INTERNATIONAL CONFERENCE ON POLICY MODELING (ECOMOD 2009)
OTTAWA, JUNE 24-26, 2009

The impact of different agricultural labor market specifications on agricultural employment and income development under different agricultural policies

Andrzej Tabeau and Geert Woltjer
The Agricultural Economics Research Institute (LEI), The Netherlands

FIRST DRAFT. No Citations, please

28-4-2009

Abstract

In this paper we assess the impact of different agricultural labor and capital market specifications on agricultural employment and income under different agricultural policies. We derive a dynamic agricultural employment equation linking changes in agricultural employment with changes in income per worker earned in agriculture compared with that in other sectors. We implement the estimated equation in a Computable General Equilibrium model based on the Global Trade Analysis Project model – GTAP (Hertel, 1997). In order to analyze the effects of agricultural policies on the agricultural sector, we run a reference policy scenario including EU direct payments decoupling, EU milk quota abolition and the EU agricultural offer in the WTO negotiations. In order to analyze the effects of the new dynamics on the agricultural factor markets, we compare simulation results with the new dynamics with a perfect competition run as applied in standard GTAP and CET labor and capital supply functions as implemented in GTAP-AGR model (Keeney and Hertel, 2005). We show how the new dynamics makes the long-run simulations much more plausible and makes it possible to show the effects of different timings of reforms on agricultural income and employment.

1. Introduction

A commonly recognized characteristic of economic development is the long-term shift of economic activities from agriculture to industry and services, which leads to a decrease of the share of agriculture in total employment and output. This process is influenced by agricultural policy reforms which currently aim to strengthen the role of market signals in the decision process concerning structure and size of agricultural production. The reduction and decoupling of agricultural support and trade liberalization also lead to worldwide structural adjustments and changes in allocation and use of agricultural resources and production factors.

In this paper we assess the impact of different agricultural labor and capital market specifications on agricultural employment and income under different agricultural policies. We derive a dynamic agricultural employment equation linking changes in agricultural employment with changes in income per worker earned in agriculture compared with that in other sectors. We implement the estimated equation in a Computable General Equilibrium model based on the Global Trade Analysis Project model – GTAP (Hertel, 1997). This multisector multi-region CGE model, allows us to capture inter-country effects and sectoral tradeoffs inherent in agricultural reforms, and production factors substitution.

In order to analyze the effects of agricultural policies on the agricultural sector, we run a reference policy scenario including EU direct payments decoupling, EU milk quota abolition and the EU agricultural offer in the WTO negotiations[1]. In order to analyze the effects of the new dynamics on the agricultural factor markets, we compare simulation results with the new dynamics with a perfect competition run as applied in standard GTAP and CET labor and capital supply functions as implemented in GTAP-AGR model. We show how the new dynamics makes the long-run simulations much more plausible and makes it possible to show the effects of different timings of reforms on agricultural income and employment.

This article is organized as follows. Section 2 describes the GTAP model in general and the GTAP employment equations in particular. The dynamic agricultural employment equation and its estimation results are presented in the section 3. The GTAP database and scenarios are introduced in Section 4. Section 5 describes the simulation results concerning agricultural income and employment and discusses the effects of different labor market specification on the obtained results. We close with conclusions in the final section.

2. GTAP model: general overview and employment modelling

The GTAP model is a multi-regional, multi-sectoral, static, applied general equilibrium model based on neo-classical microeconomic theory (see Hertel, 1997). In the extended GTAP version (van Meijl et al. 2006) we are using, production is modeled using multilevel nested CES. In the primary value added nest, the substitution of different primary production factors (land, labor, capital and natural resources) and some intermediate production factors (energy, and animal feed components) is explained by multilevel CES production function. The CES nest is also introduced to take into account substitution possibility between different energy sources including biofuels (Banse at al., 2008). We use fixed input-output coefficients for the remaining intermediate inputs.

On the consumption side, one household per region is distinguished. It distributes its income across savings and (government and private) consumption expenditures according to fixed budget shares. Consumption expenditures are allocated across commodities according to a non-homothetic dynamic CDE expenditure function which allows for changes in income elasticities when PPP-corrected real GDP per capita changes. Government expenditures are allocated across commodities according to fixed shares. The commodities consumed by firms, government and households are CES composites of domestic and imported commodities. In addition, the imported commodities are differentiated by region of origin using Armington elasticities.

Regional endowments of labor, capital and natural resources are fixed and fully employed and land supply is modeled by land supply curves (Eickhout et al. 2008), which specify the relationship between land supply and a land rental rate. Labor is divided into two categories:

[1] European Communities, 2005, The EU Agriculture Offer – Key Elements, Fact Sheet, The 6th WTO Ministerial Conference, Hong-Hong, 13-18 December, 2005

skilled and unskilled. These categories are considered imperfect substitutes in the production process.

Land and natural resources are heterogeneous production factors, and this heterogeneity is introduced by using CET transformation functions which allocate these factors among the sectors. For capital and labor markets two possibilities are distinguished. First, we assume perfect capital and labor mobility across users, which leads to common prices of these endowments across the sectors. This is the formulation used in the standard GTAP model, but is not supported by empirical evidence. Wage differentials between agriculture and non-agriculture can be sustained in many countries through limited off-farm labor migration (De Janvry et al., 1991). Returns to assets invested in agriculture also tend to diverge from returns of investment in other activities. Therefore, the second approach assumes that capital and labor markets are segmented between agriculture and non-agriculture. They are assumed to be fully mobile within each of these two sectors, but imperfectly mobile across them. This leads to differences in prices of capital and labor between agriculture and non-agriculture. This is incorporated by specifying a CET structure as applied in GTAP-AGR model (Hertel and Keeney, 2005) that transforms agricultural labor (and capital) into non-agricultural labor (and capital).

3. A dynamic employment equation

In GTAP-AGR model, CET elasticities between agricultural and non-agricultural capital and labor prices are typically less than or equal to 0.5 (Hertel and Keeney, 2005). This implies that agricultural policy changes mainly effect the prices of agricultural labor and capital and have a relatively small effect on agricultural employment. To overcome this problem, we implement a dynamic agricultural employment equation to the model which explains the agricultural employment by agricultural relative to non-agricultural wages. This relationship is consistent with the theoretical Harris and Todaro (1970) model describing rural-urban migration, which asserts that rural to urban migration rate will be zero when the expected rural income equals the expected urban income.

In our application, we use value added per worker in a sector as an indicator for the remuneration in the sector because this is the only measure that is available. In agriculture, all allocations of this value added over labor, land and capital is ad hoc and therefore not very informative. We assume that employment of labor and capital is stable when remuneration per unit of labor in agriculture is a certain percentage of that in the other sectors. This percentage may differ between countries, for example because relative capital intensity may differ between different countries. When value added per worker in agriculture becomes lower than this threshold level, people will leave the sector. So, the outflow of labor (and capital) from agriculture depends on relative value added per worker.

For some countries, especially less developed countries, growth of labor force may be accommodated in the agricultural sector. For that reason growth of total labor force is also included as an explanatory variable. So, we get the following relationship:

$$\dot{L} = \alpha_0 + \alpha_1 \dot{L}_{-1} + \alpha_2 \dot{L}_{-2} + \alpha_3 \left(\frac{VA_{Agr}}{VA_{NAgr}} \right)_{-1} + \alpha_4 \dot{F} \qquad (1)$$

or written as an error correction model:

$$\dot{L}-\dot{L}_{-1}=\alpha_2\left(\dot{L}_{-1}-\dot{L}_{-2}\right)-(1-\alpha_1+\alpha_2)\left[\dot{L}_{-1}-\frac{\alpha_0}{(1-\alpha_1+\alpha_2)}-\frac{\alpha_3}{(1-\alpha_1+\alpha_2)}\left(\frac{VA_{Agr}}{VA_{NAgr}}\right)_{-1}-\frac{\alpha_4}{(1-\alpha_1+\alpha_2)}\dot{F}\right]$$

where $\dot{L}$ = ΔlogL is a relative change in labor use in agriculture, $\left(\frac{VA_{Agr}}{VA_{NAgr}}\right)_{-1}$ is value added in agriculture divided by value added outside of agriculture, with a time lag of one year, $\dot{F}$ =ΔlogF is the relative change in labor force in the economy and α_i (i=1,2,3) are model parameters.

So the long-run relationship is

$$\dot{L}=\frac{\alpha_0}{(1-\alpha_1-\alpha_2)}+\frac{\alpha_3}{(1-\alpha_1-\alpha_2)}\left(\frac{VA_{Agr}}{VA_{NAgr}}\right)+\frac{\alpha_4}{(1-\alpha_1-\alpha_2)}\dot{F}$$

or

$$\dot{L}=\beta_0+\beta_1\left(\frac{VA_{Agr}}{VA_{NAgr}}\right)+\beta_2\dot{F} \qquad (1)$$

where

$$\beta_0=\frac{\alpha_0}{(1-\alpha_1-\alpha_2)},\ \beta_1=\frac{\alpha_3}{(1-\alpha_1-\alpha_2)},\ \beta_2=\frac{\alpha_4}{(1-\alpha_1-\alpha_2)}.$$

Equation (1) can be rewritten as:

$$\dot{L}=\beta_1\left(\frac{VA_{Agr}}{VA_{NAgr}}+\frac{\beta_0}{\beta_1}\right)+\beta_2\dot{F}\,. \qquad (2)$$

and interpreted as follows: agricultural employment increases when total labor force *F* increases or when the agricultural wage is higher than a certain fraction of non-agricultural wage. This wage can be interpreted as a reservation wage, i.e., $VA_{Agr}>\frac{-\beta_0}{\beta_1}VA_{NAgr}$. In this formulation β_0 should be negative, and β_1 and β_2 positive. Negative β_0 is required to get the positive reservation wage and positive β_1 and β_2 is necessary to get a positive impact of agricultural wage increases and increases in the labor force on agricultural employment. It is worth noting that according to equation (2), agricultural employment can change even if wages and labor supply remain unchanged. With unchanged wages and labor force, the agricultural employment remains unchanged only when the agricultural wage will be equal to reservation wage.

In order to quantify the specified relationship between agricultural employment growth, relative value added per worker and labor force growth the following regions are distinguished where we assume more or less the same responsiveness of the labor force:

- “old” EU member states: Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom;
- “new” EU member states: Czech Republic, Hungary, Poland, Slovak Republic;

- non-EU OECD countries: Australia, Canada, Japan, Korea, Norway, United States;
- Eastern European countries: Romania, Russian Federation, Ukraine, Turkey;
- South American countries: Chile, Ecuador, Mexico, Uruguay, Venezuela;
- Asian and Oceania countries: Philippines, Thailand, China, Indonesia.

For EU and OECD countries, the agricultural employment equation was estimated using 1979-2002 time series data for 25 major OECD countries derived from The Groningen Growth and Development Center (GGDC) database[2]. Additional unemployment rates data necessary to calculate labor force series came from World Development Indicators (WDI, World Bank, 2005). For other countries, we constructed the database concerning the necessary variables using the following 1979 - 2004 WDI data: industry, services and agriculture value added (constant 2000 US$), agriculture value added per worker (constant 2000 US$), labor force (total), employment in agriculture (% of total employment) and unemployment (% of total labor force). The data were available only for a limited number of developing countries and years. Therefore, we construct the regional panel data sets as indicated above.

The data (Table 1) show that in the period 1979 – 2002 (2004), labor supply was increasing in all analyzed regions. The most significant increase was observed in South American and Asian countries. The increase in East European countries (EU10 and Eastern Europe) was very small. Agricultural value added per employee was between wage 50 and 60 percent of non-agricultural value added per employee in OECD and EU countries, 43% in Eastern Europe and lower than 33% in South America and Asia. Despite relatively high employment remuneration and increasing labor availability, agricultural employment was decreasing in OECD, EU and Eastern European countries. The low value added per worker did not prevent agricultural employment increases in South America and agricultural employment stabilization in Asia. The strong labor force increase in South America could be a driving force behind the increase in agricultural employment in this region. However, the similarly high labor force increase observed in Asia did not drive agricultural employment in this region since the unemployment level in Asia is almost half of that in South America.

Table 1. Average yearly growth rats (in %) of agricultural employment and total labor force and, average agricultural to non-agricultural value added ratio by country groups in the sample.

	OECD not EU	EU15	EU10	Eastern Europe	South America	Asia
$\dot{L}$	-0.018	-0.027	-0.043	-0.022	0.022	0.004
VA_{Agr}/VA_{NAgr}	0.553	0.517	0.591	0.428	0.329	0.228
$\dot{F}$	0.014	0.009	0.003	0.004	0.029	0.025
Unemployment rate	5.500	7.800	10.660	8.420	9.730	5.510

The data analysis suggests that growth in labor supply has not a significant impact on agricultural employment and that agricultural value added per worker is lower that the

[2] See: http://www.ggdc.net/.

reservation wage and has strong impact on agricultural employment in OECD, EU and Eastern European countries. In Asia and South America, the data suggest a strong impact of labor force growth on agricultural employment. Comparison of agricultural employment and labor force growth rates suggest that agricultural value added per worker is lower than the reservation wage in Asia and close to the reservation wage in South Africa.

To estimate equation (1) we used Estimated Generalized Least Squares (EGLS) with the variance covariance matrix of disturbances estimated using Panel Corrected Standard Error (PCSE) methodology with cross section weights. We also assume cross-section fixed effects which allow for country specific reservation wages.

The estimation results are summarized in Table 2. Overall, the estimation results are satisfactory. The model fits data quite well, particularly if we take into account that the dependent variables are growth rates of agricultural employment. We have economically correct signs for all parameters and most parameters are significantly different from zero at or 5% or lower significance level.

Table 2. Estimation results of equation (1)

	OECD not EU	EU15	EU10	Eastern Europe	South America	Asia
VA_{Agr}/VA_{NAgr}	0.04*	0.07	0.11*	0.07	0.51	0.43**
C	-0.04	-0.06	-0.11	-0.06	-0.17	-0.10
$\dot{L}_{-1}$		0.14	-0.35		-0.42	-0.33*
$\dot{L}_{-2}$			0.20			
$\dot{F}$				2.11	0.86	1.43
R-squared	0.37	0.35	0.87	0.71	0.81	0.51
D-W	1.75	2.04	1.78	2.54	2.62	1.87
long term effect of VA_{Agr}/VA_{NAgr}	0.04	0.08	0.10	0.07	0.36	0.32
fraction $\frac{-\beta_0}{\beta_1}$ of non-agricultural wage	1.01	0.81	1.02	0.81	0.33	0.23

Notes: *=significant at 10% significance level, **=significant at 20% significance level, al other variables significant at 5% or lower significance level

The estimated reservation wage is consistent with our expectations and is close to non-agricultural value added per worker for high developed countries and is lower than one third of non-agricultural value added per worker for less developed countries. As expected, the estimated reservation wage is higher than agricultural value added per worker for high developed countries and close to agricultural value added per worker for less developed countries. According to the estimation results, an increase of agricultural value added per worker by 10% compared with non agricultural value added per worker causes agricultural employment to decrease which ranges between 0.4% for non-EU countries to 3.6% for South America. The labor force increase has statistically and economically significant impact on agricultural employment in Eastern Europe, South Africa and Asia. An increase of labor force by 1% rises agricultural employment by 2.1, 0.8 and 1.4 percent in Eastern Europe, South

Africa and Asia respectively. A number above 1 suggests that most growth of labor force primarily finds employment in the agricultural sector.

4. Scenarios and data

In order to simulate the impact of agricultural policies on agricultural employment and incomes, we implemented the estimated equations in the GTAP model. The analysis is based on version 6 of the GTAP database (Dimaranan ed. 2006). This database contains consistent data on a worldwide basis for 2001. The GTAP database contains detailed bilateral trade, transport and protection data characterizing economic linkages among regions, and consistent individual country input-output databases which account for intersectoral linkages. The social accounting data were aggregated to 36 regions and 25 sectors. The sectoral aggregation distinguishes all agricultural sectors. The regional aggregation includes all EU-15 countries, all EU-12 countries and the most important countries and regions outside EU from an agricultural production and demand point of view.

In order to analyze the effects of agricultural policies on the agricultural sector we run a reference policy scenario including EU direct payments decoupling, EU milk quota abolition and the EU agricultural offer in the WTO negotiations for the period 2001 - 2030. Besides the policy assumptions, the most important scenario assumptions driving the model results are those concerning macroeconomic development. The technical progress and the associated GDP growth as well as the population growth are important factors affecting the consumption development which in turn determines the production level. For our simulation experiment, we have taken the GDP and population growth projections provided by The Economic Research Service (ERS) Agency of the U.S. Department of Agriculture[3]. We assumed that capital stock will grow with the same rate as GDP and employment with the same rate as population.

Table 4. Main macro-economic scenarios assumptions: growth rates in 2001 – 2030.

	World	EU27	EU15	EU12	HighInc	C&S Amer	Asia	Africa	Rest of World
GDP	176	89	80	255	119	221	592	294	244
Technology	19	14	14	26	18	26	33	23	21
Population	38	-0.15	3	-10	21	36	39	82	4
Yields	77	31	36	19	66	59	92	118	31

Comments:

EU27: EU15+EU12, EU15: old 15 EU member states, EU12 new EU member state, High Inc: the high income countries – NAFTA, Japan, Korea, New Zeeland and Australia, C$SAmer: Central and South American countries without Mexico, Asia: Asian countries without Japan, Korea and Turkey, Africa: African countries, Rest of World: Former Soviet Union, Rest of Europe, Turkey

To obtain technical progress development assumptions, we did run the reference scenario with exogenously projected GDP targets were achieved through endogenously determined region specific technological change (Hertel et al., 2004). The growth of sectoral total factor productivity (TFP) is implemented as Hicks neutral technical change, where technological growth rates of agricultural, industrial and service sectors are different (CPB, 2003). For the

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[3] http://www.ers.usda.gov/Data/Macroeconomics/#BaselineMacroTables

projection of productivity growth in agriculture additional information on yields is derived from Bruinsma (2003).

In order to analyze the effects of the new dynamics on the agricultural factor markets, we compare simulation results with the new dynamic labor and capital supply equations with a perfect competition run as applied in standard GTAP model and CET labor and capital supply functions as implemented in GTAP-AGR model.:

- PM experiment assumes perfect mobility between agricultural and non-agricultural labor and capital;
- SM experiment assumes segmented capital and labor markets between agriculture and non-agriculture which is modeled by the CET function;
- DSM experiment assumes dynamic and segmented capital and labor markets between agriculture and non-agriculture which is modeled by the new dynamic agricultural employment equation.

In case of perfect labor and capital mobility the agricultural and non-agricultural wages are equal. In case of segmented labor markets modeled using the CES function, the percentage change of total employment in agriculture depends on the CET elasticity for changes of the relative agricultural wage compared with the economy wide wage. Since this elasticity is according to different studies lower than 1 (Abler, 2001, Hertel and Keeney, 2005 and Salhofer, 2001), agricultural employment is quite sticky in this type of model. In our simulation experiment we use elasticities equal to 1.

When the dynamic agricultural employment equation is used then agricultural employment can change even without change of wages and labor supply. This is the case when agricultural wage differs from the reservation wage. This introduces dynamics and flexibility to the agricultural employment development. The dynamic reaction of agricultural employment modeled by this equation depends not only on the parameter values of the equation but also on the initial agricultural-reservation wage ratio. To calibrate the dynamic agricultural employment equation in GTAP, we used our estimation results presented in section 3.

5. The impact of agricultural policy changes on agricultural employment and income

Figure 1 shows the agricultural employment development in the three simulation experiments. On the global level the PM and DSM experiments produce similar agricultural employment changes. The SM experiments yields significantly lower agricultural employment changes which shows that the CES specification of segmented markets yields relatively sluggish agricultural employment changes.

Despite the similarity on the global level, the regional pattern of agricultural employment changes is different in the PM and DSM experiments. The DSM experiment shows a lower decrease of employment in regions where the labor force is relatively cheap and lot of land is available or/and agricultural land productivity is expected to increase sharply, i.e. in Central and South America, Asia and Rest of the World. Consequently, higher decreases of agricultural employment in remaining regions are observed in the DSM scenario compared with PM scenario.

Figure 1. Agricultural employment development 2001-2030 (% change).

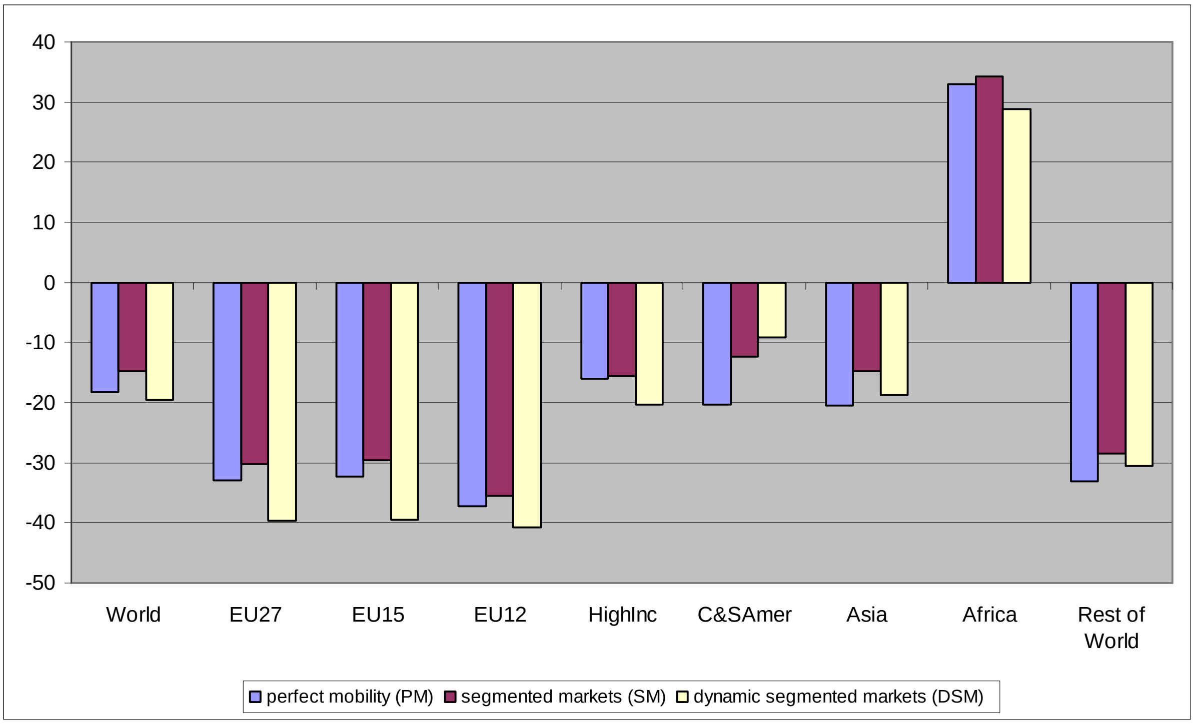
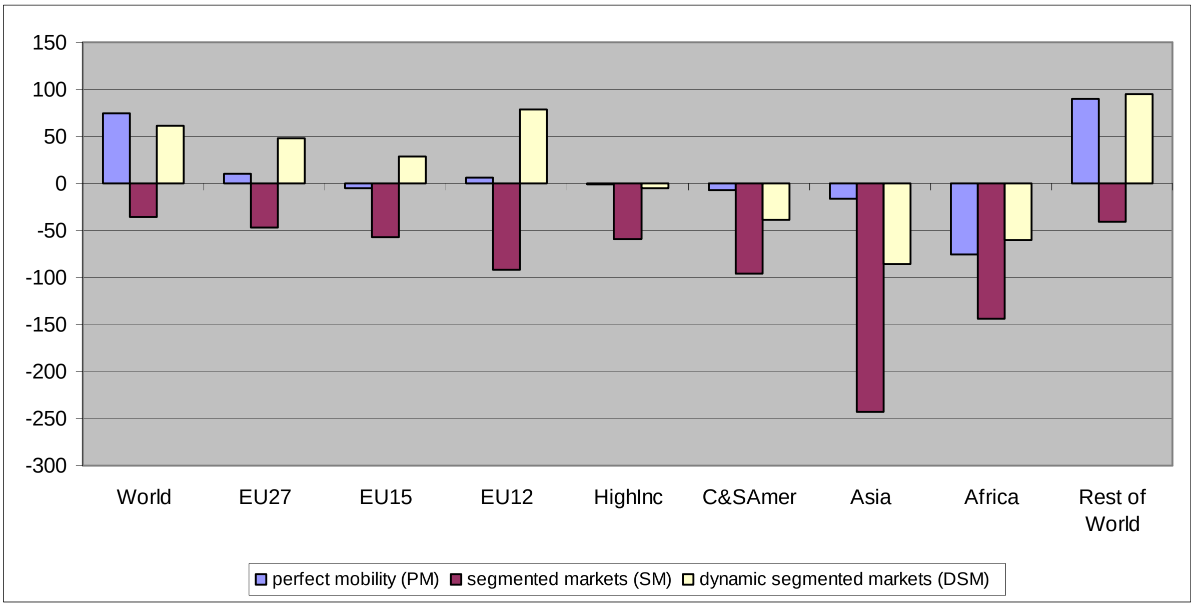


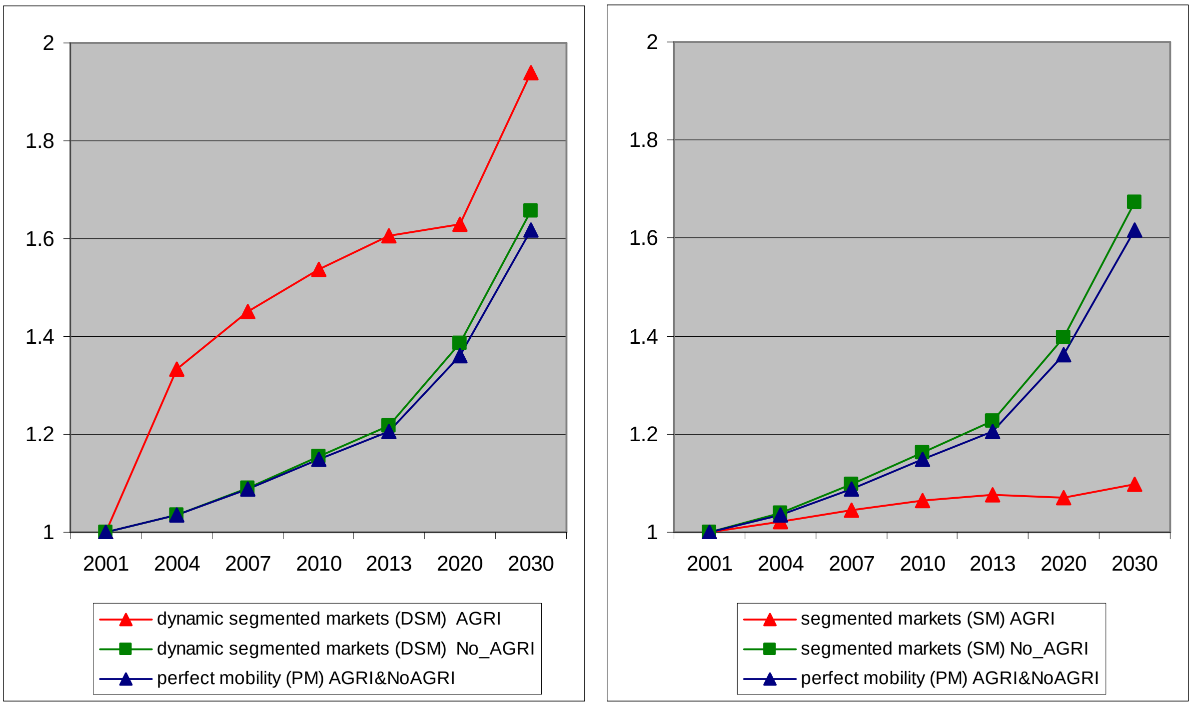
Figure 2. Relative agricultural wage to non-agricultural wage development 2001-2030 (% change).



The most important variable driving the agricultural employment is the agricultural wage development compared with non-agricultural wage development. Figure 2 shows the deterioration of relative agricultural to non-agricultural wages in all regions in the SM experiment. In two others experiments the relative agricultural to non-agricultural wage increases on the global level due to increases of agricultural workers remuneration in the EU and Rest of the World. In the remaining regions the relative agricultural wage decreases but much less than in SM experiment.

Figure 3 shows the dynamic development of the agricultural (AGRI) versus non-agricultural (No-AGRI) wages in the EU15 countries in all scenario experiments. In the DSM experiment the agricultural wages are catching up the non-agricultural wages while the SM experiment shows increasing wage divergence between agricultural and non-agricultural sectors. This seems to be an implausible result. The agricultural wages development in the DSM experiment shows that an implementation of AGENDA 2000, European Union enlargement and macroeconomic growth (equal about 1.45% per year) strengthens the wages in the EU15 agricultural sector in 2001 – 2004. On the other hand, the expected WTO reforms will temporarily decrease the speed of the catching up process of agricultural wages since in the same time the GDP is growing almost 2.1% per year. According to the DSM experiment, the decoupling of agricultural payments and milk quota abolition will not have negative impact on this process in 2004 – 2013.

Figure 3. Agricultural (AGRI) versus and non agricultural (No-AGRI) wages development in EU15 countries in 2001 -2030 under different experiments.



The specification of agricultural employment equation has a significant impact on the development of agricultural incomes per worker. The pattern of development of these incomes is closely related to that for agricultural employment and wages.

The PM and DSM experiments predict higher real agricultural income per worker than the SM experiment (Figure 4). In contrast with the SM experiment, they also predict that under CAP reforms real income per worker of the EU15 farmers will increase. In the DSM experiment, the EU15 agricultural incomes per worker will rise by 60% in 2001-2030 while the agricultural employment will decrease by 40%.

The dynamic segmented markets model shows the significant importance of short-run agricultural policy shocks on agricultural income per worker (Figure 5). For instance, the

AGENDA 2000 and enlargement of European Union together with GDP growth (1.45% per year) leads to increases of real agricultural incomes per worker by about 7% on a yearly basis in 2001-2004 while the effect of decoupling of direct payments mitigated by 2.1% increase of GDP per year is 0.5% decrease of the real agricultural incomes per worker on a yearly basis in the period 2004-2007. On the other hand, in the long–run, the model predicts a stable 1.6% increase of agricultural income per worker per year while the long-run GDP growth equals about 2.05% per year.

Figure 4. Development of real agricultural incomes per worker in 2001-2030 (% change).

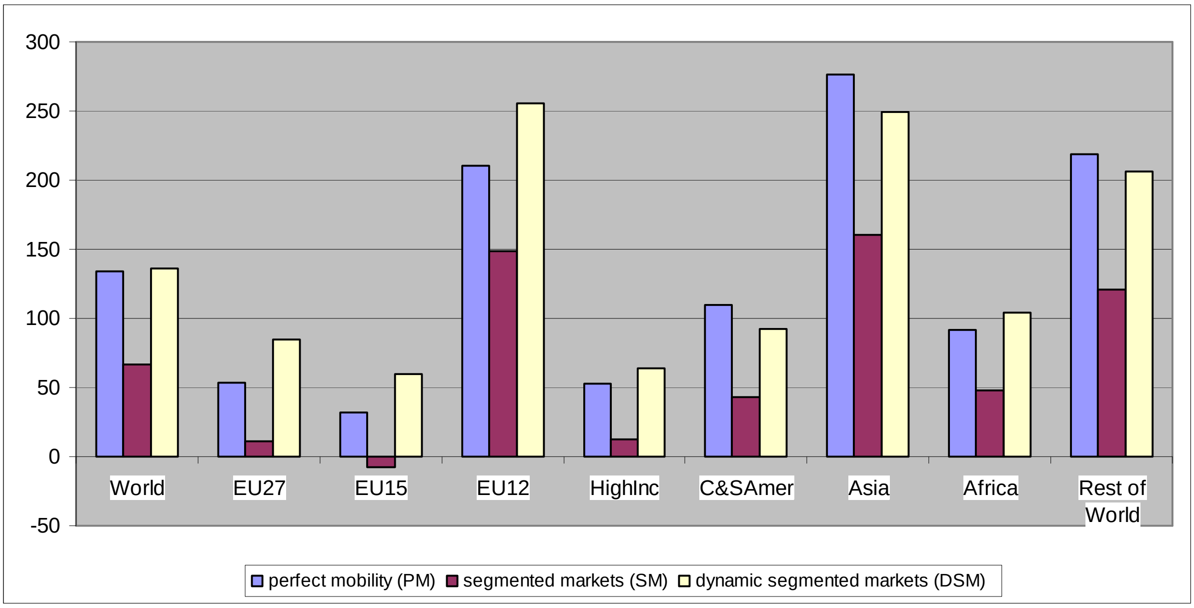
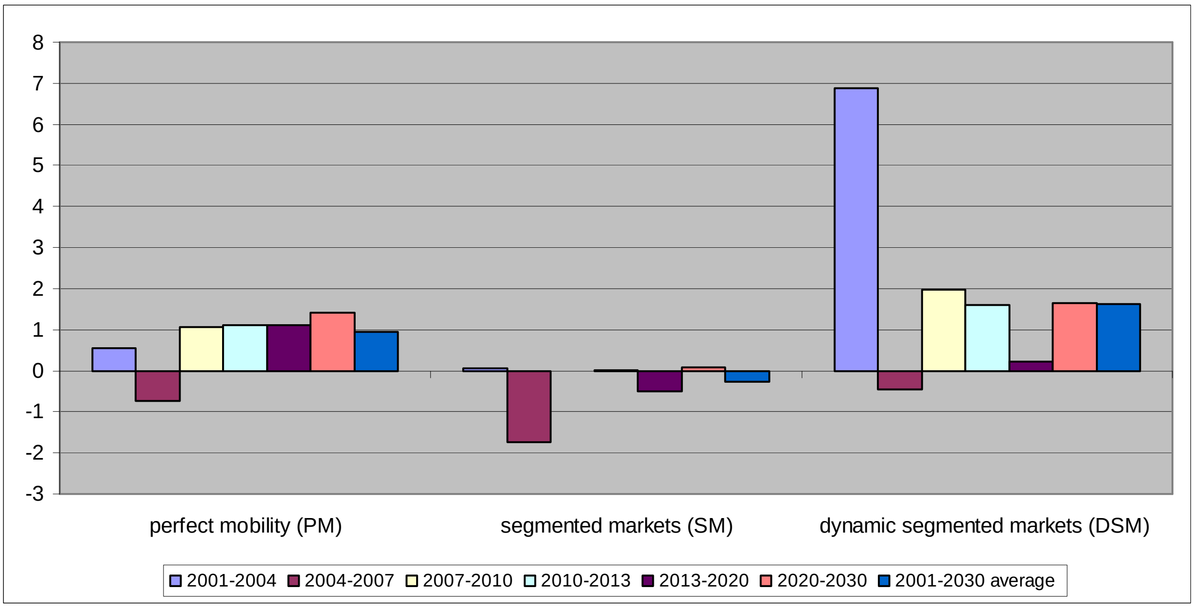
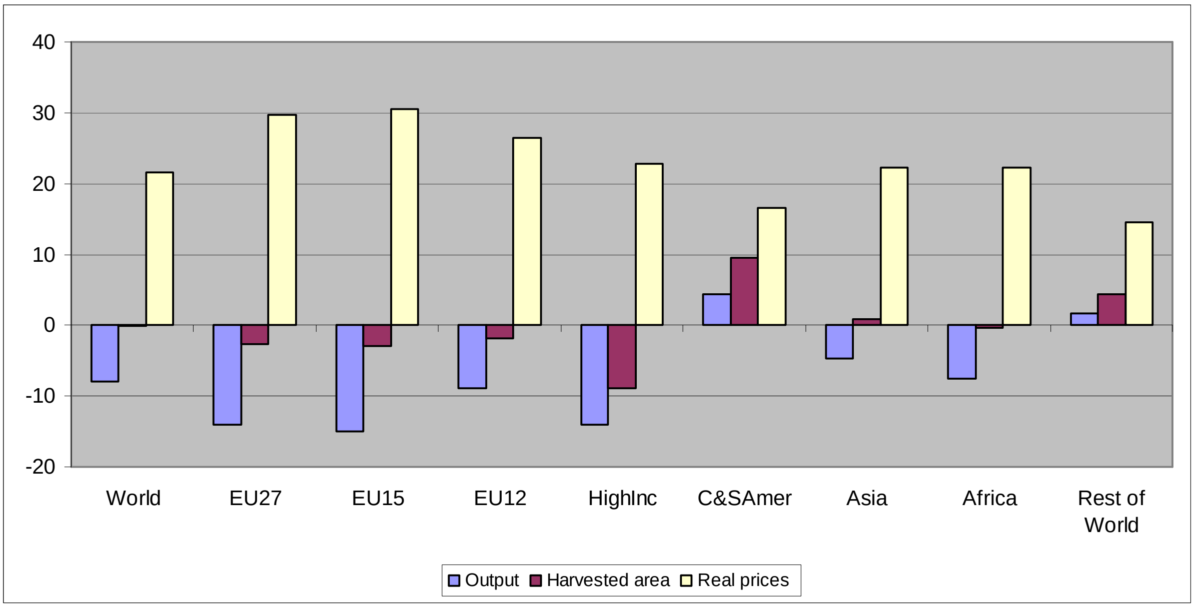


Figure 5. Real agricultural incomes per worker in EU15 in 2001-2030: yearly % changes.



Higher agricultural wages in the case of the dynamic segmented market model compared with the segmented marked model using a CET specification leads to higher agricultural prices in the DSM scenario compared with SM scenario. This, in general, results in lower agricultural production and land use. The only exceptions here are Central and South America and the Rest of the World region. These regions face smaller increases of agricultural prices compared with other regions, which boost their exports and production.

Figure 6. Agricultural production, harvested area and real prices in DSM experiment compared with SM experiment in 2001-2030 (% changes).



6. Conclusions

In this paper we have compared the development of agricultural employment, wages and income under three different specifications of the agricultural labor market: perfect mobility between agricultural and non-agricultural labor, segmented labor market between agriculture and non-agriculture modeled by a CET function and segmented labor markets between agriculture and non-agriculture modeled by a newly developed dynamic agricultural employment equation. We have run a reference scenario with these three specifications to see how the agricultural employment and related variables will react on policy shocks under these different agricultural employment equation specifications.

The obtained results support the thesis that the dynamic agricultural employment equation performs the best. The perfect mobility between agricultural and non-agricultural labor is not supported by empirical evidence, as is shown in the significant coefficients for relative value added per worker in the empirically estimated equations. From a policy perspective perfect mobility would imply small effect of agricultural policy on agricultural incomes.

Under segmented labor markets between agriculture and non-agriculture modeled by the CET function, for each reduction in the share of agricultural employment in total employment the relative wage has to decrease. This is also not supported by empirical evidence, and is not very plausible from an intuitive point of view: when people did leave the agricultural sector, they will not influence agricultural wages any more. The simulation shows an extreme deterioration of agricultural wages and incomes as a consequence of the reduced agricultural employment which in turn is a consequence of fast technological progress in combination with inelastic demand for agricultural products. This seems not to be a plausible result.

The dynamic employment market equation seems to overcome these problems. It is a combination of the two other approaches. In the long term competition on the factor markets is perfect, but in the short term it mimics more the CET structure. This implies that agricultural policy influences agricultural incomes in the short and medium term, but not in the very long term. This creates opportunities to balance short term and long term perspectives through the timing of policy.

In spite of this, the performance of agricultural employment equation requires further investigation. For instance, while the long-term agricultural employment development in EU15 seems to be plausible, consistent with currently observed trends and European Commission projections (European Commission, 2009), the real agricultural incomes per worker development seems to be too optimistic. This is due to the low estimate of the current relative value added per worker compared with the reservation wage. We have chosen to use these estimates and investigate the effects, but it requires further investigation why these estimates are so low. To improve this, the further investigation and careful calibration of initial relative agricultural to reservation wage is necessary for every region.

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