11 Conclusions

The project team

- Only projects with net social benefits should be approved. This simple idea is the reason why projects' appraisal can contribute to economic growth and welfare, and the rationale for the existence of Cost-Benefit Analysis (CBA) as a tool for guiding the selection of projects.

- Computable General Equilibrium (CGE) models have been used for large shocks, like the estimation of the economic effects of global climate change, elimination of trade barriers or the spread of human diseases. Such models can be used to calculate the *impact* on Gross Value Added (GVA), employment, the government deficit, balance of trade, and other macro indicators, as well as Hicksian welfare measures (typically Equivalent Variation, or EV).

- All projects subject to welfare assessment, regardless of method, should begin with a careful assessment of the project impacts using general equilibrium cost-benefit rules. This will clarify which items need to be measured and what the appropriate method may be (CGE/CBA). For example, such rules clarify the need to include effects on markets other than the one most directly affected by the project.

- The differences between CBA and CGE models, and how such differences may condition the economic appraisal of projects, have been analyzed. CBA is particularly useful for "small" projects (that can include many markets). It is important to stress that CBA is not a simple partial equilibrium exercise (ceteris paribus), and some observable market demands incorporate the effects on other affected markets, such as the derived demand for transport under some conditions.

- When a CGE model is used for the social appraisal of projects, such as the construction of a new railway line, an existing CGE model built for large

economic impacts would require further modelling that incorporates the specificities of the project under evaluation. A standard CGE model designed to capture the effects of changes in international trade, or similar, will barely identify differences between the net welfare effects of an investment in urban commuting or high-speed rail. Both projects will trigger the induced effect from the transport sector on the rest of the economy, but their direct effects and wider economic benefits are very different.

- In the absence of distortions, CBA and CGE should give the same net welfare. However, with distortions in secondary markets, results might differ. This research project tested differences between CBA and CGE on three projects in three different sectors of the economy. The case studies show that in the presence of the usual type of distortions that normally characterize markets, differences between CGE and CBA would be in the region of 5-10 % of the project value.

- These results should not be generalized and are to be taken as indicative orders of magnitude, specific to the CGE models included in this project. More complex models especially designed for these projects might produce different results. However, should a secondary market show a substantial distortion, there is no reason why CBA could not model such distortion. Therefore, under normal circumstances, properly conducted CBAs and CGEs should not produce meaningful differences.

- Indirect effects (beyond the main group of strongly interrelated markets) may be ignored (i) if the project is not going to produce large price changes in the rest of the economy and there are no distortions; and (ii) if they are large in absolute terms but not expected to be significantly different compared with the counterfactual.

- The multiplier effect can be ignored if it similarly affects both the project and the alternative. The absolute value of the multiplier effect of the project is not incremental and therefore is irrelevant to the estimation of its net present value.

- A health, education or transport project must be judged for its potential to improve health status, increase human capital or reduce generalized cost. Including multiplier effects in the net present value confuses the social appraisal of projects with impact studies, and may hide poor value for money.

- A project with negative social net present value reduces social welfare (in efficiency terms). Adding the multiplier effect is not going to change its net social value. Nevertheless, when choosing between mutually exclusive projects, both with positive net present value, and when there is evidence of a significantly different multiplier effect between them, the net difference of these effects should be included. Even in this case, only the price-marginal social cost gap applies.

- Both CBA and CGE are based on simplifications of the actual economy. It is practically impossible to cover all possible impacts of a project under evaluation. The case of agglomeration benefits is illustrative. Both conventional CBA and CGE need to be supplemented when changes in proximity increase productivity in a significant way.

- It is crucial to distinguish between redistribution and growth, i.e. gross and net effects. CBA aims to calculate the net welfare effect of a project, and the inclusion of transfers and gross benefits artificially inflates the value of the project. CBA is strictly constructed on an incremental basis, and double-counting must be avoided. CGE can be used to calculate a project's net welfare effects, but the counterfactual must account for the indirect and induced effects of the resources in the alternative use.

- The treatment of labour is possibly one of the main sources of potential divergence between CBA and CGE in a practical application. In contexts of high unemployment, it is easy to forget that any welfare effect of a fall in unemployment must be net of its social opportunity cost. The way CBA deals with job creation is through shadow pricing. The value of these accounting

prices varies substantially with the specificities of the labour market. Again, the key is to begin any assessment with a general equilibrium cost-benefit rule.

- In the case of high unemployment, the successive round of effects (employment multiplier) might imply additional benefits related to the creation of additional jobs, but the distinction of net effects (both net of opportunity cost and with respect to the alternative) is crucial to avoid a gross overestimation of the welfare effect of the project.

- Distributional and location effects are challenges both for CBA and CGE. Standard models must be supplemented with a more specific treatment of the interactions between initial gains and the existence of fixed factors and labour heterogeneity. Though, in principle, CGE models are useful for studying the distribution of surpluses, the difficulties of identifying the final beneficiaries and the spatial distribution of efficiency gains, when multiple equilibria are possible, require further research efforts.

- A useful way to deal with distributional issues is to display how different groups are affected by the project. Another is to use a specific social welfare function. Displaying how different groups are affected should be a part of project appraisal.

- Uncertainty pervades most assessments and presents a challenge for both CBA and CGE. There are doubts in various dimensions; not least when it comes to parameters (such as discount rates) and other data. But uncertainty may also pertain to specifics of the project itself, e.g. irreversibility. To date, we lack methods to estimate such values with any precision, regardless of the measurement approach.