POLICY NOTE OF WORKING PAPER 6.1

DETAILED POLICY IMPACT MODEL

1. OBJECTIVES

This report provides a detailed description of the economic model that has been developed for estimating the likely impacts of certain policy prescriptions arising from research results of earlier work packages. The specific model construct chosen is the GMR (Geographic Macro and Regional) modelling approach that has been applied earlier for Cohesion policy and EU Framework Program impact analyses at the levels of European regions, the European Union and Hungary. The particular country chosen for impact analysis is Turkey. This choice is motivated by practical reasons: availability and reliability of data for modelling. Though data collection for Turkey is not a process without difficulties the situation in this respect is relatively more advantageous there as compared to other ENP countries (with the exception of Israel which cannot be considered as a typical ENP country for other reasons). Turkey is an accession country but in several respects its economic, social and cultural features make this country reasonably comparable to many of the ENP countries. The objective of this report is to introduce GMR-Turkey. Its applications in actual policy analyses will be reported in working papers and in other deliverables.

The GMR framework is developed and extended in order to test as many policy suggestions generated in earlier work packages of SEARCH as possible. However, not every policy suggestions can be implemented in an economic impact model. Suggestions related to institutions are among them. This explains our choice to focus on prescriptions arising from WPs 2, 3 and 4. Instruments implemented in GMR-Turkey reflecting SEARCH policy suggestions are categorized into the following classes: (i) general *macroeconomic* (space-neutral) policy instruments (such as policies promoting increasing trade with EU countries, incentives for more intense FDI activity, policies supporting temporary migration, specific government tax and expenditure regulations to foster research activities and innovation collaborations); (ii) r*egional/local* (place-based) interventions (such as investment support of SMEs, research subsidies, promotion of more intense local knowledge flows and international scientific networking, physical infrastructure construction, promotion of human capital development by supporting education, place-specific incentives for attracting FDI).

2. SCIENTIFIC METHOD

The geographic macro and regional modeling (GMR) framework has been established and continuously improved to better support development policy decisions by ex-ante and ex-post scenario analyses. Policy instruments including R&D subsidies, human capital development, entrepreneurship policies or instruments promoting more intensive public-private collaborations in innovation are in the focus of the GMR-approach.

The GMR-framework is rooted in different traditions of economics. It incorporates insights and methodologies developed in the geography of innovation field when modelling the spatial patterns of knowledge flows and the role of agglomeration in knowledge transfers. Interregional trade and migration linkages and dynamic agglomeration effects are modelled with an empirical general equilibrium model in line with the tradition of new economic geography, while specific macroeconomic theories are followed in modelling macro level impacts.

GMR models reflect the challenges of incorporating regional, geographic and macroeconomic dimensions in development policy impact modelling by structuring the system around the mutual interactions of three sub-models such as the Total Factor Productivity (TFP), Spatial Computable General Equilibrium (SCGE) and macroeconomic (MACRO) model blocks. Following this approach the macroeconomic model of GMR-Turkey calculates policy impacts at the national level while the 26 NUTS 2-level regional models provide results at the regional level. The model system provides policy simulation results for the 2015-2025 time period.

The mutually connected three model-block system works together as follows. Without interventions TFP growth rate follows the national growth rate in each region. The impacts of interventions run through the system according to the following steps.

1. Resulting from R&D-related interventions as well as human capital and physical infrastructure investments (which increase public capital and eventually impact the level of TPF as well) regional Total Factor Productivity increases.

2. Changing TFP induces changes in quantities and prices of output and production factors in the short run while in the long run (following the mechanisms described above) the impact on in-migration of production factors imply further changes in TFP not only in the region where the interventions happen but also in regions which are connected by trade and factor migration linkages.

3. Increased private investments expand regional private capital which affects further changes in regional variables (output, prices, wages, prices, TFP, etc) in the SCGE model block. The impact of private investment support affects the macro model as well via increased private capital.

4. For each year changes in TFP are aggregated to the national level then this increases TFP in the macro model as time specific shocks. The macroeconomic model calculates the changes in all affected variables at the national level.

5. Changes in employment and investment calculated in the MACRO block are distributed over the regions following the spatial pattern of TFP impacts.

6. The SCGE model runs again with the new employment and capital values to calculate short run and long run equilibrium values of the affected variables.

7. The process described in steps 5 and 6 run until aggregate values of regional variables calculated in the SCGE model get very close to their corresponding values calculated in the MACRO model.

3. MAIN RESULTS

This report provides only a detailed description of the model system and its estimation/calibration procedure. The main result is therefore an integrated geographic-macroeconomic model system fit for the specific features of the Turkish economy. The report provides some sensitivity analysis with respect to changes in the macroeconomic conditions. In brief, these analyses show that the effect of development policy interventions (under one specific

specification for these interventions) is lower when the economy is hit by a positive shock to external demand, generally higher when the expenditure structure of the government is shifted in favor of investments, higher when the overall productivity growth is higher, and also higher if the economy's steady state growth path is higher.

4. POLICY VALUE-ADDED

As indicated previously, the aim of this report is to provide a description of the estimated model system and its internal working mechanisms. In the light of this aim, the report has an indirect policy value-added by providing a policy simulation framework for Turkey. This framework will be directly used for policy impact analysis in a further deliverable of the project, contributing to direct policy value-added.