GTAP related activities of CPB Netherlands Bureau for Economic Policy Analysis, 2009/2010

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This is a summary of our GTAP-related activities since the 2009 GTAP Board Meeting and a brief preview of further GTAP-related projects for 2010.

We finished documentation on the improvements of the WorldScan model that were made in de EU-funded Models project (CPB Memoranda 229, 242 and 244, CPB Document 201). These model improvements aim at improved impact assessments with WorldScan of the different policy proposals to raise productivity in the EU. We published a modelling approach to assess the additional costs of the adoption of renewable energy technologies in power generation in the EU (CPB Discussion Paper 142). In joint work with DG ECFIN we explored the impacts on financial transfers to emerging market economies if one would redefine CDM as the mitigation contribution over and above own abatement efforts in these countries (European Economy Economics Papers 406). Finally, we contribute to the GTAP conference with a paper that analyses the impacts of human capital and trade policies in Nicaragua and Costa Rica.

Our planned work for 2010 includes further contributions in the field of assessing EU Lisbon Agenda proposals and in the field of climate change policies. In joint work with the PBL Netherlands Environmental Assessment Agency we are extending the climate change version of the WorldScan model with air pollutants and non-CO_2 greenhouse gases to analyse the interplay of climate change mitigation and air pollution policies. Together with Stuttgart University we are working on the integration of ‘bottom-up’ information from detailed energy models at the EU member state level with WorldScan. Finally, we will calibrate the WorldScan model on the time-series of global databases that are being developed in the EU-funded WIOD project and assess the advantages of using these data.

WorldScan related publications 2009/2010:

Boeters, S. and N. van Leeuwen, 2010, Modelling Labour Supply, Wage Bargaining and Unemployment in a CGE framework, CPB document 201

This paper describes a labour market extension for the CGE model "WorldScan". The labour market module features endogenous labour supply at two margins: participation and hours of work. Involuntary unemployment is captured through a collective bargaining ("right to manage") set-up. The paper explains how these two labour market mechanisms interact and how they are calibrated to empirical elasticities. Illustrative simulations that can be placed in the context of the "double dividend" literature show the working mechanisms of the module.

Leeuwen, N. van and S. Boeters, 2009, Skill splits of labour input values in GTAP An approach based on ILO and UBS data, CPB memorandum 229

Hopman, C. and H. Rojas-Romagosa, 2010, The relation between competition and innovation: Empirical results and implementation into WorldScan, CPB Memorandum 242

We analyse the theoretical and empirical relation between changes in competition levels and innovation efforts. Using OECD panel data we find a positive and significant elasticity of 1.8 between competition (measured as one minus the Lerner index) and innovation (measured as R&D intensity). This result is similar to other studies that find a monotonic relation between both variables. However, we do not find and inverted-U relationship as in the influential paper by Aghion et al. (2005). Using the theoretical insights and our own empirical results we include this relationship into WorldScan –CPB's multicountry recursive dynamic CGE model. Although the impact of competition changes on R&D expenditures can be significant at the sectoral level, our simulations using WorldScan do not result in significant macroeconomic changes when the link between competition and innovation is present.

Rojas-Romagosa, H., 2010, Modelling Human Capital Formation in WorldScan, CPB Memorandum 244

We build new modelling capabilities in WorldScan –CPB's multicountry recursive dynamic CGE model– to address policy questions related to human capital and skill formation. To achieve this goal we revise and update the human capital satellite model by Jacobs (2005). In addition, new features are introduced into WorldScan to deal with human capital policies: i) a new production structure that incorporates capital-skill complementarity; ii) a constrained supply of high-skill workers in the R&D sector and; iii) more information is taken from the satellite model (i.e. skill-specific labour supply and efficiency changes, instead of only aggregated labour efficiency changes). Finally, this new version of WorldScan is used to evaluate current EU human capital policies. The new results have a similar dynamic pattern of macroeconomic pattern than previous WorldScan versions. However, now the Lisbon skill targets have a higher impact, while the R&D targets have lower effects due to the R&D workers constraints.

Boeters, S. and J Koornneef, 2010, Supply of Renewable Energy Sources and the Cost of EU Climate Policy, CPB Discussion Paper 142

What are the excess costs of a separate 20% target for renewable energy as a part of the EU climate policy for 2020? We answer this question using a computable general equilibrium model, WorldScan, which has been extended with a bottom-up module of the electricity sector. The model set-up makes it possible to directly use available estimates of costs and capacity potentials for renewable energy sources for calibration. In our base case simulation, the costs of EU climate policy with the renewables target are 6% higher than those of a policy without this target. As information on the supply of renewable energy is scarce and uncertain, we perform an extensive sensitivity analysis with respect to the level and steepness of the supply curves for wind energy and biomass. In the range we explore, the excess costs vary from zero (when the target is not binding) to 23% (when the cost progression and the initial cost disadvantage for renewables are doubled).

Hayden, M., P.J.J. Veenendaal and Z. Zarnic, 2010, Options for International Financing of Climate Change Mitigation in Developing Countries, European Economy Economic Papers 406, Brussels

This paper provides a model-based analysis of the potential macro-economic impacts of different options for international financing of climate change mitigation in developing countries. The model used is the climate change version of WorldScan, which is a multi-region and multi-sector applied general equilibrium model. The adopted framework implements existing carbon market mechanisms and considers alternative options of financing in the post-2012 period. The paper assesses the theoretical potential of sectoral crediting mechanisms and incentives for participation of developing countries in financing climate change actions. Following the outcome of the UNFCCC conference in Copenhagen, it makes no specific assumptions about the future international climate regime. The analysis suggests that more of a carbon market we have when moving from the project-based CDM to sectoral crediting mechanisms and internationally linked cap-and-trade, the more finance the carbon market will channel to developing countries. Relative to the baseline in 2020, global emissions fall by more than 24% at a cost of 0.3% of world Gross Domestic Product (GDP), while the international financial transfers to developing countries amount to a tentative €32 billion. The improved environmental outcome comes foremost from enhanced participation of developing countries that start to take on targets. A consideration of the current financial crisis in the baseline translates into relatively lower costs of all policy options, because the emission targets are defined in terms of pre-crisis emission levels.

Rivera, L. and H. Rojas-Romagosa, 2010, Human Capital Formation and the Linkage between Trade and Poverty: The Cases of Costa Rica and Nicaragua, paper presented at the Thirteenth Annual Conference on Global Economic Analysis "Trade for Sustainable and Inclusive Growth and Development" , Penang

We combine different analytical instruments to assess the impact of human capital and trade policies on macroeconomic aggregates and poverty, and how both sets of policies complement each other in Costa Rica and Nicaragua. We use a top-down approach --i.e. a dynamic CGE model and microsimulation-- to assess the effects of two FTAs: DR-CAFTA and EU-CAAA on production and poverty. Moreover, we use a human capital satellite model to evaluate the impact of human capital formation. Combining the satellite model with the CGE model and the

microsimulations, we construct a rich analytical framework to assess the direct effect of each set of policies on poverty and how these policies complement each other. We find that human capital policies have a significant and permanent effect on growth and this is associated with poverty reductions. On the other hand, the static efficiency changes associated with trade liberalization have positive but small growth and poverty effects.

The main objective of this study is to estimate the impact of trade and human capital formation on poverty, and assess the complementarities between both sets of policies. To achieve this goal we use several methodologies. First, we build a dynamic Computable General Equilibrium (CGE) model and use it to analyze the macroeconomic effects of two FTAs (DR-CAFTA and EU-CAAA). Secondly, using a top-down approach, we assess the microeconomic effects on households when the macro policies are implemented. Finally, we implement a human capital satellite model and use it to assess the effects of human capital policies on labor efficiency and labor supply by different skill types. We then interlink the satellite model with the CGE model to interact trade and human capital policies at the macro level. The combination of these methodologies enables us to conduct a rich analysis of each policy (education and trade), their interactions and complementarities.