branch, Strategic Policy, Human Resources Development Canada, December 1998.

____. *Long-run Trends in Economic Inequality in Five Countries – A Birth Cohort View*, Working Paper No. 222, Luxembourg Income Study, January 2000.

____. "International Comparisons of Trends in Economic Well-being." American Economics Association, Boston (Mass.), January 7, 2000; Canadian Economics Association, Vancouver (B.C.), June 2, 2000; International Association for Research on Income and Wealth, 26th General Conference, Cracow, Poland, August 31, 2000.

Osberg, Lars, F. Wien and J. Grude. *Vanishing Jobs: Canada's Changing Workplaces*, Toronto: James Lorimer Publishers, 1995.

Oxford University Press. *Concise Oxford Dictionary of Current English*, 6th ed., Clarendon Press, Oxford University Press, 1980.

Putnam, Robert D. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton: Princeton University Press, 1993.

Sen, A.K. "Gender and Cooperative Conflicts." In *Persistent Inequalities: Women in World Development*. Edited by Irene Tinker, New York and Oxford: Oxford University Press, 1990, pp. 123-49.

Sen, A.K *Development as Freedom*, New York: A.A. Knopf Publishers, 1999.

Sharpe, Andrew. "The Contribution of Productivity to Economic Well-being in Canada." Paper presented to Industry Canada, November 2001. Final version published in *Productivity Issues in Canada*. Edited by Someshwar Rao and Andrew Sharpe. The Industry Canada Research Series. Calgary: University of Calgary Press, 2002. Chapter 25.

Silber, J. (ed.). *Handbook on Income Inequality Measurement*. Boston: Kluwer Academic Publishers, 1999.

Smith, Adam. *Theory of Moral Sentiments*, 1986.

Wilkinson, R.G. *Unhealthy Societies: the Afflictions of Inequality*. London and New York: Routledge, 1996.

____. "Income Inequality, Social Cohesion and Health: Clarifying the Theory – A Reply to Muntaner and Lynch." *International Journal of Health Services* 29, 3 (1999): 525-43.

Wolfe, Barbara, and Robert Haveman. "Accounting for the Social and Non-market Benefits of Education." Institute for Research on Poverty, University of Wisconsin, March 2000.

World Bank. *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development*. Washington (D.C.), 1997.