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**Modelling agricultural input expenditure in a  
multi-market modelling framework**

by

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## DEDICATION

**To my parents, Roman Kiflemariam and Fisseha Gebrehiwet**



## DECLARATION

I declare that the dissertation, which I hereby submit for the degree of Doctorate in Agricultural Economics at the University of Pretoria, is my own work and has not previously been submitted by me for degree purposes at any other university.

SIGNATURE:..... DATE:.....

Yemane Fisseha Gebrehiwet

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Yemane Fisseha Gebrehiwet  
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## ABSTRACT

### MODELLING AGRICULTURAL INPUT EXPENDITURE IN A MULTI-MARKET MODELLING FRAMEWORK

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Agricultural input expenditures have not been widely incorporated in most partial equilibrium models. Thus, investigating the effect of economic policies and other exogenous factors on the agricultural sector will produce only a partial analysis, since the simultaneous impact of these factors on input expenditures is excluded. This study, therefore, extends the existing partial equilibrium multi-market model of the South African agricultural sector (BFAP model) by incorporating agricultural input expenditure. Thus, the analysis of the impact of economic policies on the agricultural sector, which was limited only on the gross income (production, area planted and prices), has now been extended to assess their effects on input expenditures, gross value added and net farming income of the sector. In addition, the analysis is further extended to evaluate the financial and economic position of the agricultural sector by investigating the implications of the policies on the asset and debt values of the sector.

The comparative result obtained from the shocks of a crude oil and world fertiliser price rise shows that due to the inclusion of the recursive effect from the output to input side of the sector and vice versa and endogenising input costs, the effect of the shock on gross value added and net farming income converges slowly and cyclically in the recursively

linked model, compared to the unlinked model, in which the effect abruptly halts after a single year. Thus, the recursively linked integrated model replicates the dynamics experienced by the agricultural sector better than the recursively unlinked integrated model.

In addition, the endogenisation of domestic input costs on the integrated model allows a comprehensive analysis of the effect of macroeconomic variables on the agricultural sector by considering their impact on both outputs and inputs. Thus, using the recursively linked model, a fifty percent devaluation of exchange rate is assessed. The result showed that a depreciation of exchange rate resulted in a net benefit for the sector, as the gain from enhancing agricultural income outweighs the rise in expenditure. Excluding the simultaneous impact on input expenditure would have overestimated the benefit by looking only at its effect on gross income.

The integrated model was also used to project a baseline for the South African agricultural sector's main aggregate variables for the medium term (2010-2015) under the *status quo* of policy assumptions and forecast values of exogenous variables. The baseline projections of the gross income, intermediate input expenditure and gross value added show a modest average annual growth rate during the baseline period. The net farming income, however, depicts a relatively lower growth due to the general modest rise in agricultural gross income compared with total input expenditure. Based on the projected values of main aggregate variables, several financial and economic performance indicators for the agricultural sector are also projected. In general, the economic performance indicators of the sector, measured by the net return on the sector's investment and equity, show good performance when compared with the average cost of borrowing during the baseline period.

Thus, this study shows that integrating input expenditure in a multi-market output model by recursively linking both sides and endogenising domestic input costs would improve the result of the standard partial equilibrium by generating projections for several key aggregate variables, providing the net effect of economic policies on the agricultural

sector and replicating the dynamics of the agricultural sector better than models that have few/no input components or that assess the effects separately and ignore the recursive linkage. Thus, this study provides a powerful modelling tool to be used by policy makers to comprehensively investigate the net effects of economic policies on the agricultural sector and to answer several ‘what if’ questions.

**Key words:** Multi-market commodity model, partial equilibrium model, agricultural input expenditure, input costs, general-to-specific methodology, endogenising, recursive link, BFAP, South Africa.



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