Three Essays on Black Sea Grain Markets

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Imperfect Mobility and Heterogeneous Labour in CGE Modelling

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The dissertation consists of the following articles:


Summary

The representation of labour markets in Computable General Equilibrium (CGE) models is characterised by a trade-off between data representation and data availability. Models are by definition abstract and simplified pictures of the real world: as a map of scale 1:1 does not help to find an unknown destination, a model which perfectly depicts the real world would hardly help to analyse adjustment effects of policy changes or macroeconomic shocks. When the analysis is focused on distributional issues, it seems obvious that such an analysis can only be based on models that differentiate at least more than one household group. Household groups characteristically differ in factor endowment and since factor income—besides price effects— is a main determinant of welfare analysis, the specification of labour markets crucially determines the analysis. There are mainly two possibilities to specify the labour market in a CGE model: First, the labour market can be set up as competitive market with perfect substitutability between individual workers on that market. With this setup, wages must be equal among labour types and sectors because every difference in wages provokes adjustments, which finally equalise wages again. In contrast, data reports typically significant wage differences between labour types that can only originate from imperfect labour markets. Thus, the second option is to depict these wage differences by imperfect substitutability of individual workers in the production process. But data on substitution possibilities of labour demand between different labour types is weak and estimations of substitution elasticities are in most of the cases not available.

Meanwhile, in the real world, wages differ in various dimensions and in models labour types are typically differentiated by age, gender, skill level or occupation. When differentiating labour types within these dimensions, wage differences become possible and can be explained by transformation limitations between characteristics: e.g., wage differences between female and male workers are
originating from the fact that female workers cannot become male workers. This differentiation has
the effect that in most of the models, transformation between the characteristics of a dimension is
no longer possible and workers stay in a specific labour type. Typically labour types are not
differentiated by sector of employment and, thus, are assumed homogeneous amongst sectors.
Movement of workers between sectors seems possible; nevertheless, data reports partly huge wage
differences between different sectors of an economy. As a solution, CGE models typically include an
efficiency parameter which allows calibrating the model according to the data, but the model
assumes still homogeneous labour which should be priced equal. Thus, the efficiency parameter
does not economically explain the existence of these wage differences.

Against this background, this thesis develops a comprehensive framework to model imperfect
mobility in CGE models. First, the article on ‘Relaxing Israeli Restrictions on Labour: Who
Benefits?’ introduces a single country CGE model for Israel with a detailed depiction of the labour market and a
nested Constant Elasticity of Substitution (CES) production process. Based on this model, the second
article on ‘Factor Mobility and Heterogeneous Labour’ introduces imperfect mobility between
sectors with a migration function. It furthermore develops the possibility to change between sector
and factor specific productivity, which is used to estimate productivity effects from factor
reallocation. This theoretical approach is applied in the third article on ‘Labour market flexibility and
costs of adjustment’ to analyse the macroeconomic costs of intersectoral labour reallocation found
in several empirical studies.

The thesis concludes that nested factor demand is useful to depict heterogeneity of factors. A main
critic to this approach is the non-availability of required additional parameters, thus, substitution
elasticities are mostly based on educated guesses instead of empirically estimates. However, careful
sensitivity analyses show stable results for a wide range of elasticity values. The value of a
substitution elasticity affects the results significantly only for extreme values or in combination with
factor specific productivity, when productivity differences are huge, but this is more a matter of the
productivity setup. Stronger than the value of the elasticity, the nesting structure and nesting
hierarchy seem to matter for the model outcomes.

When labour moves from less to more productive sectors, an economy experiences a de facto
increase in labour endowments, which is an important part in the explanation of economic growth.
Empirical evidence suggests, however, that labour migrating between sectors experiences wage
losses and that labour types are not perfectly mobile across sectors. Neglecting factor reallocation
costs and factor specific productivity in CGE-modelling might overestimate the size of potential
adjustments in the labour market as a response to exogenous shocks and, thus, affect simulation
results; this is the research question in the second article. Productivity effects from labour
reallocation are an important driver for model outcomes, macroeconomic results change completely
in the second article when excluding them. The productivity effects are larger the more reallocation
takes place, and the higher the mobility of labour is assumed. They depend also on the size of
differences in sectoral wages. The relevance of productivity effects for model outcomes indicate
that the assumption of full mobility might overestimate positive macroeconomic effects accruing, e.g.,
from trade liberalisation.

Several empirical studies show that workers, who change sectors, can experience large and
persistent wage losses. Responsible for these losses are primarily two effects: lower incomes during
unemployment, and lower wages upon reemployment. Neglecting these reallocation costs
overestimates the possibility of adjustment for an economy as well as the welfare benefits of policy
reforms. The third article shows, that costs of labour reallocation, which decrease labour mobility,
matter on the macroeconomic level, affect the whole economy and especially income distribution.
Workers who would migrate but are hindered due to the related costs, are the ones to lose the
most. Provided the adjustment leads to inflow of workers in the more productive sectors of an economy, the losers are relative low waged workers in the less productive sectors and the income gap widens.

This thesis presents a comprehensive and flexible framework to introduce imperfect factor markets in CGE models. Labour mobility between labour types is controlled by migration functions where the degree of mobility is controlled by elasticities that govern the responsiveness of migration to changes in relative wages. Finally, the model provides the user with three additional instruments to control the operation of labour markets. First, the user can control the stock flow relationship for each labour type, e.g., does a migrating worker keep her productivity from the initial activity, adopt that of the destination activity or something in between; second, the user controls the flexibility of the labour market by setting the migration elasticities between activity blocks; and third, the setting of adjustment parameters determines the (assumed) costs of migrating. The analysis of productivity effects and costs of factor reallocation emphasises the relevance and influence of labour market specifications on model outcomes. Thus, this thesis sets the base for a careful setup and test of labour market assumptions applied in CGE models.