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A FRAMEWORK FOR MEASURING SUSTAINABLE DEVELOPMENT

Paper submitted by OECD[1]

I. Introduction

1. Many well-meaning attempts to define and then measure sustainable development have been made. Because of the diversity of issues considered important, the list of potentially interesting indicators is vast and the task of reducing the mass to a subset which is both comprehensive and comprehensible to a layperson has not proved universally satisfactory. Instead of following this well-trodden path, we approached the measurement problem differently.

2. Our starting point is to try to define a framework within which we can link information relating to economic, environmental and social policy issues. Only by linking the issues can we examine whether different goals are reinforcing or conflicting; whether a goal of apparent merit has unexpected disbenefits; to consider trade-offs. Because of the interest in sustainability, it is essential that we have a framework with a time dimension so that we can evaluate the evolution over time of a set of indicators and assess whether the development path of the economy is indeed sustainable. Because we want to examine the interactions between different aspects of concern, we need to build a framework based on a common numeraire. The numeraire most readily to hand is that of money. This is the medium in which choices are made between economic alternatives and it inevitably impacts choices in the social and environmental spheres also.

1 Prepared by Anne Harrison, Statistics Directorate.

3. The starting point for the framework is familiar, the system of national accounts. This is the money based, time series framework within which economic models have traditionally been built but just as the traditional models need adjusting to fully reflect the concerns of sustainability, so too we adjust the traditional view of the national accounts. We derive alternative presentations designed to draw attention to those areas where variations in medium- to long-term trends are likely to impact economic policy and thus the path of development. These presentations are also intended to make the accounts more accessible to non-specialists. We integrate non-monetary data where appropriate so that different statistical fields can be explored jointly via an appropriate linking mechanism.

4. We identify thirteen areas initially, five concerning the environment and the economy, four involving social aspects and the economy, four relating primarily to the economy alone. To these we add one to allow a disaggregation for the regions of a country and one to look at the impacts on other countries making fifteen areas in all.

II. Area 1: Economic production

5. Traditionally, economic production has been documented in terms of production of goods and services or, in a very slightly extended form, as the production by agriculture, manufacturing and service industries. Increasingly interest is shifting to a different paradigm, no longer related to the nature of the inputs but more to the potential markets for products.

6. Some goods are readily exported and some less so. For example computers embody new technological developments and have a high value to weight ratio. Bricks on the other hand have neither of these attributes. Services used to be thought of as always provided locally and thus were hardly exported except in connection with the transport of goods. With the advent of electronic commerce this is now no longer so. Some services, such as hairdressing, must be provided locally but banking has become international.

7. We may explore the question of **globalisation** by categorising goods and services not in the traditional manner but looking at whether they are global or domestic in nature. Then by examining the degree to which global goods are produced and exported or provided by imports we may start to make judgements about the prospects for sustainable growth.

8. A second alternative dimension concerns the size of production units. There is increasing interest in the role of small units in both society and the economy. These units may be on the edge of legality (maybe not fulfilling government regulations on tax registration, form filling, health and safety regulations), may simply be overlooked inadvertently by officialdom or may be deliberately evasive. Various terms are used to describe their activity, informal activity, the **hidden economy** and so on. Typically small units may account for up to 80 per cent by number of enterprises and a very large proportion of employment though a relatively small proportion of turnover and income generation. Their role is important both in terms of establishing a more **plural economy** and in acting as a buffer during the peaks and troughs of economic business cycles. Increasingly, estimates to cover their activity are being made and can usefully be brought to general attention.

III. Area 2: Economic production and employment

9. A major interaction between the economy and social statistics revolves round the involvement of people in the production process as employees and as entrepreneurs. In addition to the output indicators coming from area 1, it is necessary to detail the impact for employment, ideally in terms that allow both full-time equivalents and total numbers involved to be compared. Will more jobs be found in global industry or in small, mainly domestic, firms? Further links to **labour force** statistics and **demographic trends** are straightforward. The first concern is with the changing proportion of an ageing population in the labour force. Will the number of jobs grow more quickly or more slowly than the numbers entering the labour force? What will be the impact on the numbers of employed (or unemployed) in the age ranges 18-25 and 50-65?

IV. Areas 3: Economic production and the environment

10. Resource rich economies consume these resources methodically over time. Under present accounting rules, the use of these resources is recorded as income with no provision made for the fact that some of the resources do not regenerate on a time scale to permit continued consumption into the indefinite future. Work is now well advanced to allow alternative calculations to be made so that the non-sustainable **depletion** of oil, minerals, fish and forests should be absorbed into the national accounting for income.

11. As well as absorbing natural resources, economic processes generate residues which are output into the environment using water, air and land as "sinks". Measures of the pollutants are generally available, often grouped by environmental theme. One such theme is the emission of green house gases and the implications for **climate change**. Much of this work links monetary output with physical measures of pollutants. Work is advancing, however, in the area of quantifying environmental **degradation** in monetary terms also so that an alternative money measure of total economic activity can be calculated to be set alongside conventional GDP these physical measures.

V. Areas 4-6: Three environmentally sensitive industries

12. Industries where the generation of residues are particularly severe include **agriculture, transport** and **energy** generation. Detailed policy analyses in these areas is already well established linking the need to monitor economic activity and environmental effect. For each of these three industries, the linkage between the economy and the environment is so pervasive that they each merit being treated as a separate area in their own right.

VI. Area 7: Economic production and the use of assets

13. Almost all economic production involves the use of capital as well as labour and factors affecting the cost of capital have a direct bearing on the potential for production growth. Increasing attention is being paid to the efficiency of capital, both to the **eco-efficiency** which aims to reduce the damage

referred to in area 3 and to efficiency coming from **technological development**.

14. On the accounting side, new measures of the **user cost of capital** are being developed linked to type of asset and using industry. This has the potential to allow the impact on costs of increased efficiency to be explored as well as the development of standardised approaches to measures of **total factor productivity**.

VII. Area 8: The role of government

15. Government intervenes in the production process in three ways. It imposes **taxes** which raise the prices at which products may be sold; it provides **subsidies** which lower the prices; it may impose **legislation**, say on the maximum permitted emissions to air and water, which increase operating costs and thus affect prices. An accounting presentation is available which shows these three options as the provision of public services via three mechanisms. The first is when government provides the service and funds it via taxes. The second is when enterprises provide the service and are paid by government for doing it in the form of subsidies. The third is when enterprises are obliged to provide the services but are not recompensed by government.

16. A suitable articulation of the interaction of government in the economy gives insight into the setting of **tax policies**, government **regulation** and the whole area of **"getting the prices right"**.

17. A particular application of this presentation is to be able to identify all the taxes, subsidies and legislation connected with environmental issues. Similarly those connected with employment issues or any other concern can be viewed collectively.

VIII. Area 9: Establishing household income

18. All economic production leads to household income through the payment of wages and salaries (in cash and in kind) or through the generation of entrepreneurial income for the self-employed. In addition, households receive income in the form of unemployment and other social benefits including pensions. They also receive (and may pay out) property income in the form of interest, dividends, etc. on financial assets and are affected by a number of transfers, notably the payment of taxes. The national accounts framework allows an articulation of the components of income, for households and for other sectors of the economy. This can form the basis of two quite different analyses. The first is discussed immediately below; the second under area 11.

19. Household income is not distributed according to strict equality and the question of the extent of inequality, and how it is changing over time, may also be germane to a consideration of how sustainable current economic allocations are. It is possible to envisage making a link between the macro figures on household **income distribution** coming from the national accounts with those coming from micro data sets. The first step is to disaggregate the household sector in the national accounts to show three types of households separately; those where the major source of income is from employment; those where the major source of income is from social insurance benefits payable to those still of working age and those where the major source of income is from pensions and other payments due to retirees. The reason for

this initial categorisation is to allow further integration with considerations of employment and unemployment issues (the first two categories) and the implications of an ageing population (the third category).

IX. Area 10: Government consumption

20. Area 8 looked at the means by which government funds various government policies. Area 10 looks at the type of consumption expenditure undertaken. It can be divided into at least four interesting headings. The first covers all **public goods** such as law and order, defence, down to street lighting etc. These services are described by national accountants as collective services. All other government consumption is described as individual services and we detail the two largest items, expenditure on **health** and **education**. Both of these can then be related back to demographic trends to determine whether per capita expenditure on selected groups of the population typically, but not exclusively, the young for education and the old for health.

X. Area 11: Household consumption

21. Just as it is instructive to look at how government consumption affects groups of individuals, it is desirable to look at patterns of household consumption. Initially we may look at households disaggregated as suggested in area 9 by main type of income. Some data sources may be built around ex-post distribution and show a breakdown by level of income only and not type. As long as it is possible to match the two distributions (which should not be impossible) we can make the **link between distribution of income and distribution of expenditure and consumption**. This is the link that would allow us to examine how far poor health and poor educational attainment are linked to low levels of income, for instance.

22. Of particular interest is the question of **sustainable consumption** patterns. For this we identify those types of expenditure of particular environmental concern, for example expenditure on fuel and electricity and mode of transport. We may also incorporate information on water use and waste generation. One consequence of tying this to a disaggregated set of households is to permit analysis of the non-sustainability of consumption linked to income levels.

23. The disaggregation of households also leads the way to a study of **extended household consumption**. The first step is to add in the health, education and other individual services provided by government. The next is to make estimates of the value of **unpaid household services**. Together these give an extended coverage of consumption, arguably closer to a measure of welfare and allow an analysis over time of the effect, for example, of greater participation of women in the labour force.

24. The main proposal here is that this analysis be done in money terms but there are ambiguities about the appropriate valuation of unpaid work. An alternative being suggested in the context of the **social indicator project** is instead to use time as a numeraire. A comprehensive analysis based on time is still fairly experimental but it is an area which is developing fast and has impressive potential.

XI. Area 12: Financing asset acquisition

25. We have considered above how income is generated in production, redistributed towards government and households and then part spent on consumption. What is left is saving available for, and numerically equivalent to, new investment in assets for future production. The detailed analysis of income referred to above also shows **how new investment is financed**. Frequently this involves redistribution of household saving (often in the form of pension funds) towards enterprises. The impact of the rest of the world can also be seen since some new investment may be funded by running a current account deficit. This analysis relates directly to the **genuine savings** approach of the World Bank to "green accounting" but sets it in a wider context.

XII. Area 13: Investigating new forms of assets

26. It is sometimes suggested that present accounting conventions concerning assets are inadequate since some expenditure classified as current in fact represents an investment for the future and thus should itself be classified as a form of asset. Most of these are in the class of **intangible assets**. The case which has been discussed for many years is research and development expenditure. Other subjects include the development of intellectual property and knowledge more generally and items such as brands.

27. Another special area is that of **human capital**. This raises particular problems in a purely accounting context since the knowledge and skills embodied in a person belong to that person and not to their employer. However, estimating expenditure spent on training and other forms of skill-enhancement may be a candidate for alternative treatment in the accounts.

28. R and D, training, environmental protection are all services produced by an enterprise for its own use. If they are separately identified, with their associated costs, there is no reason why different accounting treatments should not be given to the particular activities. We may (in area 8) treat environmental expenditure as a form of collective consumption produced by an enterprise at the behest of government (under regulation). Here we may follow a similar path to treat R and D as a new form of intangible capital and training as a form of human capital if we so wish.

29. Making estimates, even experimental estimates, for these items would lead to consequential effects on studies of productivity and the study of assets generally.

30. The issue of the treatment of environmental assets is not taken further here since the provision of environmental services from those assets is already covered in areas 3-6. The consequences for balance sheet recorded are unexceptional.

XIII. Area 14: The regional dimension

31. As increasing attention is given to activities in different regions of a country, the need for a

territorial disaggregation of almost all subject areas discussed so far emerges. Addressing regional concerns may not simply be a means of disaggregation of annual national figures. Environmental data which looks unexceptional at a national level may disguise phenomenon which are acute at a particular location of for a particular period of the year. More success in a regional dimension of our framework will come when there is some continuity of process or factors, such as production and employment by region. where integrated with information on the **geographical** spread of the population and probable future demographic trends will prove valuable.

XIV. Area 15: International dimensions

32. Not since area 1 has the rest of the world impinged on our framework. Obviously all the traditional concerns with **balance of payments** continue to influence the development path of a country. There are two other ways in which an international dimension to the work may also be useful.

33. One is in the area of **comparisons across countries** which may provide insight as valuable as comparisons across time. The second refers again to equity. The questions of inter-generational and inter-household equity have already been referred to. Many of the global concerns on sustainable development make reference to **international equity** also. Even when this is not seen as a moral obligation, enlightened self-interest may suggest the desirability of putting local issues within a wider context.

34. The extent of international aid flows and debt repayment have major repercussions on the interaction of third world countries with OECD Member countries. A comparison of the provision for basic needs, including health care, education as well as average GDP per capita indicate the capacity of countries to enter fully into the global economy. The emergence of tradable emission rights may be indicative of a move to develop instruments to level the international playing field.

XV. The accounting framework

35. We start with the SNA concept that output less intermediate consumption gives income. To cover areas 1-7 we need to:

- Give greater prominence to measures of output and not just value added,
- Provide new disaggregations of type of output,
- Link employment with the new disaggregations of output,
- Specify environmental inputs and outputs,
- Provide links to the user cost of capital,
- Associate production with efficiency measures and the impact of technology,
- Calculate total factor productivity measures.

For areas 8-12 we take the articulation of income generation and distribution and its use for consumption and saving. To this we add:

- An alternative way of measuring taxes, subsidies and the impact of government legislation,
- A disaggregation of households by predominant type of income,
- Consideration of sustainable consumption patterns,
- An expansion of household consumption to include unpaid household services,
- An articulation of the means of financing new investment.

36. For area 13 we investigate new forms of capital which then add to the traditional forms included above.

37. Area 14 and 15 concern a regional and international dimension. Of themselves they involve no new accounting techniques but in light of policy concerns attention may be refocused on items of special interest in the spatial context, for example cross-border flows.

Summary

38. Although wide ranging, there are a number of issues not covered in the 15 areas listed above. In each area, at least one part of the analysis involves monetised estimates related to a conventional accounting system. Thus analyses which involve comparisons of distinct non-monetary data sets, for example the impact of emissions on health, are not covered explicitly, valuable as such an analysis would be. Issues which do not involve the economy are omitted altogether, thus for instance there is no reference here to biodiversity though it may be implicit in some of the more detailed work on agri-environmental indicators. Nor have we systematically addressed problems of valuation and the measurement of consumer surplus, still less a comprehensive measure of welfare.

39. Although we started from a seemingly familiar framework, the system of national accounts, what we are proposing is still fairly ambitious. The new presentations are as yet unfamiliar. Some of their data requirements are newly available, some are feasible but not yet regularly provided; some have to be developed. It is for consideration whether the extra insights given to analysis would justify their regular provision and whether the benefits would accrue as much to Member countries as to cross-country comparisons by the Secretariat.

40. Each of the areas represents a considerable data set. The total number of available indicators is thus immense. However, choosing two or three from each area could give a total set of the order of 30-50 indicators, not more than would fit on one page. In principle, some amalgamation could be proposed. This may have some interest but cannot represent all the concerns spelt out here any more than conventional GDP says anything about the level of unemployment, the trade balance or income distribution. Just as it is expected that these four indicators stand on their own and cannot usefully be combined, we do not think that a single index of sustainability is useful. Several of the areas could lend

themselves to the calculation of an alternative measure of GDP, but this would not indicate what level of GDP was sustainable; it would simply measure a concept of GDP built on different limits to production and assets from the SNA. The power of the framework suggested here comes not from the ability to calculate GDP on a different basis but to bring data from the social and environmental sphere into an enlarged economic accounting framework.

Figure 1: LINKS BETWEEN ECONOMIC SOCIAL AND ENVIRONMENTAL SPHERES

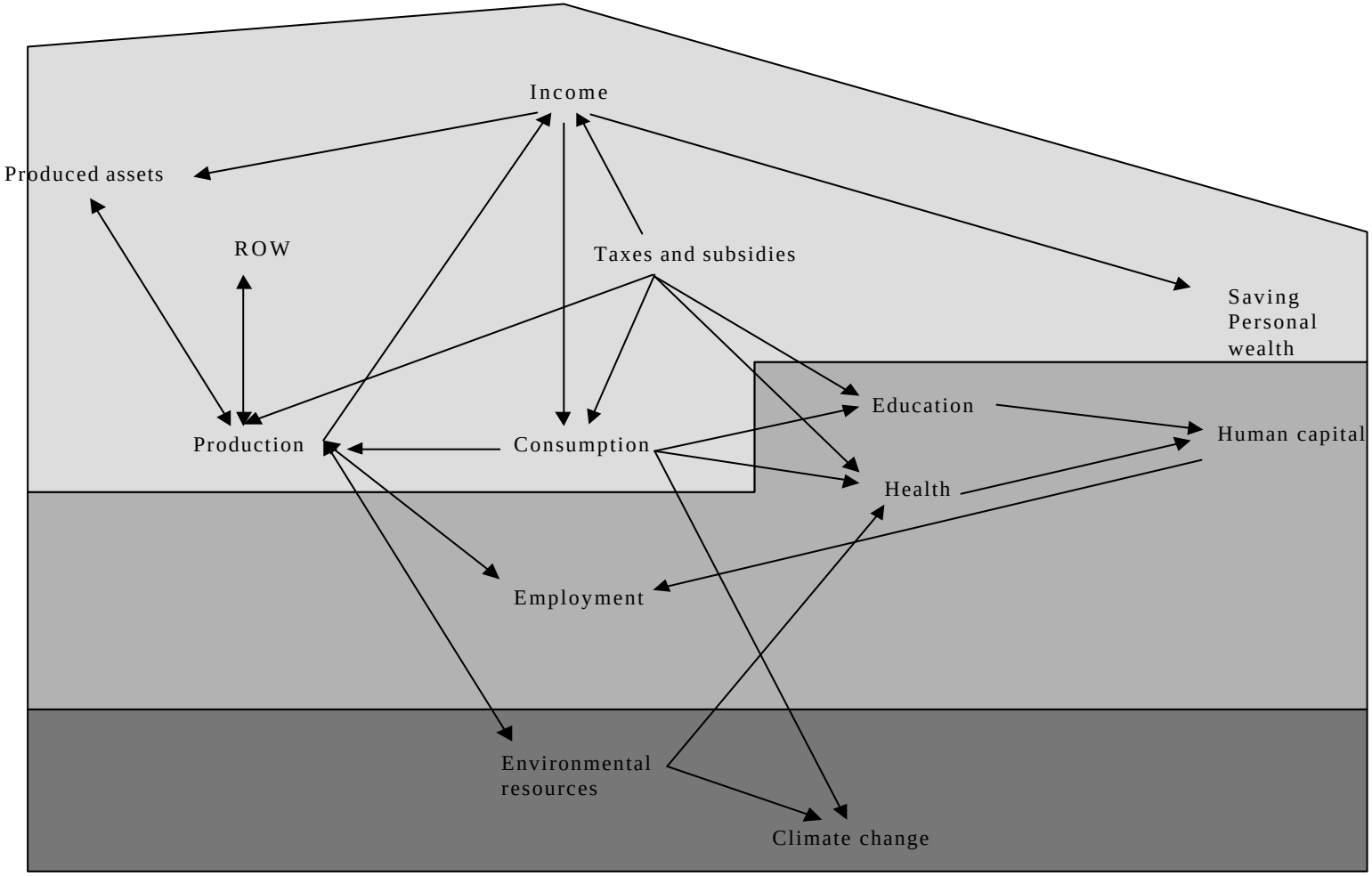

Figure 2: LINKS BETWEEN WEALTH AND WELFARE.

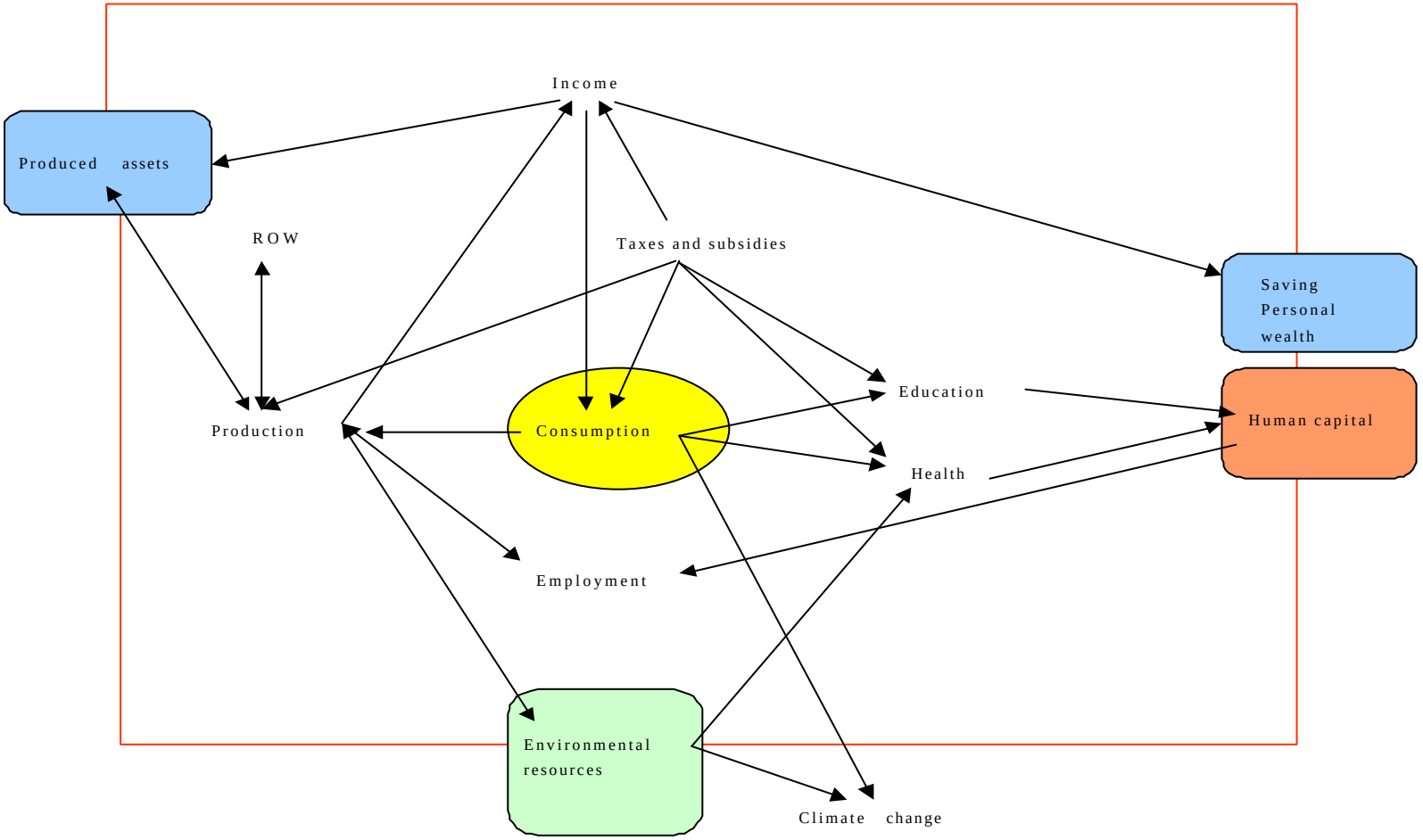

Figure 3: LINKS TO POLICY ISSUES