JOINING THE EC: THE RELEVANCE OF MACROLINKAGES IN AUSTRIAN AGRICULTURE

Diskussionspapier Nr. 10-W-92

Markus F. Hofreither
Christoph Weiß

Juli 1992

wpr
Institut für Wirtschaft, Politik und Recht
Universität für Bodenkultur Wien

Die WPR-Diskussionspapiere sind ein Publikationsorgan des Instituts für Wirtschaft, Politik und Recht der Universität für Bodenkultur Wien. Der Inhalt der Diskussionspapiere unterliegt keinem Begutachtungsvorgang, weshalb allein die Autoren und nicht das Institut für WPR dafür verantwortlich zeichnen. Anregungen und Kritik seitens der Leser dieser Reihe sind ausdrücklich erwünscht.

Kennungen der WPR-Diskussionspapiere: W - Wirtschaft, P - Politik, R - Recht

WPR Discussionpapers are edited bei the Department of Economics, Politics, and Law at the Universität für Bodenkultur Wien. The responsibility for the content lies solely with the author(s). Comments and critique by readers of this series are highly appreciated.

The acronyms stand for: W - economic, P - politics, R - law

Bestelladresse:

Institut für Wirtschaft, Politik und Recht
Universität für Bodenkultur Wien
Gregor Mendel-Str. 33
A – 1180 Wien
Tel: +43/1/47 654 – 3660
Fax: +43/1/47 654 – 3692
e-mail: h365t5@edv1.boku.ac.at

Internetadresse:

http://www.boku.ac.at/wpr/wprpage.html
http://www.boku.ac.at/wpr/papers/d_papers/dp_cont.html

JOINING THE EC: THE RELEVANCE OF MACROLINKAGES IN AUSTRIAN AGRICULTURE

HOFREITHER M. F. and WEISS Ch.R.*)

Abstract:

A proper analysis of the consequences of an Austrian participation in the European Common Market for the domestic farming sector requires a simultaneous consideration of intra- and intersectoral effects. Simulation experiments with a model link between a macroeconometric model and an econometrically estimated agricultural sector model indicate that the migration process out of the agricultural sector will substantially increase. However, neglecting individual burdens from changing ones occupation, there seems to be no unemployment problems for leaving farmers in the long run as the absorption capacity of the non-agricultural sector is shown to be sufficient.

) Professor Dr. M.F. Hofreither, Department of Economics, Politics, and Law, University of Agricultural Sciences; Mag. Ch.R. Weiss, Department of Economics , University of Linz, A-4040 Linz/Auhof. The authors gratefully acknowledges helpful comments by the participants of the Sixth Congress of the E.A.A.E. held in The Hague from 3 to 7 September 1990.

1. INTRODUCTION

With the positive 'Avis' of the Commission of the European Community (EC) in July 1991 there stands a good chance that after a couple of years Austria will be the 13th member of the community. Undoubtedly this will cause fundamental changes for many social, political and economic aspects of everyday life.

The macroeconomic consequences of a full EC-membership of Austria have been analysed by several authors (Breuss, Handler and Stankowsky (1989), Hofreither, 1989, ...). However, national averages hardly provide insight into the very different ways how individual sectors of the Austrian economy actually will be affected. Agriculture seems to be one of those sectors with much at stake.A comparison of the price levels of the EC and Austria clearly shows, that Austrian agricultural prices are situated fairly above the EC-level (Neunteufel and Ortner, 1989, p. 28).[1]Hence any kind of an integration process will cause significant inroads in Austrian rural product markets with far-reaching consequences for agricultural factor markets as well.

The most intensively discussed consequences focus on the unfavourable impact of an EC-Membership as to the agricultural labour force. Typically national food security, environmental aspects and settlement patterns are seen at stake. In any case a proper evaluation of the likely consequences for the agricultural labour force caused by an integration in the Common European Market (CEM) is a basic requirement for drafting appropriate policy measures.

Migration studies focusing on individual motives of changing ones occupation are able to shed some light on that problem. However, the process of joining the CEM will not only change the individual economic situation of farmers, but will have severe macroeconomic consequences as well. Furthermore, an increase in the outflow of agricultural labour may entail various feed-back effects, practically ignored by micro-oriented migration analyses.

In the present paper an attempt is made to scrutinise the consequences of joining the EC on the agricultural and the non-farm sector simultaneously. More specifically we aim at capturing the various feed-back effects between the two parts of the economy. This puts us in a position to follow a suggestion made by Devadoss, Meyers and Starleaf (1990) demanding a full endogenization of the labour market as a necessary improvement in investigating macrolinkages.

---

[1] This is due to the fact that agricultural products have so far been excluded from the free trade agreement between the EC and Austria.

The remaining sections of this paper are organised as follows: In the next paragraph (section 2) the likely consequences of a full integration of Austria in the Common European Market of the European Community are briefly outlined. Then follows a description of the method applied (section 3), mainly focusing on the interaction between the agricultural and non-agricultural parts of the Austrian economy. Section 4 reports the simulation results, particularly gauging the quantitative relevance of these interactions. The concluding section 5 evaluates some implications for recent Austrian agricultural policy.

2. THE COMMON MARKET 1992 AND A FULL INTEGRATION OF AUSTRIA

A very positive picture of the direction and the magnitude of the economic effects of the Common European Market is conveyed by the so called *'Cecchini-Report'* (Cecchini, et al., 1988). From the removal of various trade impediments by border-related controls, divergences in technical standards, and governmental protectionism a substantial improvement of the overall economic performance is expected. However, this report has been criticised a lot since its publication. [2] Yet widely irrespective of the factual (in)exactness of these estimates the fact remains that from the establishment of the European Common Market positive economic effects are highly probable. Independently of an official membership the Austrian macro-economy will be stimulated as well due to its tight trade and monetary relations with the EC.

Aside from these consequences, mainly caused by changes in the macroeconomic conditions (henceforth *intersectoral* effects), we simultaneously have to account for changes exclusively related to the agricultural sector (henceforth *intrasectoral* effects). In a static framework intrasectoral effects of an integration process for the agricultural sector are examined in Schneider (1989) and Neunteufel and Ortner (1989). Utilising a supply-response model[3] Neunteufel and Ortner quantify the production reactions of the Austrian farming sector in accommodating to the expected price changes. The present paper goes beyond the topics addressed in these studies by taking into account *intersectoral* product- and factor market linkages as well.

---

[2] The main point of criticism focusses on the question of the proper assumptions regarding returns of scale. Studies treating this question in a more cautious way than the Cecchini-Report do show substantially lower growth impacts from the realization of the Common Market (Prognos-AG (1989), *Euro-Report*, Vol. A, Industrialized Countries, Basel; or the Empirica Gmbh (1989), *Binnenmarktstudie*, Bonn).

[3] See Askari and Cummings (1976) and more recently Bauer (1986) and Rao (1989) for a good survey as well as a discussion of the limmitations of these types of models.

3. THE METHOD APPLIED

The empirical results of this paper rest upon a econometric simulation model specifically designed to analyse the interdependence between two parts of the economy: the Austrian nonfarm economy and the agricultural sector.

Various forms of interactions between these parts of the economy can be distinguished. Important macroeconomic variables - e.g. consumption, investment, employment, capital, prices - are composed of components separately determined in the farm and non-farm sector. These macroeconomic variables are again determining economic behaviour within both sectors. Therefore economic changes in one sector, say agriculture, do spill over to the macroeconomy and at the same time this mechanism induces feed backs on the farm sector. The dynamics of reaching a new steady state depend on the underlying partial adjustment processes characterising economic behaviour[4].

The nonfarm sector of the economy is modelled in the form of a conventional IS-LM-structure, extended by some neo-classical features on the supply side. It consists of 66 equations (29 behavioural and 37 definitions equations) describing six blocks[5]. The annual data base goes from 1954 to 1987, due to lag structures the estimation period only includes the period 1956 - 1987. The agricultural sector is represented on quite a high level of aggregation. Final agricultural production is subdivided in plant, livestock and forestry production. 16 behavioural and 27 definitions equations describing a supply, a demand, and a price section accomplish this task. The annual data base goes from 1956 to 1986.

The influence of macroeconomic changes on the farm sector is most visible in the agricultural labour market, which, in contrast to the other sectors of the Austrian economy, is numerically dominated by self-employed persons. The theoretical model explaining the labour-input decisions of farmers was developed by Tangermann (1974). Migration is determined by the returns to labour in the nonfarm sector relative to the returns to labour in agriculture as well as a long term migration rate (δ),

$$\dot{e}_t^s = \left[\dot{y}_t - \dot{y}_t^e \right] \beta + \delta \left(1 - \beta\right) \qquad (1)$$

---

4 A detailed description of the model structure in German can be found in HOFREITHER; PRUCKNER; WEISS (1991), an english version is available from the authors upon request.

5 The blocks are: Production and factor demand, domestic demand, foreign trade, income determination, price etermination, monetary sector.

where (e^s) are self employed farmers, (y) denotes per capita profits in agriculture, (y^e) is the wage income per capita in the rest of the economy and a dot above a variable symbolises a growth rate.[6]

However, migration from low to high income sectors does not occur independently of the probability of obtaining a job in the high wage sector. In fact, the farmer has to weigh the risk of being unemployed rsp. only sporadically employed for a certain period of time against the favourable wage differential (Torado, 1969). Therefore the labour market situation in the overall economy (u^e) is taken into consideration as an additional variable, measuring the probability of obtaining employment in the nonagricultural sector. After integrating (1), taking logarithms and including a lagged relative income variable as well as the lagged endogenous variable we get a model for the labour input decision which is to be estimated,

$$\ln\left(e_t^s\right) = a_0 + a_1 \ln\left(e_{t-1}^s\right) + b_1 \ln\left[y_t / y_t^e\right] + b_2 \ln\left[y_{t-1} / y_{t-1}^e\right] + a_2 \ln\left(u_t^e\right) + d(1-b)\, t + e_1 \quad (2)$$

The demand for hired labour (e^w) is modelled in a conventional neo-classical framework. Labour demand increases as long as the marginal value product from the Cobb-Douglas production function equals the wage rate. Including the lagged endogenous and a logarithmic trend gives the following equation,

$$\ln\left(e_t^w\right) = a_0 + a_1 \ln\left(e_{t-1}^w\right) + a_3 \ln\left(e_t^{w,*}\right) + a_4 \ln(t) + e_2 \quad (3)$$

Table 1 summarises the results of the OLS estimation of (2) and (3). The adequacy of this theoretical approach seems to be widely corroborated by these empirical results.

---

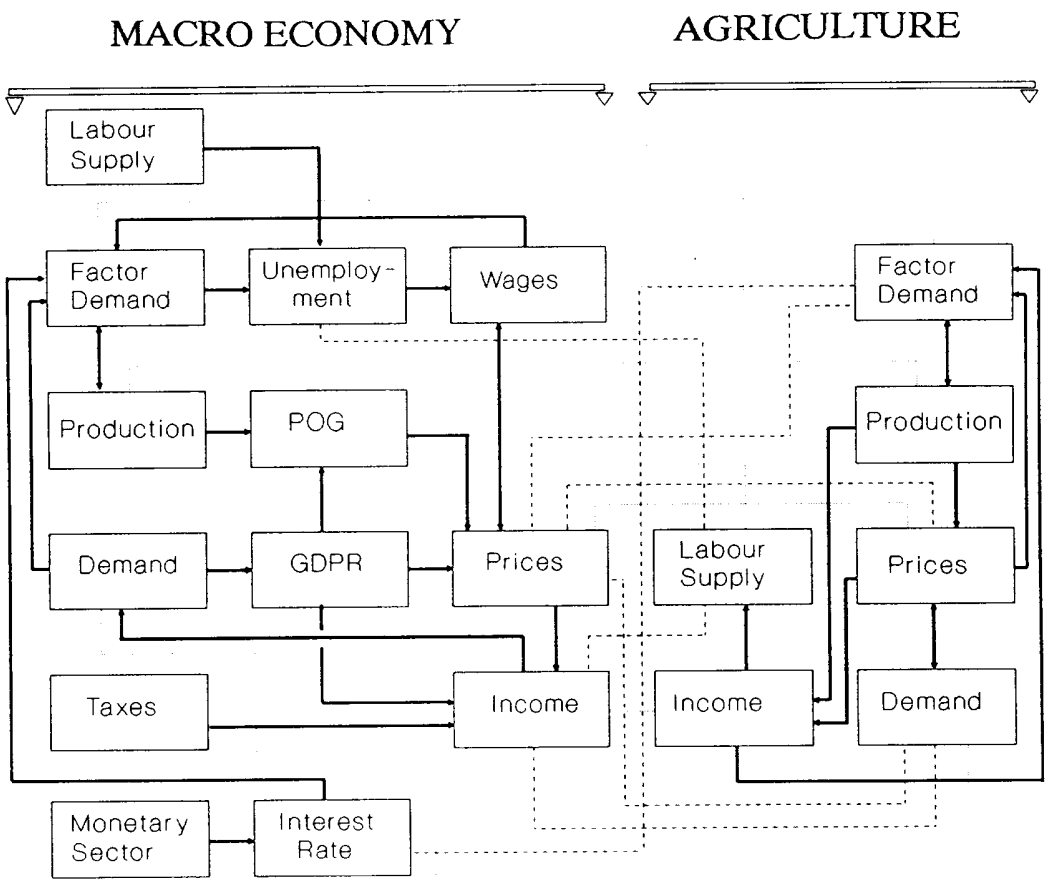
6 An 'e' as a superscript will allways symbolize a variables pertaining to the macroeconomy.

Table 1: Parameter Estimates of Labour Equations.

	Self employed		Hired Labour	
Parameter	Coefficient	(t-value)	Coefficient	(t-value)
α_0	-0,697	(-4,73)	0,601	(1,29)
α_1	0,811	(18,85)	0,837	(16,61)
$ß_1$	0,084	(3,23)	-	-
$ß_2$	0,056	(2,06)	-	-
α_2	0,023	(3,77)	-	-
α_3	-	-	0,066	(1,69)
α_4	-	-	-0,122	(-2,59)
R^2 = 0,999	D'h = 1,33		R^2 = 0,999	D'h = 1,05
SE = 0,012	RHO = 0,188		SE = 0,015	RHO = 0,188

Remarks: R^2 stands for the correlation between observed and predicted, SE labels the standard error of the estimate, D'h is the Durbins' h-statistic and RHO is the correlation coefficient between errors in two subsequent time periods.

The basic structure of the model is illustrated briefly in Figure 1.



The model puts us in a position to trace out dynamically the influence of the exogenous initial economic impact of a full Austrian membership in the CEM. Within the model *intersectoral* effects are fully endogenous, guaranteeing logical coherence between alternative scenarios.

4. SIMULATION

Founding on the Checchini-Report as well as the studies of Schneider (1989) and Neunteufel and Ortner (1989) we put up the following assumptions for our simulation:

Table 2: Assumptions concerning full integration of Austria in the CEM

Variable	Modification
Intrasectoral effects	
Price index of intermediate inputs in agriculture	- 6,25 %
Producer price index in agriculture	- 12,50 %
Intersectoral effects	
GDP of the major trading partners within the EC (FRG, Italy, France, UK)	+ 4,5 %
Foreign trade price indices	- 4,0 %
Interest rate	- 1,0 %*)
Labour productivity	+ 17-22.000
Indirect tax rate	- 1,0 %*)
Depreciation on capital stock	+ 1,0 %*)

Remarks: A '*)' indicates percentage points, the increase in labour productivity is modelled trend-dependent and therefore corresponds to a rising equivalent of 17.000 and 22.000 employed persons within the adjustment period.

On the one hand, we expect the changes in the agricultural sector (a lower price index of agricultural products and intermediate inputs) having a substantial impact on farm sector performance. These intrasectoral influences form the basis of a large body of empirical literature on agricultural sector modelling. However, considering agriculture as a sector being embedded in the macroeconomy calls for the consideration of intersectoral influences as well. Following Hirschman (1958?) and more recently Freebairn, Rausser and de Gorter (1982) as well as Andrews and Rausser (1986), we distinguish between two types of intersectoral influences: 'forward linkages' do account for influences

stemming from changes in the macroeconomy due to the factors mentioned in Table 2. On the other hand 'backward linkages' capture influences of agriculture-specific changes on the macro economy, which again are transmitted back to the agricultural sector (see again Figure 1).

With respect to the forward linkages, several important influences have to be considered according to Table 2.

a) The income effect

An increase of the GDP of the major trading partners within the EC as indicated in Table 2 raises the demand for Austrian products and stimulates aggregate demand. However, demand for agricultural products only increases under proportionally compared to nonfarm products. Widening the income gap between agriculture and non-agricultural sectors results in additional migration. This effect is intensified by an improved labour market situation in the nonagricultural sectors lowering the probability for farmers of being unemployed.

b) The inflation effect

A decrease in the foreign trade price index may affect the farm sector in two ways: Reduced import prices do induce a lower general price level and hence the costs of nonfarm inputs in agriculture may decrease. The substitution process from labour to capital and intermediate inputs reduces the agricultural labour force. At the same time a decline in the overall price level raises real income and stimulates macroeconomic demand. An economic upswing strengthens the income effect described above and again reduces farm labour.

c) The interest rate effect

A downward pressure on the interest rate lowers the user cost of capital, encourages investment and enforces the substitution effect mentioned above. Furthermore, the increased demand for capital in both agriculture and the non-farm sector again stimulates macroeconomic demand. Additional migration occurs because of the improved income situation in the overall economy.

d) The depreciation rate- and tax rate effect

An increase in the user cost of capital due to a higher depreciation rate dampens the substitution process mentioned above and hence deters migration. The decrease in the indirect tax rate has the opposite effect on agricultural migration.

The relative importance of intra- and intersectoral effects has been quantified by carrying out several simulation experiments. In isolating the farm sector by cutting all linkages to the non-farm economy all simulation outcomes can be traced back to intrasectoral effects. The results, which are reported in the appendix, indicate that a pure reliance on intrasectoral effects would lead to seriously biased results. The total (inter- and intrasectoral) effects of a full membership in the EC on the Austrian agricultural sector are summarised in Table 3.

Table 3: Consequences of a full Participation in the CEM

Year	Final Product.	Labour Force	Invest-ment	Other Inputs	Income	Demand
1	-0,22	-2,70	0,59	0,10	-4,97	0,50
2	-1,04	-8,91	-0,35	-0,23	-4,27	0,79
3	-1,78	-15,02	-0,32	-0,39	-4,23	0,94
4	-2,31	-20,49	-0,33	-0,50	-3,82	0,94
5	-2,78	-24,99	-0,48	-0,56	-4,01	1,05
6	-3,32	-29,05	-0,68	-0,64	-4,02	1,11
Mean	-1,91	-16,86	-0,26	-0,37	-4,22	0,89

Remarks: All figures represent first differences from the base solution of the model link. Final Production, Investment, Other Inputs, Income, and Demand are billions of AS in prices of 1976; Labour Force is given in 1000 persons.

The strong impact of the lower price level within the Common Market together with the above mentioned intersectoral effects squeezes real agricultural production by 1,91 bill. AS (1976)[7]. This clearly induces negative impacts on the utilisation of production

[7] 1 ECU is about 14 Austrian Schilling (AS).

factors: On average 16.860 persons migrate out of the agricultural labour force, the demand for investment goods drops by 0,26 bill. AS and the use of other inputs also decreases by 0,37 bill AS. As a result of lower prices and reduced production, agricultural income decreases by 4,02 billion AS.[8] According to Table 3 we observe a moderate increase in the demand for agricultural products (0,89 bill. AS).

Agricultural policy traditionally aims at ensuring a fair standard of living for farmers. However, in the case of a full participation of Austria in the Common Market 1992, policy making can no longer be limited to pinpoint overall farm income. Agricultural policy makers also have to care about those moving out of agriculture.[9] The following Figure 2 analyses the dynamics of out migration in greater detail and gives some impressions concerning the absorption capacity of the non-farm sector in the case of a full participation in the Common Market 1992.

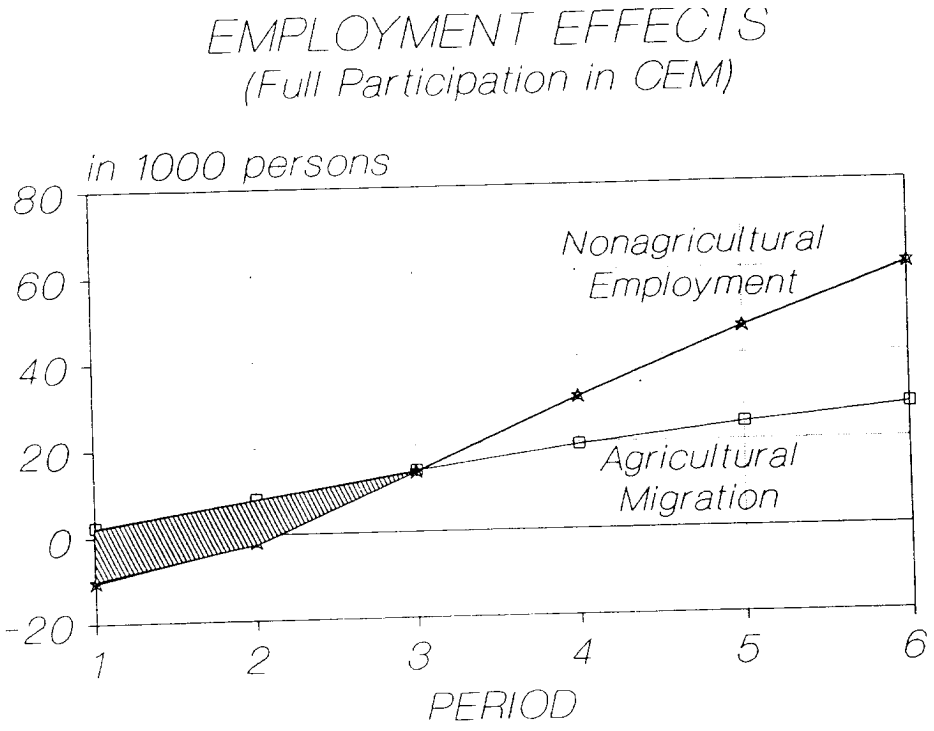
Figure 2 (see page 11) suggests that lower agricultural prices will entail a perceptible migration of rural labour force (see also Table 3). In the long run the capacity of the non-agricultural sectors to absorb workers seems to be sufficient to avoid unemployment problems. However, the stimulating macro effects require more time to spill over to the farm sector than the sharp decline in the agricultural price level, which drives out rural labour force quite immediately. Therefore in the short run farmers do face an increased risk of being unemployed,. indicated by the shaded area.

---

8 Although the resulting impact on agricultural income is clearly negative on average, these figures should be interpreted rather indicative than definitive: The development of this variable largely depends on the a priori assumptions concerning the price behavior during the simulation experiment[8]. Here we decided to retain fully exogenous product prices. Endogenous producer prices could be an admissible simulation assumption too and then income would develop somewhat more favourable because the shrinking real production leads to a partial compensation of the initial price shock.

9 While the first task is unanimous accepted as a responsibility of agricultural policy both by policy makers as many agricultural economists, the second task is commonly neglected. This deficiency certainly results from the lacking of econometric models focusing on the relationship between the macroeconomy and the agricultural sector through factor market linkages.

Figure 2:



However, it is far from certain that the increased number of unemployed in the short run must only be farmers. Our model provides no information about possible "crowding out"-effects for other workers by leaving farmers with higher qualification. Austrian employment records provide evidence that this holds especially for younger farmers.

Even if the outmigrates are absorbed in the non-farm sector, one should not underestimate the hardship caused by the migration of the agricultural labour force to other sectors of the economy. Cross section analysis of the Austrian off-farm employment behaviour (Pfaffermayr, Weiss, Zweimüller, 1991) emphasises the role of human capital, regional, and sociological factors for a successful integration process. However, these micro-aspects have not been addressed in our model because of the unfavourable situation as to the required time series data.

5. SOME POLICY ORIENTED CONCLUSIONS

The simulations carried out in this paper have shown that the realisation of the Common Market 1992 will cause substantial economic influences on the Austrian farming sector. Without any reaction of the authorities the migration process out of the agricultural sector may substantially increase in case of a participation in the CEM. Neglecting individual burdens from changing ones occupation, there seems to be no unemployment problem for leaving farmers in the long run. Due to improved macroeconomic conditions caused by the CEM the absorption capacity of the non-agricultural sector is shown to be sufficient.

In contrast to most other studies mainly focusing on the consequences of changes in agricultural market variables (intrasectoral effects) this paper also covers the various impacts stemming from changing macroeconomic conditions (intersectoral effects). Neglecting these influences primarily working via factor market linkages may lead to seriously biased results. So the "partial equilibrium island"-position (GARDNER, 1981) dominating a great many of agricultural studies has to be dropped in all questions strongly connected with substantial macroeconomic changes.

In spite of the well known robustness of agricultural politicians against economic research seriously biased scientific results nevertheless may contribute to seriously impaired policy measures. So the awareness of the fact that even agriculture is embedded in the macroeconomy is of important value for both the agricultural economist and the politician concerned with agricultural issues.

APPENDIX

In order to elucidate the relative importance of intra- and intersectoral effects, two additional simulation experiments have been carried out. In a first step the intrasectoral influence of an accommodation of Austrian agricultural prices to the lower average in the (former) Federal Republic of Germany are analysed In isolating the farm sector by cutting all linkages to the non-farm economy all simulation outcomes can be traced back to intrasectoral effects.

In a second step, the same simulation experiment is repeated but is now computed within the complete model. The difference between the outcomes of these calculations for agricultural labour force can be contributed to the existence of 'backward linkages'. Furthermore the difference between the results of this second simulation experiment and the outcomes reported in Table 3 in the text illustrates the quantitative importance of 'forward linkages'. Besides the changes in agricultural prices Table 3 accounts for the variations in the macroeconomic setting as well. Figure 3 illustrates the results.

Figure 3:

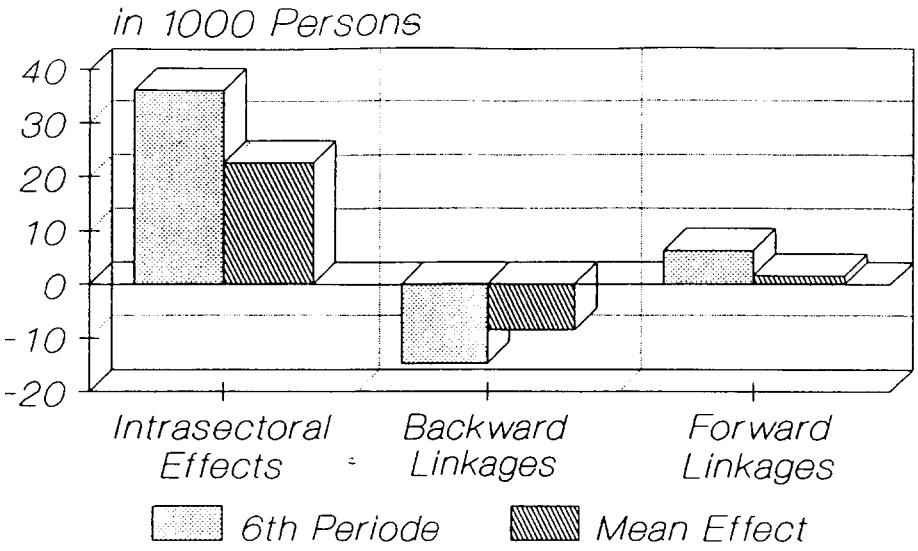


Figure 3 clearly confirms the above stated conjecture that the pure reliance on intrasectoral influences leads to wrong conclusions: Agricultural labour force is expected to shrink by 36.340 persons after 6 periods (22.700 on average) when nothing but *intra*sectoral effects are taken into consideration. This is equivalent with an 24 % increase of the number of unemployed. Comparing these results with the outcomes of Schneider

(1989) and Neunteufel and Ortner (1989)[10] shows that both the direction and the magnitude are roughly the same.

However, a comparison with the second simulation experiment accentuates that migration is to be overestimated, because the aggravating labour market situation now impairs the probability of being employed in the nonfarm sector. Therefore, the agricultural labour force now declines by less than the above mentioned amount, because farmers now weigh the favourable income differential against an increased risk of being unemployed. The difference between the two simulation results (-14.000 persons after 6 periods and -8.700 farmers on average) can be contributed to the existence of backward linkages.

The relative low quantitative importance of forward linkages in Figure 3 (migration increases by 6,300 persons additionally after 6 periods) is caused by the partial compensation of several influences described in the text (income-, inflation-, interest rate-, and depreciation effect).

10 In concentrating on intrasectoral effects Neunteufel and Ortner expect 23.000 farmers to migrate into non-agricultural sectors.

REFERENCES

ANDREWS, M. S. and RAUSSER, G. C. (1986). Some Political Economy Aspects of Macroeconomic Linkages with Agriculture, *American Journal of Agricultural Economics,* 68: 413-417.

ASKARI, H., CUMMINGS, J. T., (1977), Estimating Agricultural Supply Response with the Nerlove Model: A Survey, *International Economic Review, 18: 257-292.*

BAUER, S., (1986), Zur Analyse von Allokations- und Verteilungsproblemen im Agrarbereich: Theorie, Methoden und empirische Forschung, *Agrarökonomische Studien, Band 12, Wissenschaftsverlag Vauk, Kiel*

BARCLEY, T. and TWEETEN, L. (1988). Macroeconomic Policy Impacts on United States Agriculture: A Simulation Analysis, *Agricultural Economics, **1***: 291-307.

BREUSS, F., HANDLER H. and STANKOWSKY J., (1989). Österreichs Wirtschaft und die EG, *WIFO Monatsberichte,* 4/89: 196-201.

CECCHINI, P., (1988). *The European Challenge 1992,* The Benefits of a Single Market, Aldershot (Wildwood House).

DEVADOSS, S., MEYERS, W.H. and STARLEAF, D., (1990). Impacts of US Monetary Policies on the Farm Sector: An Econometric Analysis, *Applied Economics, **22***: 1451-1470.

DICKE, H., (1989). Vollendung des EG-Binnenmarktes - der Versuch einer Zwischenbilanz, *Weltwirtschaftliches Archiv,* 33: 88-111.

DORNBUSCH, R., (1989). Europe 1992: Macroeconomic Implications, *Brooking Papers on Economic Activity,* 17: 277-299.

EMERSON, M., (1988). *The Economics of 1992: The EC Commission's Assessment of Economic Effects of Completing the Internal Market,* Oxford: Oxford University Press.

EMPIRICA GmbH. (1989). *Binnenmarktstudie,* Bonn, January 1989.

FREEBAIRN, J.W., RAUSSER, G.C. and DEGORTER, H., (1982). Food and Agricultural Sector Linkages. In G.C. Rausser (ed.). *New Directions in Econometric Modelling and Forecasting in US Agriculture,* Amsterdam: North Holland.

GARDNER, B., (1981). On the Power of Macroeconomic Linkages to Explain Events in U.S. Agriculture, *American Journal of Agricultural Economics,* 871-878.

HENRICHSMEYER, W., (1971). Der landwirtschaftliche Sektor im wirtschaftlichen Wachstum, *Berichte über die Landwirtschaft*, 129-183.

HOFREITHER, M.F., (1988). Modelling the Austrian Economy: A Conventional Approach, Working paper Nr. 8802, Johannes Kepler Universität Linz.

HOFREITHER, M.F., (1989). Wissenschaftliche Politikberatung als Problemstellung der Ökonomie, Habilitationsschrift (Manuskript), Linz.

HOFREITHER, M.F., PRUCKNER, G. and WEISS, Ch.R. (1991). *Ökonomische Interaktionen zwischen Gesamtwirtschaft und Agrarsektor: Eine empirische Analyse für Österreich*, Wissenschaftsverlag Vauk Kiel KG.

LAMM, R.M., (1980). The Role of Agriculture in the Macroeconomy: A Sectoral Analysis, *Applied Economics, **12***: 19-35.

NEUNTEUFEL, M. and ORTNER, K.M., (1989). Schätzungen der Auswirkungen eines EG-Beitritts auf die Österreichische Landwirtschaft, Wien.

PECK, M.J., (1989). Industrial Organization and the Gains from Europe 1992, *Brookings Papers on Economic Activity*, 17: 335-347.

PETERS, G.HP., (1991). Agriculture and the Macro-Economy: Presidential Address, *Journal of Agricultural Economics*, 42: 231-249.

PFAFFERMAYR, M., WEISS, Ch.R., and ZWEIMÜLLER, J. (1991), Farm Income, Market Wages, and Off-Farm Labour Supply, Working paper Nr. 9108, Johannes Kepler Universität Linz.

PROGNOS-AG, (1988). *Euro-report '89*, Vol. A, Industrialized Countries, Basel.

RAO, J.M., (1989), Agricultural Supply Response: a survey, *Agricultural Economics, 3, 1-23*.

SCHNEIDER, M., (1989). Österreichs Land- und Forstwirtschaft und die EG, *WIFO Monatsberichte*, 408-415.

TANGERMANN, S., (1974). Ein ökonometrisches Modell für den Agrarsektor der Bundesrepublik Deutschland, *Agrarwirtschaft*, 285-295.

TORADO, M.P., (1969). A Model of Labour Migration and Urban Unemployment in Less Developed Countries, *The American Economic Review*, 59: 138-148.

WEISS, CH.R., (1990). Empirische Sektorenanalyse als Grundlage der Politikberatung - Ein ökonometrisches Modell der österreichischen Landwirtschaft, Working paper Nr. 9024, Johannes Kepler Universität Linz.

WEISS, CH.R., (1992). The Effect of Price Reduction and Direct Income Support Policies on Agricultural Input Markets in Austria, *Journal of Agricultural Economics* (forthcoming).