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Macroeconomic Effects of Disease Control in the Thailand Livestock Sector – A CGE Analysis

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[1] We are grateful to Rodney Beard (Department of Agriculture, The University of Queensland) for his comments.

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The Commissioned Organization is the Queensland Department of Primary Industries. Collaborating institutions in Australia are CSIRO-ANHL, Geelong, Victoria and the University of Queensland (Department of Economics; Department of Geographical Sciences and Planning). In Thailand, the collaborating institutions are the Department of Livestock Development (National Institute of Animal Health; Disease Control Division), Chiang Mai University (Department of Agricultural Economics; Department of Animal Husbandry) and Thammasat University (Faculty of Economics). The collaborating institution in Laos is the Department of Livestock and Veterinary Services. Dr F.C. Baldock, Senior Principal Epidemiologist, Queensland Department of Primary Industries is the Project Leader in Australia and Dr P. Chamnanpood, Senior Epidemiologist, Thai Department of Livestock Development is the Project Leader in Thailand. Professor Clem Tisdell and Dr Steve Harrison, Department of Economics, University of Queensland are responsible mainly for the economic component of this project.

'The overall goal of this project is to develop and evaluate the .necessary tools to provide decision-makers with reliable animal health information which is placed in context and analysed appropriately in both Thailand and Australia. This goal will be achieved by improving laboratory diagnostic procedures; undertaking research to obtain cost-effective population referenced data; integrating data sets using modern information management technology, namely a Geographical Information System (GIS); and providing a framework for the economic evaluation of the impact of animal diseases and their control.

A number of important diseases will be targeted in the project to test the systems being developed. In Thailand, the focus will be on smallholder livestock systems. In Australia, research will be directed at the northern beef industry as animal health information for this sector of livestock production is presently scarce.'

For more information on *Research Papers and Reports Animal Health Economics* write to Professor Clem Tisdell (c.tisdell@economics.uq.edu.au) or Dr Steve Harrison,(s.harrison@uq.edu.au) Department of Economics, University of Queensland, Brisbane, Australia, 4072.

Macroeconomic Effects of Disease Control in the Thailand Livestock Sector - A CGE Analysis

ABSTRACT

Increased demand for livestock products and the regime switch from import substitution to export orientated industrialisation has put pressure on the livestock sector in Thailand to expand production and exports. One of the constraints to expansion is the production and trade effects of diseases endemic to Thailand. The economic effects of livestock diseases and their control are reviewed. A change in the disease-free status of the Thailand livestock sector is investigated using a computable general equilibrium model. Three scenarios are hypothesised. In the first scenario, where disease control increases livestock production, resources shift out of manufacturing and into the agriculture and tertiary sectors leading to a decline in GDP and household welfare. In the second scenario, where control increases livestock exports, exports increase for all sectors and resources shift out of the agriculture and tertiary sectors and into manufacturing leading to an increase in GDP and household welfare. In the third scenario, where disease control increases livestock production productivity, there is a resultant decline in livestock output and exports as factor input prices rise. The flow-ons to the rest of the economy are negligible.

The results show that disease control programs in the Thai livestock sector would not produce major benefits to the economy unless they were undertaken with a concurrent elimination of export restrictions.

We are grateful to Rodney Beard (Department of Agriculture, University of Queensland) for his comments.

Keywords: Animal health, Thailand, livestock disease control,

JEL Classification: Q16

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1. Introduction

The transition of the Thailand economy from import substitution to export orientated industrialisation has increased economic growth and with it the demand for less traditional consumption products. Changing demographics and the increasing urbanisation and modernisation of the workforce has increased demand for alternative dietary protein sources, particularly beef and dairy products. Export enhancement policies have stimulated the commercialisation of the agricultural sector and in particular the livestock sector with Thailand being a net exporter of poultry.

The expansion of the livestock sector has renewed interest in controlling disease and particularly the economic viability of control programs. Most research that has been carried out on the economics of disease control has concentrated on the actual costs of control and the benefits to the particular sector (Brooksby, Stubbins, and Petrzik 1972; Lembit and Fisher 1992). These studies have used sector specific methods to evaluate FMD control such as Cost-Benefit Analysis or partial equilibrium econometric modelling. It has been taken for granted that control of disease will lead to net benefits for the economy as a whole yet very little empirical work has been carried out to test this hypothesis.

This paper attempts to estimate the effects of control programs on the livestock sector and the economy as a whole and in particular their production and export enhancement effects. One of the major problems in quantifying losses due to disease and their control is that the control of disease may not necessarily mean that there will be an economic improvement for producers in the livestock sector. Control of disease may lead (hopefully) to increases in production which may lead to a reduction in prices received and a shift in resources from one sector to another. This change in prices and shift in resources will have differing effects on sectors in the economy depending on their relative efficiency to each other. Economic models attempt to capture these shifts and estimate their effect on the economy. Section 2 reviews the role of the livestock sector in Thailand and the effects of disease on the sector. Section 3 outlines the economic effects of trade restrictions due to endemic diseases. Section 4 outlines the use of economic models in estimating the economy-wide effects of trade liberalisation.

Section 5 outlines the procedure used to turn a theoretical general equilibrium model into a computable general equilibrium model. Section 6 outlines the model used in the analysis of disease control and its theoretical underpinnings. Section 7 presents the results of the simulations carried out and finally Section 8 presents the implications of the model results for the Thai livestock sector.

2. The Thailand Economy and the Livestock Sector

The livestock sector plays a small but important role in the Thai economy. Agriculture as a whole has been a significant but declining component of GDP forming 42.5% of GDP in 1950 to around 12% currently (See Table 2.1). The livestock sector has consistently contributed around 12% of the total agricultural share of GDP. Traditional livestock production in Thailand has centred around subsistence agriculture with bovine species (buffaloes and cattle) being used for draught power for cropping and swine and poultry used for household consumption

Table 2.1: Agriculture and livestock percentage of GDP at current prices

Table 2.1: Agriculture and livestock percentage of GDP at current prices

Year	1950	1961	1967	1972	1977	1982	1987	1988	1989	1990	1991
Total Ag	42.5	39.2	32.5	25.4	24.8	19.1	16.4	16.6	15	12.6	12.4
Livestock	4.6	5.1	4.1	2.6	2.6	1.7	1.8	1.6	1.6	1.6	1.5

(Source: (Office of Agricultural Economics 1992))

The increasing urbanisation of the population and the demand for export income has prompted the intensification of agricultural industries to cater for the increased demand. There has been an increased demand for milk and meat as incomes and population have risen and livestock numbers have increased as a consequence. The introduction of mechanised agricultural practices has also shifted the balance of livestock from draught to meat production (See Table 2.2).

Table 2.2: Livestock numbers: Thailand

Year	Buffaloes	Cattle	Swine	Chickens
1983	6354349	4832570	4192653	78189000
1984	6300896	4788989	4263201	78198000
1985	6249926	4828983	4224120	78717000
1986	6256854	4878741	4201074	79265000
1987	5998423	4968845	4209059	84495000
1988	5708270	5072024	4684926	86679000
1989	5442614	5284960	4678503	89405000
1990	5094270	5458680	4761622	94519000
1991	4976730	5631130	4859036	99722000
1992	4861910	5815470	4655479	105619000

(Source: (Office of Agricultural Economics 1992))

Until recently, Thailand has been a net importer of meat and dairy products as domestic production could not satisfy domestic demand (See Table 2.3). This has been due to a combination of factors including the difficulties of obtaining adequate grazing land and maintaining feed supply. Exports of live animals have generally been greater than imports, but this has mainly been due to the export of poultry for breeding purposes (Office of Agricultural Economics 1992) rather than the export of cattle, pigs and chicken for consumption purposes. Thailand is a net importer of cattle products but is a net exporter of pork and poultry products (See Table 2.4).

Table 2.3: Thailand imports and exports of livestock products ('000 mt)

	Live Animals		Meat and Dairy	
Year	Imports	Exports	Imports	Exports
1961-65	49.2	6493.8	21656.6	2612.0
1966-70	358.2	4171.4	24883.2	1252.6
1971-75	1102.2	7236.0	27193.8	3999.2
1976-80	3879.8	10923.2	49260.8	26228.2
1981-85	6200.4	5208.8	87894.6	66010.4
1986-90	24997.6	3236.4	122025.8	235849.8
1991-92	37182.0	3224.5	194672.5	475742.0

(Source: (United Nations Food and Agriculture Organisation 1993))

Table 2.4: Thailand imports and exports of livestock

	Swine (head)		Pork (mt)	Cattle (head)		Chickens (mt)	
Year	Imports	Exports	Exports	Imports	Exports	Imports	Exports
1977	739	639		1253	214497	-	4254
1982	1389	11488		1145	2221	-	33217
1987	2529	12631	21	9068	149	-	81933
1988	3582	1201	36	9844	429	63	97464
1989	1653	510	159	8991	180	106	110248
1990	1137	38	1424	23915	15357	121	141487
1991	2897	-	1328	20623	8351	101	167663
1992	763	40	228	10279	4430	143	180241

(Source: (Office of Agricultural Economics 1992, 1993))

Dietary composition has changed only slowly as population has grown and western culture infiltrates the social fabric of the country. Preferences for meat have continued to be for more traditional fare - poultry and pig, while beef and dairy products continue to become a greater proportion of the consumption basket at a much slower rate.

In order to satisfy domestic demand for agricultural products, and to increase exports as a way of generating foreign exchange, the Thai government has embarked upon a policy of increasing production, especially in the livestock sector (See Figure 2.1). Apart from the biological constraints to increased production (grazing land, feed supply), Thailand is .faced with disease constraints as well, especially foot-and-mouth disease in cattle and swine and Newcastle disease in poultry.

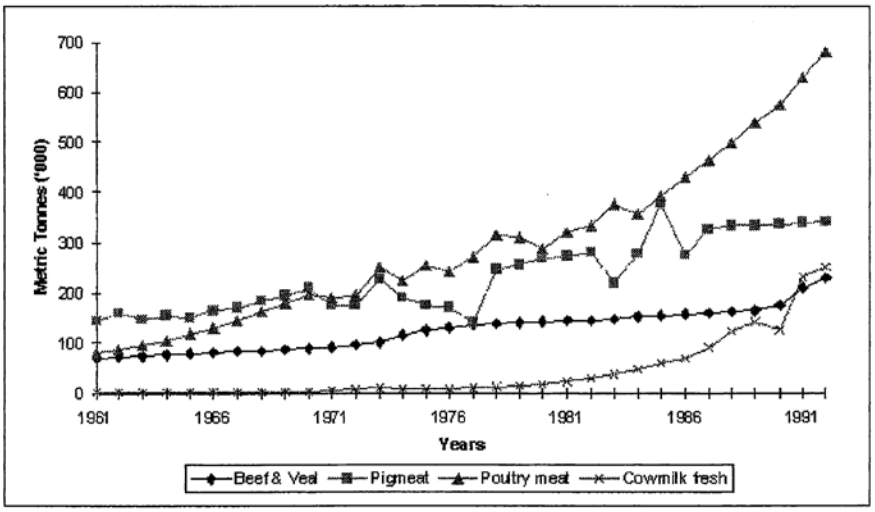

Figure 2.1 Production of livestock products: Thailand. (Source: (United Nations Food and Agriculture Organisation 1993))

2.1. Foot-and-Mouth Disease

Aphthovirus (Foot and Mouth Disease - FMD) is a *plus-strand* RNA virus endemic to Thailand, especially its cattle, pig, sheep and goat population. Epidemiologically, FMD is characterised by (Pereira 1981; Blaha 1989):

- High levels of virus in tissues, secretions and lesion exudates in sub-clinical infections,
- High survivability of the virus outside the animal host,
- Establishment of a virus reservoir in recovered animals,
- Transmission of the virus through contact, animal products or aerosols,
- High morbidity (100%) but low mortality (<5%) of susceptible populations,
- Short incubation period of disease and
- A plethora of antigenic forms of the virus which do not confer cross-protection.

After the incubation period of 2 to 8 days, diseased animals exhibit signs of fever, anorexia, depression and a fall in milk production which precedes the development of vesicular lesions on the mouth, udders and feet. The rupture of these vesicles lead to excessive salivation and lameness and may permanently damage milk production. As the disease progresses past the acute stage, considerable loss of condition and growth occurs but mortality is low. Recovered animals regain condition but milk production may be affected. Recovered animals may act as carriers for prolonged periods of time as the virus resides in the pharynx of animals recovered from infection (Pereira 1981).

Of the numerous types of *Aphthovirus* prevalent around the world, only type O (Oise), A (Allemagne) and Asia 1 have been identified in Thailand (See Table 2.5).

Table 2.5: Incidence of FMD in South-East Asia

Country	Type O	Type A	Type Asia 1
Myanmar	Endemic	Occasional	Endemic
Thailand	Endemic	Occasional	Endemic
Laos	Occasional		Occasional
Cambodia			Occasional
Malaysia	Occasional	Occasional	

(Source: (Pereira 1981) p. 346)

Control of FMD in Thailand is difficult due to the lack of coordinated control efforts between neighbouring countries. Animals in areas outside the control zones act as reservoirs for the

virus re-infecting disease-free herds. Further, subsistence type animal production systems in Thailand play an important role in harbouring the virus and maintaining the cycle of infection. Studies by Sellers and Parker (1969) cited in (Pereira 1981) indicate that whereas cattle are the main disseminators, sheep act as maintenance hosts and pigs act as amplifiers of the infection. An additional problen1 which may occur is the emergence of new sub-types with increased epidemiological potential in partially immune host populations - as would occur under sub-optimal vaccination programs without other concurrent control measures (Pereira 1981).

Strategies available for control, prevention and eradication include:

- Restriction of movement of livestock and products likely to contain the virus,
- Stamping out of the virus in areas of occasional infection by herd slaughter, and
- Vaccination of host population at short, regular intervals to maintain constant immunity.

2.1.1. Economic effects of foot-and-mouth disease

The economic effects of FMD include

> ..the reduction in the productivity of the diseased animals, the loss of animals for breeding, the death of animals and, above all, from the impairment of international trade and transit. (Blaha 1989 p. 17)

The economic effects are hard to quantify due firstly to the cost of information gathering and secondly due to the nature of the disease itself. Infected animals can exhibit a wide range of symptoms and corresponding production losses. Data on individual animal production losses due to FMD are hard to come by but as a comparison, losses due to parasitism have been found to be high (see also Dargie, 1980, p.351) (see Table 2.6).

Table 2.6: Production Effects on Livestock Due to Parasitism

Reference	Host	Parasite	Production Effect
(Abbott et al. 1986)	Sheep	*H. contortus*	19% LWG Reduction
(Abbott et al. 1988)	Sheep	*H. contortus*	58% LWG
(O'Kelly and Seifert 1970)	Cattle	*B. microplus*	8% – 18% LWG Reduction
(Barger 1973)	Sheep	*T. colubriformis*	83% Wool Growth
(Barger et al. 1973)	Sheep	*T. colubriformis*	58% Wool Growth
(Thomas and Ali 1983)	Sheep	*H. contortus*	77% Milk Production
(Leyva et al. 1982)	Sheep	*O. circumcincta*	83% Milk Production

On a national level, FMD outbreaks around the world have recorded huge economic losses (See Table 2.7).

Table 2.7: Cost of FMD Outbreaks

Reference	Country	Year	Cost
(Pereira 1981)	20 Countries - Subtype A_5	1951-52	US$600m
(Ellis 1994)	Britain	1967	£250m
(Ellis 1994)	India	1976	£200m

Losses have mainly been due to lost productivity and costs of control including slaughtering of infected herds. Deaths due to FMD itself are low, with a mortality of less than 5%, mainly affecting young animals with underdeveloped immune systems (see Table 2.8).

Table 2.8: Death of livestock due to epidemic diseases, Thailand (Head)

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Buffaloes	266	36	6	134	34	10	3	-	35	8	1
Cattle	87	18	75	139	9	4	1	15	44	151	57
Swine	311	40	1609	288	-	-	-	-	1231	119	57

(Source: Thailand Department of Livestock (Office of Agricultural Economics(O.A.E.) 1992, 1993))

2.2. Newcastle Disease

Paramyxovirus (Newcastle disease) is a non-ubiquitous *minus-strand* RNA viral disease of poultry prevalent in Thailand. Epidemiologically, Newcastle disease is characterised by (Geering, Forman,and Nunn 1995):

(a) High levels of virus in tissues, faeces and expired air,
(b) High survivability of the virus outside the host,
(c) Establishment of a virus reservoir in recovered animals with the virus being excreted in faeces for more than a year after recovery from clinical disease,
(d) Transmission of the virus though contact, poultry products, contaminated feed, sheds, and transport crates, or aerosols,
(e) High morbidity and mortality approaching 100% in susceptible flocks,
(f) Short incubation period of the disease and explosive outbreaks,
(g) A single serotype - Avian Paramyxovirus type 1 (A/PMV 1) with minor antigenic relationships with the other types but a wide variation in virulence and tissue tropism according to strain.

After an incubation period of 5-6 days, diseased birds exhibit signs of marked depression, loss of appetite and a sharp drop in egg production. Increased respiratory disturbance, diarrhoea, nervous symptoms and high levels of mortality follow in virulent strains of the disease. Recovered birds experience a period of compensatory weight gain (Hallet al. 1967) but may continue to harbour the virus for extended periods of time.

The disease spreads rapidly among unvaccinated chickens and outbreaks occur most frequently among native chickens as they are not usually vaccinated whereas outbreaks in commercial situations are rare.

Control of Newcastle disease, like the control of FMD and swine fever, is difficult in Thailand due to the dichotomy of the production process. Control is relatively easy in large commercial stocks with mass vaccination either by aerosol spray or by individually administered inactivated oil-emulsion vaccines but is difficult in traditional village level production systems.

2.2.1. Economic effects of Newcastle disease

Economic losses consist of high mortality, approaching 100%, a drop in egg production and slow body growth. Reduction in weight gain is temporary and compensatory growth is seen post infection. Economic losses occur primarily among smallholders with small flocks of birds. The integrated system of agricultural production in traditional village level production systems makes it difficult to conduct a comprehensive vaccination scheme and thus the effectiveness of vaccination programs for smallholders is limited. In contrast, commercial poultry production is generally free of Newcastle disease with outbreaks confined to those rare cases where vaccination procedures break down. In situations of Newcastle disease outbreaks in commercial enterprises, economic losses are severe with extremely high mortality rates unless steps are taken to contain the outbreak.

2.3. Livestock Disease in Thailand

Apart from FMD and Newcastle disease several other diseases of cattle, swine and poultry are of particular importance in Thailand (see Murphy and Tisdell, 1995, Tables 3 and 5). For example Swine fever and Aujesky's disease are important viruses affecting pigs (See Table 2.9). Generally the incidence of disease in the livestock sector impacts on the economy by reducing production (increased mortality and product quality downgrades) and incomes for producers (consumer boycotts) which flow on to dependent sectors in the economy (See

Figure 2.2).

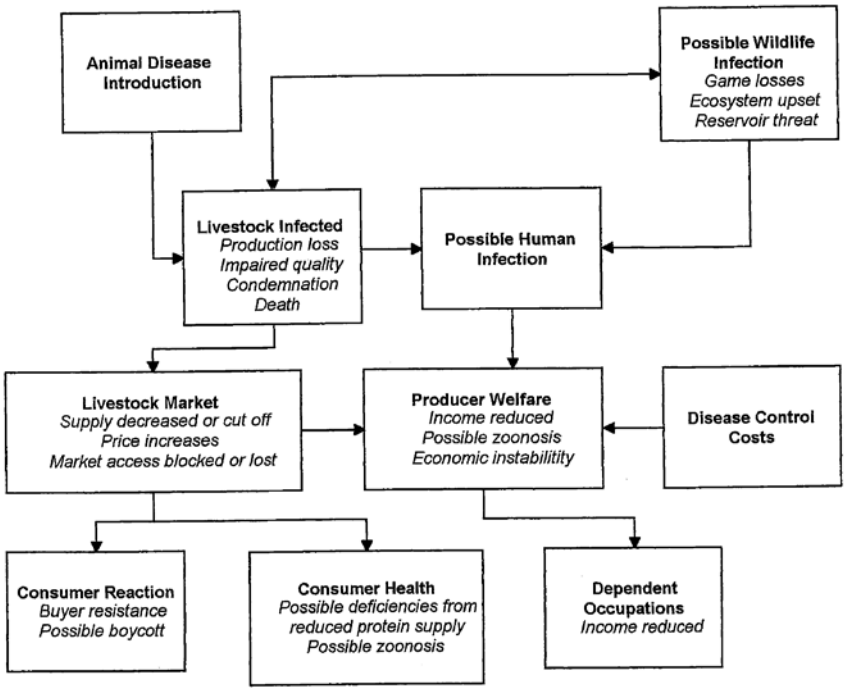

Figure 2.2 Consequences of disease introduction (Source: Hanson and Hanson 1983, p. 28)

By far the most important economic effect of livestock disease is the restriction of trade in infected animals and products.

> "According to the recommendations of the O.I.E. [Office Internationale des Epizootics], FMD-free countries can prohibit the import or transit of cloven-footed animals, their meat and meat products, other animal products, semen and embryos, pathological material and biological products and feed-stuffs if they come directly or indirectly from FMD infected countries". (Blaha 1989 p. 21)

Table 2.9: Number of swine fever outbreaks and vaccinated pigs (head)

Year	Outbreaks	Morbidity	Death	Destruction	Vaccinated
1969	30	970	634	336	229439
1970	31	1112	835	277	299939
1971	22	805	704	101	345217
1972	15	599	435	164	372802
1973	37	947	891	156	418547
1974	23	393	368	25	429222
1975	21	441	407	34	384153
1976	28	426	408	18	399138
1977	30	1187	1130	157	459664
1978	26	924	884	40	609865

(Source: (Kongsmak 1980))

These phytosanitary standards act as non-tariff barriers (NTB's) and are a major threat to the viability of the livestock sector in Thailand. While the rest of the economy has been gearing up for Export Oriented Industrialisation (EOI) ever since the regime switch from Import Substitution Industrialisation (ISI) in the Third Five Year Plan (1972-1976) (National Economic and Social Development Board 1971), the livestock sector has been hamstrung in its attempts to develop into a commercial industry. While ecological factors have played a role in limiting the size of the livestock sector (lack of grazing land and tropical climactic conditions limiting dairy production for example), diseases such as FMD and Newcastle disease have restricted the growth in domestic and export demand for Thai meat and dairy products. In an attempt to increase growth in the livestock sector, the Thai government, in conjunction with the private sector, has embarked on national control programs for FMD and Newcastle disease including the creation of disease-free zones and national vaccination programs (Murphy 1996a, b). Disease control programs have been expensive to implement and there has been an interest in determining the economic viability of control programs to justify their continuing investment.

3. Economic Effects Of Trade Restrictions Due To Disease

It has been assumed that the restriction of trade due to the presence of disease in an exporting country delivers a welfare loss to that country in terms of lost export opportunities. This section shows that this may not be the case and the result depends on relative prices (domestic and world) and elasticities.

Consider the case where exports are restricted due to the presence of disease in the exporting country (See Figure 3.1).

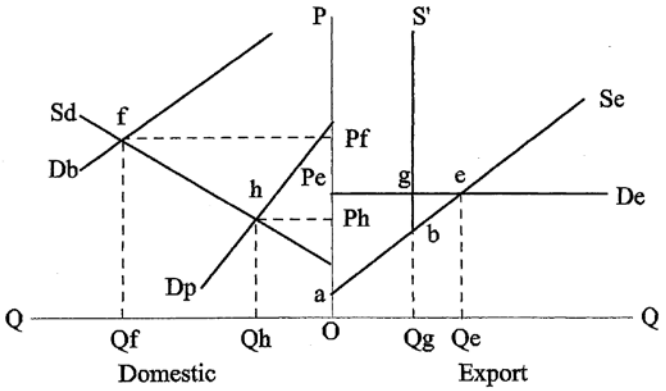

Figure 3.1 Effect of export restrictions on the Thailand livestock sector

The supply of livestock exports is restricted to $\overline{OQ_g}$ and Thailand's livestock export supply curve becomes $\overline{abS'}$. The small country assumption gives a highly elastic export demand schedule, D_e, giving the equilibrium in the export market at g and the export price at P_e. On the domestic market domestic demand for exportable livestock products (poultry and pork) is D_p and importable livestock products (beef) is D_b. With the supply of livestock being S_d (i.e. total supply comprising of domestic production and imports), the equilibrium position on the domestic market is at f with a price P_f and quantity $\overline{OQ_f}$ for the importable product and h with a price P_h and quantity $\overline{OQ_h}$ with the exportable product. With disease control supply restriction $\overline{abS'}$ is removed and a new equilibrium is attained at e with the supply curve now being S_e. Exports increase to Q_e but prices remain at P_e due to the small country assumption. Since there is no corresponding shift in overall supply nor a change in the domestic demand curve, the two domestic equilibria remain at f and h. With a freeing up of the export market there is an increase in exports of poultry and pork as their prices are below the world price and beef continues to be imported as its price is above the world market price. Producer surplus, shown by Δbge, is captured by the exporters as trade is liberalised. This leads to an interesting implication.

Theorem 3.1 (The Rybczynski theorem). *If relative commodity prices are constant and if both commodities continue to be produced, an increase in the supply of a factor will lead to an increase in the output of the commodity using that factor intensively and a decrease in the output of the other commodity.*

Consider two linear homogenous functions $Y = F(K, L)$ and $X = F(K, L)$. Let us assume that the production possibility set for the two functions is $H(Y, X) = 0$ and that the derivatives of the function are $F' > 0$ and $F'' < 0$. We can bring the labour factor input from Y outside the function:

$$y = L^{-1}F(K, L) = f\left(\frac{K}{L}, 1\right)$$

and setting $k = \frac{K}{L}$, gives $y = f(k)$. So, from theorem 3.1, an increase in k (an increase in capital usage relative to labour usage) will lead to an increase in production of y. Since the production possibility set is closed there is a fixed level of factor inputs $\frac{\bar{K}}{L} = k_y + k_x$ and the increase in k_y leads to a decrease in k_x and a corresponding decrease in x.

Given $y = f(k)$ we can rearrange this to $k = f^{-1}(y)$ or $k = g(y)$ which implies that the derivatives are $g' > 0$ and $g'' > 0$. So an increase in y will lead to an increase in k_y leading to a decrease in k_x which leads to a decline in x. Thus the Rybczynski theorem can be rearranged into:

Corollary 3.2. *If relative commodity prices are constant and if both commodities continue to be produced, an increase in the output of one commodity will increase the supply of the factor used intensively by that commodity to that commodity and a decrease in the supply of that factor to the other commodity and a resultant decrease in its output.*

This can applied to the livestock case. Consider the situation where the livestock industry can be split into two components. The first component is the traditional village level farming system where livestock production is a labour intensive activity. The second component is the modern commercial production system which is capital intensive and export orientated. An increase in exports would, according to corollary 3.2, increase investment and the usage of capital intensive inputs in the exporting component of the livestock industry (e.g. the poultry and pork producers). This would be at the expense of the non-exporting labour intensive component (e.g. the cattle producers).

More generally, this can be applied to the Thai economy as a whole. An increase in the exports or output of the livestock sector would shift capital intensive inputs out of other sectors of the economy and lead to a resultant decline in the output of those sectors. If those sectors are more efficient producers than the livestock sector then there would be an overall welfare decline.

One of the questions that has to be answered is why would the livestock sector continue to export if the export price is lower than the domestic price? What has to be remembered is that the analysis in this paper is on an aggregate basis and domestic and export prices reflect the different meat products produced for each market rather than a price differential within a particular meat product. For example, beef, which is produced mainly for domestic consumption is higher priced than poultry which is produced mainly for export (See Table 3.1). There is an incentive to export at a lower price because, with the imposition of trade restrictions due to disease prevalence in the exporting country, there are quota rents to be obtained by the exporter from the importing country.

One of the areas of international trade research which has applications to the trade effects of disease is that of non-tariff barriers like Quantitative Restrictions (QR). QR's like Voluntary Export Restrictions (VER) are bilateral agreements between exporting and importing countries to restrict the levels of exports to a country to a particular quota level in the face of explicit or implicit threats of retaliatory sanctions. Empirical evidence (Jeon 1992; de Melo and Tarr 1992) suggests that QR's enable quota rents to be captured by those who hold the quota rights. QR's raise the price of the imported commodity above the world price and if the price is set external to the importing country (i.e. by the exporting country) then the exporting country will accrue the quota rents.

Table 3.1: Meat prices in Thailand (Bhats/kg)

	Wholesale Price		Farm Price
Year	Beef	Pork	Live Chicken
1983	39.50	30.25	23.38
1984	39.17	25.44	20.38
1985	39.33	22.20	18.68
1986	38.95	24.45	18.85
1987	38.59	27.48	19.15
1988	40.79	31.29	19.49
1989	45.62	33.82	20.66
1990	44.69	30.73	23.12
1991	48.00	35.44	22.44
1992	52.38	38.41	22.02

(Source: (Office of Agricultural Economics (O.A.E.) 1993))

While a theoretical exposition will indicate the likely direction of welfare effects, but not the magnitude, empirical modelling enables the direction and magnitude of welfare changes to be estimated in a country specific setting. Section 4 gives a brief overview of empirical modelling and compares and contrasts the partial and general modelling schools.

4. Modelling Trade Liberalisation

4.1. A Typology of Modelling In Trade Liberalisation Studies

Research on the implications of agricultural trade liberalisation relies to a great extent on empirical modelling. Because the actual interaction of policies with trade and agricultural production and consumption is extremely complex, these models necessarily involve simplifying assumptions (Goldin and Knudsen 1990).

Over the past decade, quantification of the likely consequences of international agricultural trade liberalisation has advanced from single commodity analysis to multi-commodity models, and finally to economy-wide, general equilibrium models (Hertel 1991). For each model parameters and coefficients are specified which determine the interrelationships of key variables. The choice of variables, assumptions, and the relationships between variables differentiates the models (Goldin and Knudsen 1990).

Many of the models are more use in normative, ex-post, policy negotiations. Many of the model parameters, however, are conditional on particular liberalisation scenarios and based on historical data or prior studies (Hertel1991). As such, these models are open to critique,

where major reform may well imply structural changes entailing different values for these parameters. Thus, at best, models provide only a reference or normative guide to the impacts and benefits/costs of particular policy scenarios (Hertel 1991).

To estimate the economic effects of policy changes on sectors in the economy two modelling approaches have been used, the partial equilibrium approach and the general equilibrium approach.

4.2. Partial Equilibrium Models

The partial equilibrium approach examines the effect of policy changes on particular sectors or commodities in the economy while ignoring the interrelationships with other sectors or the macroeconomy (Goldin and Knudsen 1990; Brown 1993). As a consequence, there is a focus on efficiency gains in the sector analysed, but not on the effects on incomes, relative prices and indirect efficiency effects (Goldin and Knudsen 1990).

By incorporating assumptions regarding the responsiveness of supply and demand to changes in prices, mainly through the use of price elasticities, partial equilibrium models can simulate the effects of alternative policies on domestic and international markets (Goldin and Knudsen 1990).

There are some drawbacks in using a partial equilibrium model including the exogenising of exchange rates and the failure to incorporate the consumption and production effects between sectors of the economy. Partial equilibrium models assume away many of the difficulties involved in modelling consumer and producer behaviour. For example, the welfare impact of a policy change is assumed to be evaluated under risk- neutrality and prices in any particular year are the same as in the previous year. These drawbacks can be eliminated by the use of a dynamic general equilibrium model.

4.3. General Equilibrium Models

The initial spur for many of the general equilibrium models centred on the need to reveal internal benefits of unilateral or n1ultilateralliberalisation of agricultural policies in developed countries by outlining the adverse effects of agricultural support on non-agricultural sectors. More recently, general equilibrium models have been developed to indicate the impact of agricultural policy reform on developing countries where strong intersectoral links are present (Hertel1991).

General equilibrium models examine the economy as a whole and the interactions between sectors. These models include a number of important determinants such as savings, employment and income (Goldin and Knudsen 1990). The general equilibrium models use input-output ratios to capture the interactions between sectors of the economy and use elasticities for parameters such as export demand, import substitution, primary factor substitution, and consumer demand elasticities (Pearce 1992).

General equilibrium models, by explicitly modelling the non-agricultural economy, allow the analysis of both efficiency and income effects throughout the economy. However, such analysis rests on assumptions regarding the nature of these linkages (Goldin and Knudsen 1990). The general equilibrium approach is intuitively more appealing than the partial equilibrium approach and in principle permits a full specification of both income and efficiency effects. However, there are limitations, not least in terms of the modelling effect and resources required (Blandford 1990; Goldin and Knudsen 1990).

General equilibrium models incorporate traditional theories of production and consumption to explicitly model the non-agricultural sector and quantify the effects of a shock in one sector on another sector (Goldin and Knudsen 1990). Conversely, intersectoral effects in partial equilibrium models are represented by reduced form supply and demand elasticities. Such elasticities do not easily relate back to specific assumptions about consumer preferences, production technology or factor mobility. This makes it difficult to interpret the results of these models and leaves open the possibility of theoretical inconsistencies (Hertel 1990). Some of the assumptions underlying many of the partial and general equilibrium models in use are outlined below.

4.4. Assumptions Underlying Model Specifications

There has been some doubt raised by researchers (Burniaux et al. 1990a, b; Duncan 1990; Hertel1991) as to the validity of results obtained using trade liberalisation models. Hertel (Hertel 1991) suggests that the sign of the likely change in output following economy-wide trade liberalisation is not always predicted correctly. Hertel attributes this to the departure from reality of the underlying assumptions used in the models.

Models of agricultural markets have typically .had a partial equilibrium structure that differ in country and commodity coverage, the detail with which they treat individual countries, whether they are static or dynamic, and the way they represent agricultural policies

(Blandford 1990).

An important characteristic of these models is their ability to capture the price effects of policy changes across related commodities, through substitution in supply and demand, and among countries through the trade linkage. The information which different models provide on these factors is determined largely by their structure and the way in which agricultural policies are incorporated (Blandford 1990). The major structural differences between models are in five areas:

4.4.1. Commodity coverage

The use of a few major commodities in models has made comparison between models difficult. Further, the increase in trade of value added products, rather than raw bulk commodities, has turned homogeneous products into differentiated ones. Differentiating commodities allows scope for imperfect competition and strategic behaviour (Oxley 1990; Brown 1993).

As countries produce different commodities, the omission of particular commodities in any analysis of broad based liberalisation will bias the distributional impacts across countries (Brown 1990). Other problems stem from omitting cross commodity relationships like grains and livestock prices (Tyers 1985). Interactions can alter the directions and magnitudes of trade and welfare effects. Tyers (1985) has shown that eliminating cross price effects overstates the effects of liberalisation.

4.4.2. Country coverage

Coverage of countries in models varies depending on the intent, commodity and regional issues to be considered. Major participants differ according to the commodity examined (like grains- OECD, or rubber- Malaysia, Indonesia) (Brown 1993). In general, models incorporate some of the key participants of interest and then take parameters from other studies for the remaining countries (Parikh et al. 1988; Stoeckel et al. 1990; Brown 1993). Limitations of this approach lie in the different structural and institutional characteristics of countries and that protection policies may be poorly represented by general price wedges (Brown 1993).

4.4.3. Temporal coverage

Risk and Uncertainty The incorporation of risk and uncertainty in models may alter the conventional conclusions about gains from free trade as income support policies are often

intertwined with risk reducing policies (Tyers 1985; Tyers and Anderson 1988).

Risk reducing behaviour has important implications for trade modelling. The magnitude of price distortions varies from year to year as international prices fluctuate, even if there is no underlying change in the protective intent of these policies (Tyers 1985; McClatchey and Warley 1991; Brown 1993). In essence, models may be modelling natural variation in prices rather than fundamental policy reform.

Elasticities The response of trade to a price change depends on both the elasticity of export and import demand which themselves depend on other factors such as:

(a) Completeness of price transmission,
(b) Narrowness of the product,
(c) Completeness of price transmission to domestic producers and consumers,
(d) Stockholding behaviour, and
(e) Restrictions on domestic production and input use. (Brown 1993)

Elasticities vary by commodity and by country and are also temporal as imports and exports do not adjust instantly. The sensitivity of model outcomes to changes in elasticities is dependent on the changes made. Higher elasticities increase the initial impact of a change in assistance on trade and prices.

A key assumption for trade elasticities regards the elasticity of substitution (Burniaux et al., 1990b). Tyers and Anderson (1988) claim that grain export demand elasticities for the US in their model are larger than for other studies because they allow for more substitution in production and consumption. Substitution between domestic and export products is also a critical parameter (Burniaux et al., 1990b). Armington trade models assume separability between imports from various sources, and this assumption is the basis of many general equilibrium models. Price responsiveness at a country's border is likely to be less in an Armington model than for a spatial equilibrium model where perfect substitution is implicit (Burniaux et al., 1990a, b; Brown 1993).

4.4.4. Partial versus general equilibrium

General and partial equilibrium models can lead to different outcomes where the extent of the divergence depends on the particular case and the parameters of interest (Brown 1993). Models which do not model the full equilibrium response tend to overestimate the effects.

Conversely, the lack of sector detail in general equilibrium models may underestimate effects by not allowing for imperfect policy transmission (Duncan 1990).Cross price elasticities of supply in partial equilibrium models are generally negative reflecting the substitution effect. Hertel argues that although this may happen in the short run, in the long run, as input fixities are relaxed, cross price elasticities may be positive. Most of the reduced form, partial equilibrium models embody this conventional conclusion. (i.e. products are assumed to be substitutes in production over the time horizon for which the simulation is presumed to apply). Consequently, partial equilibrium models may understate the consequences of liberalisation for resource movement (Hertel 1990; 1991).

4.4.5. Imperfect competition

General equilibrium models have generally used the assumption of perfect competition whereas partial equilibrium models have often incorporated imperfect competition and strategic trade behaviour. Imperfect competition has been incorporated into trade theory by relaxing the traditional assumptions of constant returns to scale, homogeneous products and competitive markets and to view imperfectly competitive markets as game theoretic in nature (Economides 1983; Brown 1993).

Where markets are perfectly competitive the conventional conclusion is that in those cases where agriculture is lightly protected, liberalisation will cause this sector to expand. A detailed analysis by (Hertel 1991) of unilateral trade liberalisation indicates that, for plausible parameter values, the conventional wisdom is robust to a variety of departures from the perfectly competitive paradigm. However, introduction of imperfectly competitive behaviour in the import competing sectors may significantly dampen the degree to which an export-orientated agricultural sector might expand as a result of liberalisation (Hertel 1991). Hertel's argument is that reductions in assistance may force imperfectly competitive industries to become more competitive and produce more. The magnitude of this 'pro- competitive' effect depends importantly on the way in which foreign and domestic products are differentiated.

While some studies like that undertaken by Hertel (1990, 1991) have suggested that gains from liberalisation may be less than that hypothesised by perfectly competitive models, other studies have suggested that trade liberalisation using imperfectly competitive models may produce gains two or three times larger than that estimated under perfect competition (Richardson 1989).

Richardson (1989) suggests that trade liberalisation under an imperfect competition scenario would not only increase welfare by increasing production and consumption but would also reduce price distortions as foreign competition increases and the domestic industry is rationalised by the exit of marginal firms. However, this scenario depends heavily on whether the economy is an inherent exporter or importer of the goods produced by an industry. If the economy is an inherent exporter, then the scenario changes with mark-up pricing under imperfect competition capturing the same benefits as an optimal tariff under perfect competition and thus reaping excess profits on exports, enhancing its welfare. Adjustment pressure under the imperfect competition scenario is greater with trade liberalisation and dramatic, sudden changes in industry size and even existence occurs with very small changes in trade policy regimes (Richardson 1989).

5. Numerically Solving General Equilibrium Models

In practice is it impossible to solve algebraically a realistically structured general equilibrium model. However, with the development of solution algorithms (Scarf 1967; Scarf and Hansen 1973) and the refinement of the Walrasian general equilibrium model embodied in the Arrow-Debreu-Hahn (Arrow and Debreu 1954; Arrow and Hahn 1971) model, it is possible to solve numerically for equilibrium prices and quantities. The procedure pioneered by Johansen (1960) is to solve the non-linear general equilibrium equations as percentage changes of their linear form. The advantages of the Johansen approach are that (Horridge, Parmenter, and Pearson 1993; Karunaratne 1996):

(a) it enables elasticities to be evaluated without having to obtain explicit forms for the solution equations (Dixon et al. 1992 pp. 77-78),
(b) it enables flexible model closures with differing endogenous and exogenous variables,
(c) it enables a consistent and updated database to be generated after each change,
(d) it enables the reduction of the model to a manageable size by substituting out or omitting unimportant matrix variables of large dimensions, and
(e) it evaluates (unitless) percentage changes at given values of the Input- Output database negating the need of an arbitrary choice of units in the calibration stage.

The procedure for conducting policy experiments on CGE models is relatively simple. Once the model structure has been linearized under the Johansen approach and a consistent

benchmark dataset created, the model is solved using one of several algorithms for computing general equilibria (Shaven and Whalley 1992 pp. 37-68). A percentage-change-from-the-original counterfactual equilibrium dataset is computed and policy implications can be drawn (See Figure 5.1).

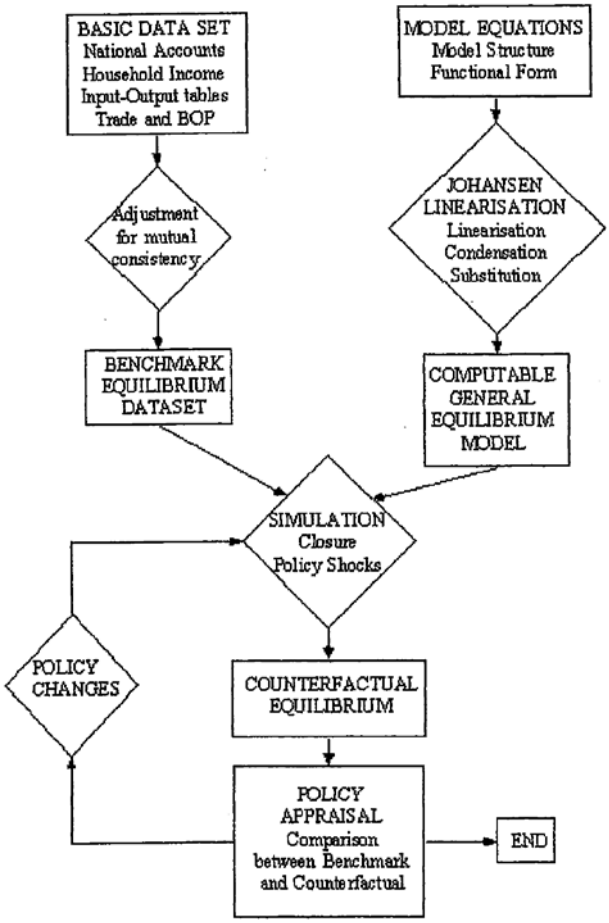

Figure 5.1: Procedure for carrying out computable general equilibrium analysis

The development of the model and creation of the benchmark dataset are application specific and will be discussed in section 6. Condensation and model closure are more general in their application (although the choice of variables remains a model specific issue) and are discussed below.

5.1. The Johansen Approach to Model Condensation and Closure

Consider the general equilibrium model $F(V) = 0$ where F is a vector function of length m (the equations of the model), V is a vector of variables of length n and 0 is a $m \times 1$ vector. The differential form of the model under Johansen-style computations can be expressed as $A(V)v = 0$ where $A(V)$ is a $m \times n$ matrix whose components are functions of V and v is a n ×

1 vector of percentage changes in V. (See Dixon et al. 1992 pp. 73-148 for a full elucidation).

5.1.1. Condensing the model

Since the dimensions of the model, $m \times n$ may be very large, and hence computationally intractable, condensation of the linearized version of the model $A(V)v = 0$ by eliminating some variables and equations needs to be carried out. A system of equations of the form $A^*(V)v^* = 0$ where A^* is a $(m - r) \times (n - r)$ matrix and v^* is a $(n - r)$ subvector of v and r is the number of eliminated variables can be derived. Apart from eliminating those variables that are linearly dependent to obtain a non-singular matrix, $A_\alpha^*(V^I)$, the choice of which variables to eliminate is arbitrary, and depends on the application of the model:

(a) eliminated variables are necessarily endogenous and variables to be shocked for policy analysis should not be eliminated,
(b) key endogenous variables which are to be analysed for policy implications should be retained, as eliminating and backsolving for variables increases computation time, and
(c) variables that appear in no more than one or two equations and for which explicit expressions exist in terms of variables which are to be included in the condensed system can be eliminated to keep the algebra simple. Ideal variables for elimination are intermediate input flows, commodity flows to households, and input flows to industries. Variables normally kept include tax and tariff rates, factor supplies and prices, and industry outputs and employment (Dixon et al. 1992).

5.1.2. Specifying the endogenous/exogenous split

Generally, a CGE model will have more variables than equations and to solve the model the number of endogenous variables needs to be restricted to the number of equations. To close the model the endogenous/exogenous split of variables needs to be specified in order to satisfy the above restriction.

In computations of the percentage changes of endogenous variables from their initial solutions due to exogenous shocks, $A^*(V)$ is evaluated at $V = V^I$ giving

$$A_\alpha^*(V^I)v_\alpha^* = A_\beta^*(V^I)v_\beta^* = 0$$

where v_α^* is a $m \times n$ subvector of endogenous components of V, v_β^* is a $(n - m) \times 1$ subvector of exogenous components of V, $A_\alpha^*(V^I)$ is a $m \times m$ matrix formed by the columns

of $A^*(V^I)$ corresponding to the endogenous variables, and $A^*_\beta(V^I)$ is a $m \times (n - m)$ matrix formed by the columns of $A^*(V^I)$ corresponding to the exogenous variables.

Solving for v^*_α gives

$$v^*_\alpha = -A^*_\alpha(V^I)A^*_\beta(V^I)v^*_\beta$$

if the inverse does not exist, then the Johansen method will fail. However, if $A^*_\alpha(V^I)$ is singular, then it is likely that the endogenous and exogenous variable split is illegitimate. i.e. is unlikely that the system $F(V) = 0 \Rightarrow v^*_\alpha = f(v^*_\beta)$ in the region of V^I and in this case any solution method should fail.

With large CGE models it is difficult to specify an endogenous/exogenous split which meets the criteria of existence of A^{*-1}_α and $A^*_\alpha(V^I)$ being non-singular. Specification of the split is usually by trial-and-error but time can be saved by creating a table of variables to attack the task systematically (See Table 5.1).

Table 5.1: Tally of Variables and Equations

A Dimension	B Variables	C Equations	D (C-B) Exogenous
MACRO	66	51	15
COM	18	11	7
COM × IND	7	5	2
COM × MAR	2	1	1
COM × SRC	9	7	2
COM × SRC × IND	8	6	2
COM × SRC × IND × MAR	4	2	2
COM × SRC × MAR	4	2	2
IND	27	15	12
IND × OCC	3	2	1
OCC	2	1	1
TOTAL	150	103	47

(Source: (Horridge et al. 1993 p. 118))

Further, an examination of the linearized model to identify which of the *n* components of *A(V)* are zero and setting them to be exogenous as well will reduce the number of choices for the split to a tractable amount.

Once the model has been condensed and a closure specified, exogenous variables can be shocked and policy implications drawn.

6. Modelling the Thailand Livestock Sector

In order to examine the effects of increased production and trade in livestock products due to an eradication of disease in Thailand a 28 sector computable general equilibrium (CGE) model of the Thailand economy is used. The model is outlined in detail in Karunaratne (Karunaratne 1996) and only a brief exposition for completeness sake is undertaken here.

6.1. The Thailand Livestock Model

The Thailand Livestock Model (TLM)[1] is a 28 industry × 28 commodity CGE model adapted from ORANI-F, (Horridge et al. 1993) the forecasting version of the ORANI model of the Australian economy developed by the IMPACT Project (Dixon et al. 1982). This is a dynamic model which has stock and flow accumulation relationships between capital stocks and investment and foreign debt and trade deficits. This goes part way to alleviating the concerns outlined in Section 4.2.

The model of 25,000 equations and 28,000 scalar variables contains 2 sources of commodity production (domestic and imported), 2 margin services (wholesale and retail) and 2 occupational categories (skilled and unskilled labour) (See Table 6.1 and Appendix C Tables C.l and C.2).

The production and demand structures are a nested CES/CET/Leontief set of functions outlined in (Horridge et al. 1993 Figs. 6-8) and (Karunaratne 1996 Fig. 3). Factor inputs in traditional livestock production have mainly been comprised of labour intensive inputs while for the export orientated livestock processing industries, capital intensive inputs comprise the main factor inputs used. The model aggregates the individual livestock industries (cattle, swine, poultry, domestic labour intensive, export capital intensive) into one homogenous industry and therefore cannot capture the individual nuances of each industry.

[1] The ‘Thailand Livestock Model’ is the name given to this particular 'strain' of the model presented in (Karunaratne 1996) and refers to the particular condensation and closure used. It should be remembered that the Thailand CGE model presented in (Karunaratne 1996) is a generic model of the Thailand economy and as such can be used for many different policy simulations.

Table 6.1: Thailand Livestock Model Flows Database

		Absorption Matrix					
		1 Producers	2 Investors	3 Household	4 Export	5 Other	6 Δ Invent.
	Size	I	I	1	1	1	1
Basic Flows	C×S	V1BAS	V2BAS	V3BAS	V4BAS	V5BAS	V6BAS
Margins	C×S×M	V1MAR	V2MAR	V3MAR	V4MAR	V5MAR	n/a
Taxes	C×S	VITAX	V2TAX	V3TAX	V4TAX	V5TAX	n/a
labour	O	VILAB					
Capital	1	VICAP					
Land	1	VILND					
Other Costs	1	VIOCT					

Joint Prod. Matrix	
	I
C	Make

Import Duty Vector	
	1
C	V0TAR

C = Number of Commodities (28)
I = Number of Industries (28)
S = Commodity Source (2: Domestic, Imported)
O = Occupational Types (2: Skilled, Unskilled)
M = Number of Commodities used as Margins

Econometric Estimates
Parameters

(Source: (Horridge, Parmenter, and Pearson 1993; Karunaratne 1996))

6.1.1. Model calibration and validation

The model was validated using an aggregation of the 1985 Thailand 180-sector Input-Output table (National Statistical Office 1987) which was manipulated to show purchases of inputs (factor and final demands) by the various agents in the economy and basic prices converted from purchaser prices by netting out margins and taxes (Karunaratne 1996). Parameters such as elasticities were obtained from other general equilibrium studies of the Thailand economy (Horridge et al. 1993; Dixon et al. 1994; Office of Agricultural Economics and Australian National University 1994).

6.1.2. Model closure

There are three considerations in choosing a closure for a CGE model: tractability, sensibility, and invertibility.

Tractability: Because the model has 25,000 equations and 28,000 variables, the model needs to be reduced in size to make it tractable on modern PC's[2] . There are two methods of reducing the size of a model to make it tractable; substituting out variables and omitting variables.

[2] A single run of a multistep simulation under Systematic Sensitivity Analysis (SSA), solving the model 2 times, took just over 8 and a half minutes on a Pentium 120MHZ with 64MB RAM running GEMPACK v5.1 in a NT 4.0 MSDOS Box. Because of the size of the TLM, the GEMSIM source code needed to be modified to increase memory allocation (See (Harrison and Pearson1994b Sec. 5-13)).

Substituting out variables: Variables which are substituted out from the model are made endogenous and replaced by their independent (RHS) components of their respective equations.

For example, every occurrence of the variable $p1$ (intermediate purchaser's prices) in the TLM is replaced by the right hand side of the equation

$$p1 = \frac{(V1BAS+V1TAX)(p0+t1)+\sum_{M}^{MAR} V1MAR(p0=a1MAR)}{V1PUR+TINY} =$$

Generally, substituting out a variable with k components will reduce by k the number of rows and columns in the *A(V)v* matrix. The variables substituted out of the TLM are outlined in Appendix A.

Omitting variables: If all components of a linear variable are to be made exogenous and not shocked then their percentage changes will be zero. These variables can be omitted from the model to reduce its size. Omitting a variable with *k* components will reduce the number of columns (but not rows) in the *A(V)v* matrix by *k*. The variables omitted from the TLM are outlined in Appendix A.

Sensibility: The issue of sensibility is one of selecting those particular variables you are interested in applying policy shocks to be exogenous and selecting enough of them to restrict the number of endogenous variables to be equal to the number of equations. Those variables selected to be exogenous are outlined in Appendix B.

Invertibility: The issue of whether or not the matrix is non-singular and the inverse exists for a particular model and closure is, for all practicality, a one of running the model and if it fails the closure is invalid and another closure needs to be specified.

6.1.3. Model shocks

Sections 2.1.1 and 2.3 outline the economic effects of FMD and Newcastle disease. As stated at the beginning of section 6, the objectives of this study are to examine the production and trade effects of disease control on the Thailand macro economy. Accordingly, a distribution of shocks (See Section 6.3 for details) corresponding to a 20% ± 19% change in production of livestock (Scenario I), a 20% ± 19% change in exports of livestock (Scenario II), and a 20% ± 19% change in livestock capital augmenting technical change (Scenario III) was applied to the TLM. These shocks can be interpreted as:

(a) an increase in the quantity of livestock and livestock products going to market due to the reduction in mortality and loss of condition/milk production attributed to the control of disease (Scenario I),
(b) an increase in the quantity of livestock and livestock products being exported due to the elimination of export barriers for infected livestock products (Scenario II), and
(c) an increase in the productivity of livestock production as the elimination of disease, through the reduction in mortality and loss of condition/milk production, causes increased production (i.e. a change in technical efficiency) (Scenario III).[3]

6.2. Using the General Equilibrium Modelling PACKage (GEMPACK)

The problems of linearizing a CGE model under the Johansen approach and solving it using an appropriate algorithm are made substantially easier by using a software package such as GEMPACK (Harrison and Pearson 1994a, b).Given a CGE model in levels, linearized, or mixed form, GEMPACK:

(a) condenses the model to a tractable size,
(b) linearizes the model to express the equations in percentage change form,
(c) attaches the database, closure and policy shocks to the model,
(d) solves the model to find the percentage change equilibrium prices and quantities, and
(e) prints out the solution in a Report Form amenable to interpretation.

Given condensation and linearization instructions (See Appendix A) and solution algorithm, closure and shocks instructions (See Appendix B) GEMPACK produces results which show percentage changes of endogenous variables from their initial, pre-simulation levels due to percentage changes in exogenous, shocked variables.

[3] Beard (1992) outlines the case where differences in herd productivity can be explained by differential access to veterinary services. If some livestock producers purchase veterinary supplies (i.e. vaccines) to control disease and thereby increase the productivity of their herds relative to producers that don't vaccinate, then veterinary services can be seen as a special type of capital augmenting production factor with livestock being treated as capital.

6.3. The Systematic Sensitivity Analysis (SSA) approach to policy simulations

One of the main problems with using the results of CGE analysis is the generation of point estimators without corresponding confidence intervals. Unlike econometric models with an underlying statistical basis, CGE models are not amenable to statistical interpretation. In previous studies (Pagan and Shannon 1985, 1987; de Janvry and Sadoulet 1987) one of the techniques used to generate a 'feel' for confidence in the model and its results is sensitivity analysis. The robustness of a model's results (endogenous variables) can be checked by varying the values of exogenous inputs (parameters and shocks). If some small change in the values of the exogenous variables causes large changes in the magnitude of, or changes in the sign of endogenous variables, then the model is not robust and the choice of values for exogenous inputs will be critical for the model results.

The generation of model results under varying input values can be computationally tedious and an automated procedure has been developed based on Gaussian quadrature methods (Ardnt and Pearson 1996). Assuming that the exogenous inputs vary symmetrically and independently, the Gaussian quadrature method develops order three discrete approximations to the first two moments of the distribution for exogenous inputs and the model is solved for each point in the distribution. The mean and standard deviation of the model results are approximated and presented in Section 7.

> We highlight again that the automated procedure described here produces only approximations to the true mean and standard deviation of model results. In general, the procedure produces no estimate of the accuracy of these approximations. However, as discussed in Arndt (1996b) [Ardnt 1996], the results are often surprisingly accurate, given the relatively modest number of times the model is solved.

(Ardnt and Pearson 1996 p. 3)

7. Results

The full model simulation results are exhaustive and only a brief selection are presented in the body of the paper. The full results are shown in Appendix C. The model, as stated before, is adapted from ORANI-F, the forecasting version of ORANI. Simulation shocks are projected to the medium term (5 years) and the final, overall results presented below. In CGE

modelling the short-run is usually taken to be about 3 years as industries take time to adjust capital stocks to the effects of the exogenous shocks. The results in Tables 7.1 to 7.7 are presented as means with standard deviations in brackets. Standard deviation results will be treated separately in section 7.4.

7.1. Scenario I

Under Scenario I a 20% increase in livestock production due to disease control leads to mixed reactions across sectors of the economy.

One of the questions we are interested in answering when we shock livestock production and exports is what will happen to other exporting industries (See Tables 7.1 and 7.2). Exporting industries are composed of traditional exporters, mostly primary products and manufactures, which export a large percentage of their total output and non-traditional exporters which export a small percentage of their total output. Those industries that are non-traditional exporters (I1- I3,I7-I10,I18-I28) (See Table 0.1) have increased their exports by 11.66% due to a shock to the production of livestock. However, these results are not robust and therefore suspect (See Section 7.4).

As a result of an increase in livestock production, the flow-throughs in the livestock sector indicate that even though prices rise 11.74%, exports increase by 28.18%. The flow-throughs to the rest of the agriculture industry indicate that output and employment both increase by 17- 28% and 78 - 113% respectively.

The rise in prices for other traditional exporting sectors, like the textiles (cloth and leather) and car (vehicles) industries leads to a reduction in exports and a fall in employment as resources are shifted out of these industries and into the livestock, general agriculture, and tertiary sectors.

Tertiary sectors, like Public Administration and Education, Health, Services, and Banking all have an increase in output with a concomitant fall in prices and increase in employment.

The effect of increased livestock production on the economy as a whole, as indicated by the macroeconomic indicators (See Table 7.7), shows that foreign debt and the trade deficit both decline in real terms. There is an increase in the taxation base as Aggregate Revenue from all Indirect Taxes increases by around 650% (the magnitude of the increase is tempered somewhat by the rather large standard deviation of 560%) and Indirect Taxes on Households

increases by 26%. Real household consumption increases by 38% as the number of households increases by 31%. However, there does not seem to be a volume increase in the basket of consumption goods as utility actually falls by 35%.

There is a decline in the usage of the factors of production, Land Labour, and Capital (78-107%) as investment falls (Aggregate Nominal- 48%, Aggregate Price Index- 320%). Lastly, there is a decline in Nominal GDP of 9%.

Table 7.1: Effect of livestock production increases on industries, means(standard deviations)

Industry	Scenario I		
	Exports	Price	Output
Paddy	11.66(41.42)	-68.52(72.28)	17.22(10.55)
Fruit-Vegetables	11.66(41.42)	-51.89(62.07)	28.33(17.66)
Other Agriculture	11.66(41.42)	-14.38(23.61)	20.98(15.71)
Livestock	28.18(3.82)	11.74(7.87)	20(7.76)
Canning	9.42(28.98)	-9.16(19.41)	15.94(26.49)
Rice	-12.14(18.74)	-7.66(26.14)	17.36(10.5)
Liquor	11.66(41.42)	-34.83(49.69)	38.36(41.24)
Beer	11.66(41.42)	-19.66(29.52)	32.82(34.66)
Soft Drinks	11.66(41.42)	-27.61(54.43)	36.29(8.63)
Tobacco	11.66(41.42)	39.96(28.13)	-15.23(10.23)
Oil/Sugar	-24.03(19.65)	-10.62(25.14)	10.17(16.94)
Cloth/Leather	-18.31(12.66)	9.88(0.52)	5.0(18.05)
Wood/Paper	-5.73(12.79)	8.09(1.56)	18.5(38.61)
Engineering/Chem	-21.57(42.51)	6.89(10.82)	19.76(51.16)
Electrical Equip	20.57(32.79)	1.49(2.37)	-8.73(10.59)
Plastics/Ceramics	6.19(20.81)	7.46(2.05)	13.28(30.8)
Vehicles	-69(52.74)	17.07(12.54)	2.94(25.13)
Fuel	11.66(41.42)	47.95(36.93)	-26.51(7.59)
Power/Water	11.66(41.42)	-42.21(51.43)	26.18(25.99)
Construction	11.66(41.42)	-300.08(290.29)	58.76(125.39)
Hotel/Restaraunts	11.66(41.42)	-2.63(10.81)	22.49(23.04)
Transport	11.66(41.42)	-6.53(13.38)	25.03(33.65)
Dwellings	11.66(41.42)	-75(96.76)	61.42(45.34)
Public Admin & Ed	11.66(41.42)	-88.44(71.11)	9.12(6.41)
Health	11.66(41.42)	-47.33(49.74)	39.6(23.32)
Services	11.66(41.42)	-63.47(55.72)	7.35(16.72)
Banking	11.66(41.42)	-72.98(68.27)	33.59(47.4)
Entertainment	11.66(41.42)	-61.48(54.58)	129.81(115.94)

Table 7.2: Effect of livestock production increases on industries, means(standard deviations) (continued)

Industry	Scenario I	
	Employment	Investment
Paddy	64.41(31.89)	-338.3(345.5)
Fruit-Vegetables	113.57(66.26)	90.85(247.85)
Other Agriculture	78.74(50.93)	-972.07(923.47)
Livestock	-31.44(100.11)	71.79(111.09)
Canning	11.74(3.84)	-11.71(55.32)
Rice	-29.45(82.09)	65.45(110.77)
Liquor	69.67(42.67)	53.75(111.07)
Beer	56.45(26.64)	46.1(102.08)
Soft Drinks	-43.42(166.4)	105.89(127.21)
Tobacco	-39.09(48.26)	-77.63(10.91)
Oil/Sugar	-14.98(33.22)	31.3(92.57)
Cloth/Leather	-8.84(9.77)	-972.57(901.3)
Wood/Paper	23.18(37.94)	103.87(185.3)
Engineering/Chem	12.71(51.23)	43.65(143.46)
Electrical Equip	-34.67(21.02)	48.49(128.98)
Plastics/Ceramics	12.0(22.41)	105.6(184.01)
Vehicles	-10.15(9.18)	75.91(160.53)
Fuel	-89.96(79.88)	72.2(150.46)
Power/Water	22.23(6.68)	78.4(182.76)
Construction	-288.26(200.42)	544.6(655.6)
Hotel/Restaraunts	2.33(17.75)	79.75(173.06)
Transport	23.79(19.62)	156.93(237.93)
Dwellings	65.59(89.58)	166.01(196.47)
Public Admin & Ed	8.92(5.56)	97.9(282.07)
Health	39.98(1.09)	-19.68(53.64)
Services	-0.24(4.93)	-556.22(456.19)
Banking	46.32(45.41)	708.46(836.34)
Entertainment	168.36(142.46)	200.52(281.87)

7.2. Scenario II

An increase in livestock exports of 20% due to the elimination of export restrictions on Thailand livestock leads to an across the board increase in exports and investment and a reduction in price for the majority of industries (See Tables 7.3 and 7.4).

There are mixed effects on output and employment with a reduction in both for the agriculture sector of around 2 - 6% and 8 - 22% respectively. Most of the manufacturing industries record increases in output and employment. In the tertiary sector, Hotels and Restaurants, Public Administration and Education, Health, and Entertainment all record decreases in output and employment of around 1-10% and 1- 15% respectively.

In the economy as a whole (See Table 7.7), the macroeconomic indicators show an increase in real foreign debt (8100%) and real trade deficit (3890%). As exports increase (border value- 9.3%, volume index- 12.5%) there is a real devaluation (1.85%) but the terms of trade still decline (2.82%) as the value of imports increase as well (value plus duty- 7.33%) even though, for most industries, the volume of imports fall. Some manufacturing industries (Engineering/Chemical, Electrical Equipment, and Vehicles) actually increase their imports of big-ticket items (3%, 22.5%, 13% respectively) (See Appendix C) causing an increase in the value of imports unrepresentative of the actual volume. All price indices fall resulting in a fall in indirect tax revenue (49%). Household consumption falls 11% as does the number of households (22%) but utility per household increases by 33%. The increases in exports and manufacturing output increases the use of factor inputs with payments to labour and capital increasing by 9% and 11% respectively and a concomitant increase in investment expenditure of 34%. Finally, there is an increase in Real GDP of 3.8%

Table 7.3: Effect of livestock export increases on industries, means(standard deviations)

Industry	Scenario II		
	Exports	Price	Output
Paddy	19.92(7.54)	-0.56(0.03)	-1.85(0.53)
Fruit-Vegetables	19.92(7.54)	-4.18(1.31)	-4.14(1.37)
Other Agriculture	19.92(7.54)	-4.29(1.48)	-2.66(0.93)
Livestock	20.0(19)	-8.19(2.86)	-6.6(2.4)
Canning	9.66(3.56)	-4.07(1.42)	5.11(1.9)
Rice	16.12(5.91)	-6.63(2.22)	-1.88(0.54)
Liquor	19.92(7.54)	-9.5(3.68)	-2.97(1.46)
Beer	19.92(7.54)	-6.12(2.34)	-4.08(1.91)
Soft Drinks	19.92(7.54)	-10.49(3.63)	-12.85(4.57)
Tobacco	19.92(7.54)	-6.51(2.48)	-3.27(1.67)
Oil/Sugar	24.75(9.3)	-5.16(1.74)	4.55(1.8)
Cloth/Leather	19.2(7.52)	-4.6(1.66)	4.94(1.77)
Wood/Paper	11.05(4.11)	-3.03(1.08)	8.28(3.02)
Engineering/Chem	-3.17(0.92)	0.5(0.12)	12.5(4.56)
Electrical Equip	4.45(1.6)	-1.31(0.47)	10.47(3.93)
Plastics/Ceramics	8.14(3.04)	-2.45(0.89)	7.94(2.91)
Vehicles	11.47(4.48)	-2.55(0.95)	8.7(3.21)
Fuel	19.92(7.54)	-5.0(1.84)	7.7(2.81)
Power/Water	19.92(7.54)	-4.64(1.68)	-0.99(0.36)
Construction	19.92(7.54)	2.58(0.85)	25.04(9.02)
Hotel/Restaraunts	19.92(7.54)	-3.78(1.34)	-5.15(2.32)
Transport	19.92(7.54)	-4.12(1.56)	0.68(0.04)
Dwellings	19.92(7.54)	-9.33(3.27)	-9.5(3.59)
Public Admin & Ed	19.92(7.54)	7.57(2.87)	-1.16(0.41)
Health	19.92(7.54)	-2.17(0.83)	-8.2(2.99)
Services	19.92(7.54)	3.24(1.24)	4.52(1.68)
Banking	19.92(7.54)	0.42(0.05)	4.66(1.62)
Entertainment	19.92(7.54)	1.62(0.51)	-9.81(3.88)

Table 7.4: Effect of livestock export increases on industries, means(standard deviations) (continued)

Industry	Scenario II	
	Employment	Investment
Paddy	-8.61(2.64)	84.76(32.93)
Fruit-Vegetables	-14.3(4.53)	62.55(24.05)
Other Agriculture	-10.65(3.61)	76.92(28.8)
Livestock	-22.06(7.25)	12.09(4.21)
Canning	-1.91(0.71)	31.62(11.97)
Rice	-14.23(4.57)	20.34(7.8)
Liquor	-16.32(6.17)	18.14(6.03)
Beer	-18.22(6.83)	16.16(5.16)
Soft Drinks	-32.29(9.93)	-0.3(0.79)
Tobacco	-11.25(4.62)	23.16(7.99)
Oil/Sugar	-3.22(0.94)	30.51(11.72)
Cloth/Leather	-1.83(0.81)	31.68(11.89)
Wood/Paper	4.57(1.47)	36.93(13.89)
Engineering/Chem	13.36(4.61)	43.59(16.3)
Electrical Equip	9.11(3.34)	40.45(15.36)
Plastics/Ceramics	4.48(1.51)	36.86(13.92)
Vehicles	5.53(1.89)	37.69(14.23)
Fuel	2.19(0.58)	35.03(13.14)
Power/Water	-11.14(3.85)	43.85(16.44)
Construction	39.25(14.31)	41.15(15.05)
Hotel/Restaraunts	-9.07(3.77)	36.15(12.99)
Transport	-5.99(2.43)	30.9(11.18)
Dwellings	-40.09(12.16)	1.839(0.31)
Public Admin & Ed	-1.42(0.51)	75.45(28.66)
Health	-16.33(5.68)	27.89(10.15)
Services	2.73(1.0)	47.78(18.2)
Banking	-3.28(1.43)	56.05(20.91)
Entertainment	-14.64(5.55)	29.85(10.5)

7.3. Scenario III

An increase in livestock capital augmenting technical change of 20% due to disease control enhancing the productivity of the livestock sector has only slight effects on the Thai economy.

A 25% increase in the effective price of the livestock primary factor composite leads to a decline in factor inputs used equivalent to the small percentage decline in output of 1.6% (See Tables 7.5, 7.6 and Appendix C). Prices of capital and land increase by between 17.6% to 23% while the price of labour only marginally increases. The relative price differential in factor input costs prompts a 23% increase in labour usage and a corresponding migration of labour out of other industries. The high rate of return for fixed capital (23%) in the livestock sector prompts an inflow of investment with investment reaching 16% compared to marginal increases in investment of most of the other industries. The increase in the price of factor inputs flows through to an increase in the domestic price of 4.5% for livestock products. As domestic prices increase livestock imports increase, reflecting the substitution of commodity sources by consumers faced with higher domestic prices. The effect on the rest of the economy is only slight with a maximum of 0.6% change in magnitude across all other industries for output and domestic prices.

With an increase in capital augmenting technical change exports of livestock have actually declined by 9%, non-traditional exporters have increased exports by around 1.4% and the traditional exporters have only slight increases or decreases in exports.

The effects of increases in capital augmenting technical change on the economy as a whole are generally slight. Real foreign debt and the trade deficit increase by 360% and 174% respectively (compared to 8100% and 3890% under Scenario II) but the rest of the indicators do not change by more than 1% in magnitude (See Table 7.7 and Appendix C).

Table 7.5: Effect of livestock export increases on industries, means(standard deviations)

Industry	Scenario III		
	Exports	Price	Output
Paddy	1.36(0.52)	-0.12(0.05)	-0.07(0.03)
Fruit-Vegetables	1.36(0.52)	-0.16(0.06)	-0.1(0.04)
Other Agriculture	1.36(0.52)	-0.56(0.21)	-0.5(0.19)
Livestock	-9.2(3.43)	4.50(1.78)	-1.59(0.60)
Canning	0.11(0.04)	-0.05(0.02)	0.02(0.01)
Rice	0.35(0.14)	-0.16(0.06)	-0.07(0.03)
Liquor	1.36(0.52)	-0.33(0.13)	-0.07(0.03)
Beer	1.36(0.52)	-0.13(0.05)	-0.18(0.07)
Soft Drinks	1.36(0.52)	-0.22(0.08)	-0.29(0.11)
Tobacco	1.36(0.52)	-0.25(0.1)	0.07(0.03)
Oil/Sugar	0.54(0.21)	-0.13(0.05)	0.03(0.01)
Cloth/Leather	0.16(0.06)	-0.04(0.02)	0(0)
Wood/Paper	0.22(0.09)	-0.06(0.02)	0.16(0.06)
Engineering/Chem	-0.1(0.04)	0.02(0.01)	0.25(0.09)
Electrical Equip	0.08(0.03)	-0.02(0.01)	0.14(0.05)
Plastics/Ceramics	-0.13(0.05)	0.03(0.01)	-0.02(0.01)
Vehicles	0.09(0.04)	-0.02(0.01)	0.15(0.06)
Fuel	1.36(0.52)	-0.04(0.01)	0.05(0.02)
Power/Water	1.36(0.52)	-0.12(0.05)	-0.08(0.03)
Construction	1.36(0.52)	0.11(0.04)	0.58(0.22)
Hotel/Restaraunts	1.36(0.52)	0.44(0.17)	-0.36(0.14)
Transport	1.36(0.52)	-0.06(0.02)	-0.01(0)
Dwellings	1.36(0.52)	-0.13(0.05)	-0.2(0.08)
Public Admin & Ed	1.36(0.52)	0.09(0.03)	-0.02(0.01)
Health	1.36(0.52)	-0.03(0.01)	-0.16(0.06)
Services	1.36(0.52)	0.03(0.01)	-0.01(0)
Banking	1.36(0.52)	-0.09(0.03)	0.04(0.02)
Entertainment	1.36(0.52)	0.01(0)	-0.15(0.06)

Table 7.6: Effect of livestock export increases on industries, means(standard deviations) (continued)

Industry	Scenario III	
	Employment	Investment
Paddy	-0.29(0.11)	1.58(0.61)
Fruit-Vegetables	-0.36(0.14)	1.36(0.53)
Other Agriculture	-1.47(056)	-2.04(0.76)
Livestock	22.9(8.91)	16.05(5.77)
Canning	-0.23(0.09)	0.52(0.2)
Rice	-0.39(0.15)	0.40(0.16)
Liquor	-0.41(0.16)	0.39(0.15)
Beer	-0.63(0.24)	0.23(0.09)
Soft Drinks	-0.87(0.34)	0.04(0.02)
Tobacco	-0.03(0.01)	0.67(0.26)
Oil/Sugar	-0.22(0.08)	0.53(0.21)
Cloth/Leather	-0.26(0.10)	0.50(0.19)
Wood/Paper	0.08(0.03)	0.76(0.29)
Engineering/Chem	0.24(0.09)	0.88(0.34)
Electrical Equip	0.02(0.01)	0.72(0.28)
Plastics/Ceramics	-0.27(0.11)	0.49(0.19)
Vehicles	0.05(0.02)	0.74(0.29)
Fuel	-0.22(0.09)	0.53(0.21)
Power/Water	-0.37(0.14)	0.81(0.31)
Construction	0.89(0.34)	0.93(0.36)
Hotel/Restaraunts	-0.52(0.20)	0.50(0.19)
Transport	-0.18(0.07)	0.6(0.23)
Dwellings	-1.11(0.43)	0.11(0.04)
Public Admin & Ed	-0.03(0.01)	1.57(0.61)
Health	-0.35(0.14)	0.64(0.25)
Services	-0.07(0.03)	0.87(0.34)
Banking	-0.20(0.08)	1.01(0.39)
Entertainment	-0.25(0.1)	0.74(0.29)

Table 7.7: Effect of changes to the Thailand livestock sector on the macroeconomy, means(standard deviations)

Indicators	Scenario I	Scenario II	Scenario III
Change in Real Foreign Debt	-38174(12591.7)	8100(3123.1)	362.77(141.42)
Change in Real Trade Deficit	-18339(6049)	3891(1500.3)	174.27(67.94)
GDP Price Index Expenditure Side	-28.02(32.23)	-1.81(0.6)	0.09(0.03)
Real Devaluation	22.1(26.12)	1.85(0.63)	-0.09(0.03)
Terms of Trade	-5.25(11.75)	-2.82(0.99)	0(0)
Aggregate Investment Price Index	-318.92(313.68)	1.05(0.33)	0.05(0.05)
Consumer Price Index	-18.58(24.62)	-2.87(1.03)	0.10(0.04)
Subsistence Price Index	-30.29(37.45)	-2.94(1.02)	0.13(0.05)
Export Price Index	-5.25(11.75)	-2.82(0.99)	0(0)
Number of Households	31.31(27.48)	-21.82(7.27)	-0.47(0.18)
Utility per Household	-35.87(4.45)	32.9(13.74)	0.4(0.16)
Real Household Consumption	38.61(19.75)	-11.39(4.3)	-0.27(0.1)
Nominal Total Household Consumption	15.3(10.74)	-13.89(5.08)	-0.17(0.07)
Value of Imports plus Duty	-2.48(12.02)	7.33(2.74)	0.09(0.03)
Agg. Tariff Revenue	2.48(21.22)	8.56(3.18)	0.12(0.04)
Agg. Rev. All Indirect Taxes	652.77(560.28)	-48.54(18.52)	-0.25(0.11)
Agg. Rev. Indirect Export Taxes	15.12(28.99)	7.94(2.9)	0.29(0.11)
Agg. Rev. Indirect Household Taxes	26.47(8.74)	-12.58(4.85)	-0.22(0.09)
Agg. Payments to Labour	-99.34(78.37)	9.19(3.47)	0.1(0.04)
Agg. Payments to Capital	-107.57(83.84)	11.1(4.24)	0.3(0.12)
Agg. Nominal Investment	-47.68(26.64)	35.41(13.07)	0.66(0.25)
Agg. Real Investment Expenditure	107.44(179.59)	33.96(12.5)	0.61(0.23)
Agg. Payments to Land	-78.05(90.77)	-4.59(1.31)	-0.67(0.25)
Export Volume Index	-3.96(18.35)	12.51(4.73)	0.08(0.03)
Border Value of Exports	-0.58(16.64)	9.29(3.48)	0.08(0.03)
Nominal GDP from Expenditure Side	-9.058(2.99)	1.92(0.74)	0.09(0.03)
Real GDP from Expenditure Side	12.49(22.36)	3.81(1.39)	0(0)

7.4. Robustness of Simulation Results

The variation (standard deviation) in the mean for the endogenous variables gives an indication of how sensitive the model results are to changes in the exogenous inputs. If the standard deviation is larger than the absolute mean for the endogenous variable in question, then it is uncertain whether or not the sign or the direction of the change due to the exogenous shock, of the variable is the true sign (given the current model specification and closure). Further, a large standard deviation gives less confidence in the magnitude of change due to exogenous shocks.

The results show that endogenous changes under Scenario III are quite robust with all standard deviations for all endogenous variables in tables 7.5, 7.6 and 7.7 being smaller than the absolute value of their corresponding means. Further, the standard deviation magnitudes

are quite small, relative to their corresponding means indicating that a fair amount of confidence can be placed on the magnitudes of the endogenous changes as well.

Similarly, the results show that endogenous changes under Scenario II are quite robust with all standard deviations for all endogenous variables (except Investment in Soft Drink manufactures) in tables 7.3, 7.4 and 7.7 being smaller than the absolute value of their corresponding means. In addition, the standard deviation magnitudes are quite small relative to their corresponding means.

The results are not so encouraging under Scenario I (See Tables 7.1, 7.2 and 7.7). Only about 36% of the endogenous variables are robust with standard deviations being smaller than the absolute value of their corresponding means. The relative magnitudes of the standard deviations compared to their corresponding means is also quite high, indicating that although a fair amount of confidence can be placed on the sign of the change, we are unsure about the magnitude of that change.

7.5. Accuracy of Simulations

The initial (non SSA) model simulations were checked for accuracy of results.

Three multi-step solutions algorithms are available in the Gempack program.

Gragg, Midpoint, and Euler's method. (See Harrison and Pearson 1994a sec. 2.5 and Harrison and Pearson 1994b sec. 5.2 for details on solution algorithms).

Convergence accuracy under the various solution algorithms was checked (See Table C.3).

Accordingly, Euler's method was used in the multi-step calculations under SSA for Scenario I and Gragg's method for Scenario II and III.

8. Conclusions

The prevalence of diseases such as FMD and Newcastle disease play an important role in the international competitiveness of the Thailand livestock sector. Disease incidence in Thailand restricts the potential for livestock exports to increase and, to a smaller extent, the ability of the sector to provide enough for domestic consumption.

The use of CGE modelling enables the economy wide effects of policy changes, like the

control of livestock diseases, to be evaluated. Two possible effects of disease control are the increase in production on an individual and herd (flock) basis and the increase in exports as trade restrictions are lifted.

With an increase in the production of livestock (Scenario I) due to disease control, increases in the output and exports of the livestock, agriculture, and tertiary sectors at the expense of manufacturing are predicted, as per the Rybczynski theorem. Resources shift out of manufacturing and into the other sectors where output has increased and there is a demand for factor inputs.

There is a reduction in foreign debt and trade deficit as import using manufacturers decrease and primary exports increase, but there is a decline in GDP as investment and employment decreases.

Consumption increases as household numbers increase but there is a concurrent decline in utility per household.

The implications of Scenario I results need to be tempered by the lack of robustness in the simulation results. It is hard to predict the changes to the economy due to increased livestock production when the direction (and magnitude) of such changes are in doubt.

The other facet to changes in the production side of the livestock sector due to disease control is the increase in capital augmenting technical change (Scenario III). The increase in capital augmenting technical change simulates the increase in productivity that would eventuate due to disease control. The negative effects of Scenario I are unlikely to eventuate as it is unlikely that disease control will have an as large effect on livestock production as a 20% increase. For example, most infected animals only get a mild dose of FMD and fully recover. A fall in production due to FMD in high yielding livestock like dairy cows is significant but highly commercial industries like the dairy industry already practice a regime of vaccination and would not significantly gain further from a national FMD control scheme. Similarly, the high level of commercialisation of the export orientated poultry industry has seen widespread vaccination carried out and a corresponding decline in disease incidence. This can be compared to low levels of vaccination in traditional poultry rearing and a correspondingly high level of disease incidence. Flow-on into the economy, due to increases in technical change, are diluted by the hierarchical nature of production embedded in the model structure.

The increase in the productivity of livestock production due to disease control decreases the output and exports of the livestock sector as the increases in the costs of production due to the use of veterinary inputs flow through to an increase in price. The increase in productivity due to capital augmenting technical change prompts the intensification of factor input usage leading to increases in the costs of production. There is negligible change to the other sectors of the economy and GDP. Scenario III results are robust and imply a reduction in the livestock sector with no economy wide effects except for an increase in livestock imports and a corresponding increase in the trade deficit and foreign debt.

With an increase in livestock exports (Scenario II) as disease control winds back sanitary and phytosanitary trade restrictions there is an across the board increase in exports and investment and a reduction in price for the majority of industries.

In contrast to Scenario I, an increase in manufactures output and employment at the expense of the agriculture and tertiary sectors is predicted along with an increase in the use of factor inputs (Corollary 3.2) and a concomitant increase in investment expenditure giving rise to an increase in real GDP. The increase in investment expenditure is reflected in the increase in manufacturing sector imports giving rise to increases in real foreign debt and the real trade deficit as the terms of trade decline.

Consumption falls as the number of households decreases but utility per household increases.

The implications of Scenario II are robust and indicate an increase in welfare due to an expansion in exports in manufactures as a flow-through from increases in livestock exports. This increase in exports flows back and causes an increase in employment and investment and a resultant rise in real GDP. Removal of disease trade barriers would give a boost to the Thai economy as a whole and not just to the agriculture sector and the livestock industry in particular.

The results of the simulation scenarios indicate that disease control programs in the Thai livestock sector would not have major benefits to the economy unless they were undertaken with a concurrent elimination of export restrictions.

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A. Stored-Input File for the Thailand Livestock Model

```
!   This Stored-input file is used to run TABLO to process
!    the TABLO Input file thai.TAB for THAILAND LIVESTOCK MODEL.
!   It carries out the standard condensation for the model.
log      ! Create a LOG file
b        ! Output to screen and to LOG file
thai.log      ! Name of LOG file
bat       ! Run in batch mode

thai    ! Name of TABLO Input file
thai    ! Name of Information file
c        ! condense
o         ! Omit following variables
a1
a1oct
a1mar
a1_s
a2mar
a3
a3mar
a4mar
a5mar
a7mar

s                ! Substitute
p1
E_p1
s
p1lab
E_p1lab
s
p1_s
E_p1_s
s
p2
E_p2
s
```

```
p3
E_p3
s
p5
E_p5
s
p7
E_p7
s
t1
E_t1
s
t2
E_t2
s
t3
E_t3
s
t5
E_t5
s
t7
E_t7
s
x1
E_x1
s
x1lab
E_x1lab
s
x1mar
E_x1mar
s
x1_s
E_x1_s
s
x2
E_x2
s
x2mar
```

```
E_x2mar
s
x3
E_x3
s
x3mar
E_x3mar
s
x4mar
E_x4mar
s
x5
E_x5
s
x5mar
E_x5mar
s
x7
E_x7
s
x7mar
E_x7mar
s
x1oct
E_x1oct
s
p1oct
E_p1oct
s
x3sub
E_x3sub
s
x3lux
E_x3lux
e          ! exit condensation
a          ! code generation
pgs

thai     ! program name
```

B. Command File for the Thailand Livestock Model

```
!------------------------------ Thai.cmf -------------------------!
verbal description=
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+                      Thailand Livestock Model                  +
+                     Shock to Livestock sector by               +
+                 Eradication of Foot and Mouth Disease          +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ ;
!
! Model to use
auxiliary files = thai;
equation file = thai;
model=thai;
version=1;
identifier = THAILAND LIVESTOCK MODEL;
!
! Input file specification
file mdata = thai.dat;
file thaitime = thaitime.dat;
display file=thai.dis;
file DISFILE=thai1.dis;
!
!Updated data files
updated file mdata=thai.upd;
updated terminal data=term.upd;
updated file thaitime = thaitime.upd;
Save LU file thai;
Save environment file thai;
!
! Output file specification
Solution  File = thai;
Log       File = thai.log;
!
! Scenario (I) Increase in livestock production due to disease eradication
!
! Solution method
! method = euler; ! Seems best to use according to Extrapolation Accuracy
! steps=2 4 6;
! iz1 = no; ! Don't reuse pivots - so multistep gragg will succeed
```

```
! extrapolation accuracy file = yes;
!
! Shocks to livestock sector (I4)
! Shocks to output of commodity c by industry i : q1(c,i)
! shock q1 88 =file shk_v1.shk ; ! Shocks by Sensitivity analysis
! shock q1 88 = 20; ! Shocks by percentage change
!
! Simulation Specification
! exogenous
! delx6 a2 f5 f7 a1lab_o f1lab a1cap x1lnd
! a1lnd f1oct q1 88 t0imp a2_s a3lux a3sub f0tax_s
! f4p f4q pf0cif a1prim a1tot a2tot f1lab_o f_accum
! f1ret f1lab_i delB delFudge delUnity employ_i
! f2tax_csi f3tax_cs f4_ntrad f4tax_ntrad f4tax_trad
! f5tax_cs f5tot f7tax_cs f7tot2 phi r1cap_i w3lux;
! rest endogenous;
!
!
! Scenario (II) Increase in livestock exports due to relaxation of
!    export controls for disease free livestock
!
! Solution method
! method = gragg; ! Seems best to use according to Extrapolation Accuracy
! steps=2 4 6;
! iz1 = no; ! Don't reuse pivots - so multistep gragg will succeed
! extrapolation accuracy file = yes;
!
! Shocks to livestock exports (I4)
! Shocks to export of commodity c : x4(c)
! shock x4 4 = file shk_v1.shk ; ! Shocks by Sensitivity analysis
! shock x4 4 = 20; ! Shocks by percentage change
!
! Simulation Specification
! exogenous
! delx6 a2 f5 f7 a1lab_o f1lab a1cap x1lnd
! a1lnd f1oct x4 4 t0imp a2_s a3lux a3sub f0tax_s
! f4p f4q pf0cif a1prim a1tot a2tot f1lab_o f_accum
! f1ret f1lab_i delB delFudge delUnity employ_i
! f2tax_csi f3tax_cs f4_ntrad f4tax_ntrad f4tax_trad
! f5tax_cs f5tot f7tax_cs f7tot2 phi r1cap_i w3lux;
```

```
! rest endogenous;
!
! Scenario (III) Increase in livestock Capital due to disease eradication
!
! Solution method
method = gragg; ! Seems best to use according to Extrapolation Accuracy
steps=2 4 6;
iz1 = no; ! Don't reuse pivots - so multistep gragg will succeed
extrapolation accuracy file = yes;
!
! Shocks to Livestock Capital Augmenting Technical Change (I4)
! Shocks to Capital augmenting technical change of industry i : a1cap(i)
shock a1cap 4 =file shk_v1.shk ; ! Shocks by Sensitivity analysis
! shock a1cap 4 = 20; ! Shocks by percentage change
!
! Simulation Specification
exogenous
delx6 a2 f5 f7 a1lab_o f1lab a1cap x1lnd
a1lnd f1oct t0imp a2_s a3lux a3sub f0tax_s
f4p f4q pf0cif a1prim a1tot a2tot f1lab_o f_accum
f1ret f1lab_i delB delFudge delUnity employ_i
f2tax_csi f3tax_cs f4_ntrad f4tax_ntrad f4tax_trad
f5tax_cs f5tot f7tax_cs f7tot2 phi r1cap_i w3lux f1lab_io;
rest endogenous;
!
eaa = yes; ! echo all activity
cpu = yes; ! Report CPU times
```

C. Thailand Livestock Model Results

SETS

No	Name	Size	Description
1	COM	28	Commodities
2	SRC	2	Source of Commodities
3	IND	28	Industries
4	OCC	2	Occupation Types
5	MAR	2	Margin Commodities
6	NONMAR	26	Non-Margin Commodities
7	TRADEXP	10	Traditional Export Commodities
8	NTRADEXP	18	Non-Traditional Export Commodities
9	YEARS	5	

VARIABLES

No	Name	Size	Arguments (if any) and Description
1	x4	28	(COM) Export
2	delx6	28	(COM) Inventories
3	p0	56	(COM,SRC) basic price of commodity c, source s
4	a2	1568	(COM,SRC,IND) Investment
5	f5	56	(COM,SRC) Other Demand Shift
6	f7	56	(COM,SRC) Sexport Demand Shift
7	t4	28	(COM) Export
8	p4	28	(COM) Exports $A
9	a1lab_o	28	(IND) Labor Augmenting Technical Change
10	f1lab	56	(IND,OCC) Wage Shift Variable
11	x1cap	28	(IND) Current Capital Stock
12	p1cap	28	(IND) Rental Price of Capital
13	a1cap	28	(IND) Capital Augmenting Technical Change
14	r1cap	28	(IND) Current Rates of Return on Fixed Capital
15	x1lnd	28	(IND) Use of Land
16	p1lnd	28	(IND) Rental Price of Land
17	a1lnd	28	(IND) Land Augmenting Technical Change

```
18 f1oct              28 (IND)  Shifts in Price of "Other Cost" Tickets
19 q1                784 (COM,IND)  Output of commodity c by industry i
20 t0imp              28 (COM)  Power of Tariffs
21 x2_s              784 (COM,IND)  Investment
22 x3_s               28 (COM)  Household
23 p2_s              784 (COM,IND)  Investment
24 p3_s               28 (COM)  Household
25 a2_s              784 (COM,IND)  Investment
26 a3lux              28 (COM)  Household - Supernumerary Demands
27 a3sub              28 (COM)  Household - Subsistence Demands
28 f0tax_s            28 (COM)  General Sales Tax Shifter
29 f4p                28 (COM)  Price (upward) Shift in Export Demand S ...
30 f4q                28 (COM)  Quantity (right) Shift in Export Demands
31 pf0cif             28 (COM)  C.I.F. Foreign Currency Import Prices
32 x0dom              28 (COM)  Total Supplies of Domestic Goods
33 x0imp              28 (COM)  Total Supplies of Imported Goods
34 a1prim             28 (IND)  All Factor Augmenting Technical Change
35 a1tot              28 (IND)  All Input Augmenting Technical Change
36 a2tot              28 (IND)  Neutral Technical Change - Investment
37 employ             28 (IND)  Employment by Industry
38 f1lab_o            28 (IND)  Industry-Specific Wage Shifter
39 f_accum            28 (IND)  Capital Accumulation Shifter
40 f1ret              28 (IND)  Rate of Return Shifter
41 p1lab_o            28 (IND)  Price of Labour Composite
42 p1prim             28 (IND)  Effective Price of Primary Factor Composite
43 p1tot              28 (IND)  Average Input/Output Price
44 p2tot              28 (IND)  Costs of Units of Capital
45 x1lab_o            28 (IND)  Effective Labour Input
46 x1prim             28 (IND)  Primary Factor Composite
47 x1tot              28 (IND)  Activity Level or Value-Added
48 x2tot              28 (IND)  Investment by Using Industry
49 f1lab_i             2 (OCC)  Occupation-Specific Wage Shifter
50 x1lab_i             2 (OCC)  Employment by Occupation
51 delB                1   (Balance of Trade)/GDP
52 delDebt             1   Ordinary Change in Real Foreign Debt
53 delDebt_Ratio       1   Ordinary Change in Debt/GDP ratio
54 delBT               1   Ordinary Change in Real Trade Deficit
55 delFudge            1   "Fudge Factor": set to Unity for dynamic sim ...
56 delUnity            1   dummy variable, always exogenously set to one
57 levDebt_Ratio       1   Levels Debt/GDP ratio
```

58	employ_i	1	Aggregate Employment- Wage Bill Weights
59	f1lab_io	1	Overall Wage Shifter
60	f1tax_csi	1	Uniform % Change in Powers of Taxes on Inter ...
61	f2tax_csi	1	Uniform % Change in Powers of Taxes on Inves ...
62	f3tax_cs	1	Uniform % Change in Powers of Taxes on House ...
63	f4_ntrad	1	Demand Shift, Non-Traditional Export Aggregate
64	f4tax_ntrad	1	Uniform % Change in Powers of Taxes on NonTr ...
65	f4tax_trad	1	Uniform % Change in Powers of Taxes on Tradt ...
66	f5tax_cs	1	Uniform % Change in Powers of Taxes on "Othe ...
67	f3tot	1	Ratio between x3tot and x0gdpexp
68	f5tot	1	Overall Shift Term For "Other" Demands
69	f7tax_cs	1	Uniform % Change in Power of Taxes on Sexports
70	f7tot	1	Overall Shift Term Sexports
71	f5tot2	1	Ratio between f5tot and x3tot
72	f7tot2	1	Ratio betwen f7tot and x7to
73	p0cif_c	1	Imports Price Index, CIF, A$
74	p0gdpexp	1	GDP Price Index, Expenditure Side
75	p0imp_c	1	Duty-paid Imports Price Index,A$
76	p0realdev	1	Real Devaluation
77	p0toft	1	Terms of Trade
78	p1cap_i	1	Average Capital Rental
79	p2tot_i	1	Aggregate Investment Price Index
80	p3tot	1	Consumer Price Index
81	p3sub	1	Subsistence Price Index
82	p4_ntrad	1	Price, Non-Traditional Export Aggregate
83	p4tot	1	Exports Price Index
84	p5tot	1	"Other" Demands Price Index
85	p6tot	1	Inventories Price Index
86	p7tot	1	Sexports Price Index
87	phi	1	Exchange Rate, $A/$world
88	q	1	Number of Households
89	r1cap_i	1	Average Rate of Return
90	utility	1	Utility per Household
91	w0cif_c	1	CIF A$ Value of Imports
92	w0gdpexp	1	Nominal GDP from Expenditure Side
93	w0gdpinc	1	Nominal GDP from Income Side
94	w0imp_c	1	Value of Imports plus Duty
95	w0tar_c	1	Aggregate Tariff Revenue
96	w0tax_csi	1	Aggregate Revenue from All Indirect Taxes
97	w1cap_i	1	Aggregate Payments to Capital

98	w1lab_io	1	Aggregate Payments to Labour
99	w1lnd_i	1	Aggregate Payments to Land
100	w1oct_i	1	Aggregate Other Cost Ticket Payments
101	w1tax_csi	1	Aggregate Revenue from Indirect Taxes on Int ...
102	w2tax_csi	1	Aggregate Revenue from Indirect Taxes on Inv ...
103	w2tot_i	1	Aggregate Nominal Investment
104	w3lux	1	Total Nominal Supernumerary Household Expend ...
105	w3tax_cs	1	Aggregate Revenue from Indirect Taxes on Hou ...
106	w3tot	1	Nominal Total Household Consumption
107	w4tax_c	1	Aggregate Revenue from Indirect Taxes on Export
108	w4tot	1	A$ Border Value of exports
109	w5tax_cs	1	Aggregate Revenue from Indirect Taxes on "Other"
110	w5tot	1	Aggregate Nominal Value of "Other" Demands
111	w6tot	1	Aggregate Nominal Value of Inventories
112	w7tax_cs	1	Aggregatte Revenue from Indirect Taxes on Se ...
113	w7tot	1	Aggregate Nominal Value of Sexports
114	x0cif_c	1	Import Volume Index, CIF Weights
115	x0gdpexp	1	Real GDP from Expenditure Side
116	x0imp_c	1	Import Volume Index, Duty-Paid Weights
117	x1cap_i	1	Aggregate Capital Stock, Rental Weights
118	x1prim_i	1	Aggregate Output: Value-Added Weights
119	x2tot_i	1	Aggregate Real Investment Expenditure
120	x3tot	1	Real Household Consumption
121	x4_ntrad	1	Quantity, Non-Traditional Export Aggregate
122	x4tot	1	Export Volume Index
123	x5tot	1	Aggregate Real "Other" Demands
124	x6tot	1	Aggregate Real Inventories
125	x7tot	1	Aggregate Sexports

Table C.1: Industry Classification for Thailand Livestock Model

Industry		Industry	
Paddy	I1	Electrical Equipment	I15
Fruit-Vegetables	I2	Plastics/Ceramics	I16
Other Agriculture	I3	Vehicles	I17
Livestock	I4	Fuel	I18
Canning	I5	Power/Water	I19
Rice	I6	Construction	I20
Liquor	I7	Hotel/Restaraunts	I21
Beer	I8	Transport	I22
Soft Drinks	I9	Dwellings	I23
Tobacco	I10	Public Administration & Education	I24
Oil/Sugar	I11	Health	I25
Cloth/Leather	I12	Services	I26
Wood/Paper	I13	Banking	I27
Engineering/Chemical	I14	Entertainment	I28

Table C.2: Thailand Livestock Model variable names

Level I	Description
a	technical change
del	ordinary (rather than %) change
f	shift variable
H	indexing parameter
p	price, $A
pf	price, Baht
S	input share
SIGMA	elasticity of substitution
t	tax
V	levels value, $A
w	percentage-change value, $A
x	input quantity
Level II	**Description**
1	current production
2	investment
3	consumption
4	export
5	other (Government)
6	inventories
7	sexport (special exports)
0	all users

Level III	Description
bas	basic - not incl. margins or taxes
cap	capital
cif	imports at border prices
imp	imports (duty paid)
lab	labour
lnd	land
lux	LES (supernumerary part)
mar	margins
oct	other cost tickets
prim	all primary factors
pur	all purchaser prices
sub	LES (subsistence part)
tar	tariffs
tax	indirect taxes
tot	total or average over all inputs
Level IV	**Description**
_i	sum over industries
_c	sum over commodities
_io	sum over industries and skills
_s	sum over source (domestic, import)

Table C.3: Simulation accuracy of the Thailand Livestock Model, No. Variables

Solution algorithm	Gragg			Midpoint			Euler		
Scenario	I	II	III	I	II	III	I	II	III
Machine accuracy:									
Last 2 results equal to	662	634	633	662	632	634	662	632	632
2 extrapolations equal to	-	15	1001	-	11	82	-	3	4
Extrapolated result:									
Confidence in	-	2231	1394	3	2224	2311	685	2203	1883
Fair confidence in	1	107	-	-	66	1	381	84	120
Monotonic:									
results very close together	-	4	-	-	-	-	-	-	-
appears to be converging	31	36	-	1	60	-	788	69	232
but may be diverging	34	-	-	34	-	-	46	3	62
but appears to be diverging	33	-	-	33	-	-	78	1	32
Oscillating:									
but appears to be converging	1894	1	-	2099	34	-	340	29	31
and may be diverging	302	-	-	190	1	-	4	1	4
and appears to be diverging	71	-	-	6	-	-	44	3	28

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
x4 Export	C1-C3,C7-C10,C18-C28	11.6550	41.4166	19.9151	7.5447	1.3649	0.5233
	C4	-28.1835	3.8203	20.0000	19.0000	-9.1999	3.4270
	C5	9.4249	28.9797	9.6636	3.5604	0.1061	0.0387
	C6	-12.1373	18.7395	16.1217	5.9114	0.3515	0.1359
	C11	-24.0336	19.6473	24.7450	9.2986	0.5371	0.2072
	C12	-18.3104	12.6555	19.1961	7.5158	0.1558	0.0594
	C13	-5.7340	12.7853	11.0518	4.1148	0.2235	0.0867
	C14	-21.5694	42.5086	-3.1660	0.9166	-0.1021	0.0381
	C15	20.5739	32.7881	4.4452	1.6012	0.0831	0.0324
	C16	6.1912	20.8090	8.1369	3.0365	-0.1330	0.0529
	C17	-69.0043	52.7402	11.4745	4.4832	0.0872	0.0356
p0 basic price of commodity c, source domestic	C1	-68.5171	72.2813	-0.5617	0.0253	-0.1236	0.0467
	C2	-51.8879	62.0665	-4.1825	1.3129	-0.1563	0.0601
	C3	-14.3755	23.6142	-4.2926	1.4757	-0.5600	0.2124
	C4	11.7348	7.8711	-8.1881	2.8612	4.5022	1.7775
	C5	-9.1640	19.4096	-4.0658	1.4222	-0.0473	0.0173
	C6	-7.6607	26.1448	-6.6273	2.2225	-0.1602	0.0619
	C7	-34.8260	49.6885	-9.4953	3.6784	-0.3258	0.1269
	C8	-19.6564	29.5220	-6.1170	2.3428	-0.1320	0.0511
	C9	-27.6104	54.4252	-10.4891	3.6272	-0.2160	0.0837
	C10	39.9551	28.1314	-6.5058	2.4801	-0.2514	0.0978
	C11	-10.6216	25.1353	-5.1581	1.7430	-0.1250	0.0482
	C12	9.8750	0.5213	-4.6035	1.6616	-0.0421	0.0162
	C13	8.0851	1.5608	-3.0316	1.0831	-0.0595	0.0232
	C14	6.8884	10.8205	0.4950	0.1188	0.0233	0.0085
	C15	1.4918	2.3663	-1.3082	0.4703	-0.0217	0.0086
	C16	7.4613	2.0512	-2.4479	0.8900	0.0301	0.0119
	C17	17.0738	12.5351	-2.5509	0.9461	-0.0210	0.0086
	C18	47.9521	36.9261	-4.9949	1.8362	-0.0370	0.0150
	C19	-42.2063	51.4323	-4.6378	1.6780	-0.1232	0.0476
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C21	-2.6322	10.8127	-3.7769	1.3410	0.4351	0.1723
	C22	-6.5327	13.3820	-4.1235	1.5571	-0.0630	0.0245
	C23	-75.0039	96.7603	-9.3342	3.2728	-0.1305	0.0497
	C24	-88.4394	71.1074	7.5659	2.8656	0.0870	0.0348
	C25	-47.3335	49.7437	-2.1683	0.8322	-0.0311	0.0115
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
	C27	-72.9802	68.2707	0.4190	0.0548	-0.0859	0.0328
	C28	-61.4812	54.5849	1.6239	0.5093	0.0097	0.0044
p4 Exports $A	C1	-68.5171	72.2813	-0.5617	0.0253	-0.1236	0.0467
	C2	-52.0852	58.1115	-2.5421	0.7648	-0.1091	0.0418
	C3	-22.6795	28.8720	-2.9669	1.0021	-0.4418	0.1674
	C4	3.5463	13.0080	-6.9242	2.4094	3.9774	1.5704
	C5	-12.6272	21.6515	-3.5942	1.2524	-0.0424	0.0155
	C6	-12.0192	27.8692	-5.7350	1.9209	-0.1402	0.0541
	C7	-36.2520	48.9977	-8.2732	3.2050	-0.2878	0.1121

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C8	-22.3444	30.7415	-5.3186	2.0362	-0.1165	0.0450
	C9	-31.6399	52.6188	-8.2592	2.8480	-0.1734	0.0671
	C10	29.3017	19.4857	-5.5056	2.0983	-0.2207	0.0858
	C11	-16.1415	28.1462	-4.2617	1.4298	-0.1070	0.0412
	C12	-1.4208	9.0064	-3.4049	1.2197	-0.0311	0.0119
	C13	-4.1621	8.3745	-2.0586	0.7261	-0.0446	0.0173
	C14	-3.1463	0.7896	0.6466	0.1905	0.0204	0.0076
	C15	-6.1997	8.8053	-0.8633	0.3040	-0.0166	0.0065
	C16	-5.2436	8.4576	-1.5431	0.5531	0.0266	0.0106
	C17	10.7035	7.0709	-2.1301	0.7876	-0.0174	0.0071
	C18	39.9452	30.2275	-4.4328	1.6270	-0.0327	0.0132
	C19	-42.2063	51.4323	-4.6378	1.6780	-0.1232	0.0476
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C21	-2.6322	10.8127	-3.7769	1.3410	0.4351	0.1723
	C22	-6.5327	13.3820	-4.1235	1.5571	-0.0630	0.0245
	C23	-75.0039	96.7603	-9.3342	3.2728	-0.1305	0.0497
	C24	-88.4394	71.1074	7.5659	2.8656	0.0870	0.0348
	C25	-47.3335	49.7437	-2.1683	0.8322	-0.0311	0.0115
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
	C27	-72.9802	68.2707	0.4190	0.0548	-0.0859	0.0328
	C28	-61.4812	54.5849	1.6239	0.5093	0.0097	0.0044
x1cap Current Capital Stock	C1	0.0918	14.9328	6.7926	2.6387	0.1262	0.0492
	C2	6.4296	19.1944	5.0121	1.9269	0.1093	0.0423
	C3	1.0298	16.6484	6.1642	2.3078	-0.1632	0.0612
	C4	20.8387	31.7867	3.3633	1.1729	4.4672	1.6063
	C5	15.4775	34.1927	8.8007	3.3301	0.1456	0.0557
	C6	19.3659	31.9980	5.6604	2.1694	0.1118	0.0435
	C7	23.7219	39.7080	5.0475	1.6793	0.1089	0.0422
	C8	21.5597	37.1718	4.4958	1.4350	0.0631	0.0242
	C9	29.5612	35.4947	-0.0841	0.2198	0.0115	0.0045
	C10	5.7591	24.3850	6.4453	2.2249	0.1873	0.0727
	C11	13.9609	31.0593	8.4898	3.2615	0.1489	0.0578
	C12	10.6936	30.6069	8.8170	3.3076	0.1390	0.0538
	C13	16.1529	38.9450	10.2782	3.8646	0.2103	0.0815
	C14	20.4668	48.5385	12.1303	4.5357	0.2456	0.0950
	C15	5.3901	27.9043	11.2566	4.2755	0.1996	0.0776
	C16	14.0361	35.9686	10.2590	3.8740	0.1377	0.0531
	C17	9.2474	32.9546	10.4883	3.9602	0.2053	0.0796
	C18	-5.8543	16.0388	9.7475	3.6560	0.1475	0.0575
	C19	19.7028	35.6945	6.6722	2.5008	0.1232	0.0479
	C20	305.5630	351.1510	16.5862	6.0658	0.3743	0.1443
	C21	16.3369	36.1435	7.6235	2.7397	0.1045	0.0402
	C22	23.7271	41.8281	6.8742	2.4876	0.1331	0.0517
	C23	41.9054	49.5096	0.4590	0.0776	0.0277	0.0107
	C24	9.1814	29.3623	9.2908	3.5295	0.1936	0.0753
	C25	24.6622	40.1802	5.8811	2.1393	0.1354	0.0526

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C26	25.4418	46.7137	10.0764	3.8373	0.1844	0.0718
	C27	26.3881	46.9953	8.8907	3.3171	0.1610	0.0625
	C28	34.9077	52.1394	6.2944	2.2142	0.1550	0.0601
p1cap Rental Price of Capital	C1	-117.7600	147.4170	-8.1832	2.5481	-0.3703	0.1415
	C2	-106.6880	148.7100	-12.9417	4.1239	-0.4282	0.1650
	C3	-95.5306	121.1990	-9.8846	3.3516	-1.3537	0.5124
	C4	-267.5930	318.6610	-17.8431	5.9737	17.6585	6.7706
	C5	-137.6580	142.9080	-1.5565	0.5902	-0.2814	0.1115
	C6	-242.3510	281.6770	-11.4354	3.7250	-0.4086	0.1569
	C7	-113.6760	133.5900	-13.1457	5.0338	-0.4195	0.1620
	C8	-124.1380	146.1870	-14.6946	5.5859	-0.5916	0.2291
	C9	-371.4280	461.3550	-26.3633	8.3416	-0.7847	0.3022
	C10	-172.7450	178.9080	-9.0293	3.7453	-0.1241	0.0474
	C11	-178.7110	192.0210	-2.5987	0.7794	-0.2692	0.1034
	C12	-142.5500	142.2990	-1.4978	0.6691	-0.3063	0.1185
	C13	-93.8040	81.0492	3.5481	1.1186	-0.0376	0.0145
	C14	-61.7710	29.5107	10.3865	3.5309	0.0959	0.0366
	C15	-141.0490	129.2010	7.0963	2.5642	-0.0781	0.0290
	C16	-109.7850	100.5330	3.4783	1.1537	-0.3113	0.1211
	C17	-118.6460	102.2160	4.2973	1.4471	-0.0565	0.0216
	C18	-195.0160	186.0260	1.6816	0.4254	-0.2744	0.1045
	C19	-170.0220	191.7920	-9.0902	3.1775	-0.3968	0.1527
	C20	-104.0470	26.8982	30.2834	10.7678	0.6085	0.2330
	C21	-121.1500	121.4560	-5.1766	2.2761	-0.4208	0.1633
	C22	-139.6030	146.4390	-6.9877	2.7509	-0.2938	0.1131
	C23	-282.5430	370.5090	-29.6137	9.7301	-0.8496	0.3277
	C24	-127.7020	125.9020	0.1899	0.0618	-0.0868	0.0327
	C25	-162.6750	184.5300	-10.3817	3.7377	-0.3083	0.1184
	C26	-138.9690	131.3780	3.0861	1.1165	-0.1144	0.0432
	C27	-101.4770	98.1059	-1.0931	0.5807	-0.2052	0.0789
	C28	-50.4118	63.0064	-9.1644	3.6126	-0.2366	0.0912
r1cap Current Rates of Return on Fixed Capital	C1	-145.2630	188.0460	-11.8820	3.7066	-0.5351	0.2046
	C2	-126.6260	187.5930	-18.7818	5.9913	-0.6189	0.2386
	C3	-114.5510	151.6190	-14.3514	4.8724	-1.9621	0.7428
	C4	32.7209	43.3829	-24.6817	8.1712	23.2279	8.9027
	C5	46.6907	33.2495	-3.4365	1.2139	-0.4389	0.1725
	C6	27.3071	32.6875	-16.3237	5.2634	-0.6068	0.2324
	C7	110.5140	76.8772	-18.5514	6.9648	-0.6212	0.2390
	C8	95.8503	59.2779	-20.5733	7.6793	-0.8482	0.3275
	C9	62.0352	66.9227	-35.7978	11.2249	-1.1029	0.4240
	C10	-11.0454	25.9087	-13.1825	5.3009	-0.2315	0.0880
	C11	22.6382	1.8009	-4.7968	1.4564	-0.4228	0.1618
	C12	20.7270	14.7532	-3.3596	1.3172	-0.4718	0.1817
	C13	52.4563	63.5769	3.2219	0.9947	-0.1173	0.0446
	C14	41.9642	79.6793	12.1416	4.1142	0.0589	0.0229
	C15	-10.1818	0.1254	7.8492	2.8666	-0.1707	0.0637

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C16	41.6911	48.0809	3.1311	1.0410	-0.4784	0.1851
	C17	12.4383	28.5014	4.1990	1.4204	-0.1422	0.0539
	C18	-74.0820	68.1264	0.7873	0.0976	-0.4296	0.1632
	C19	61.9386	28.3186	-12.3389	4.2410	-0.5500	0.2110
	C20	-788.3300	694.8490	36.4194	12.8835	0.7028	0.2695
	C21	58.1241	51.0724	-8.4222	3.5100	-0.6431	0.2487
	C22	107.8940	89.4509	-11.5005	4.3558	-0.5011	0.1920
	C23	257.8680	148.0050	-34.1139	11.0631	-1.0232	0.3937
	C24	5.3273	0.8750	-1.2748	0.4073	-0.2005	0.0754
	C25	107.4150	69.9366	-15.4344	5.4568	-0.4899	0.1875
	C26	112.0430	114.4560	2.2837	0.8914	-0.2463	0.0928
	C27	115.1610	113.3120	-3.0331	1.2893	-0.3626	0.1388
	C28	192.4080	168.0330	-13.7937	5.2937	-0.3922	0.1505
p1Ind Rental Price of Land	C1	-91.0446	100.1990	-1.2994	0.0296	-0.2306	0.0873
	C2	-71.0474	93.9873	-8.1670	2.4802	-0.3073	0.1185
	C3	-73.1268	77.6697	-3.7754	1.2559	-1.5322	0.5786
	C4	-199.6240	235.0680	-15.1500	5.2110	23.0233	8.9630
	C5	-93.9450	79.7184	7.0875	2.6361	-0.1363	0.0561
	C6	-175.1160	197.6260	-6.5031	2.0146	-0.2974	0.1137
	C7	-64.4524	65.5252	-8.8463	3.8294	-0.3112	0.1201
	C8	-76.2184	79.5726	-10.9397	4.6128	-0.5290	0.2052
	C9	-287.7810	368.0220	-26.4069	8.4965	-0.7733	0.2978
	C10	-137.3110	123.6800	-3.2493	1.9627	0.0629	0.0252
	C11	-126.0790	120.4020	5.6451	2.3311	-0.1208	0.0459
	C12	-108.0220	87.9170	7.1650	2.5299	-0.1679	0.0650
	C13	-65.1698	32.1397	14.2342	5.2354	0.1726	0.0669
	C14	-49.5082	3.1181	23.9368	8.9660	0.3418	0.1319
	C15	-114.8810	83.2168	19.2614	7.4318	0.1213	0.0485
	C16	-79.8702	50.5721	14.1388	5.2808	-0.1741	0.0683
	C17	-86.2844	49.2601	15.2936	5.7293	0.1487	0.0579
	C18	-161.6970	132.4760	11.6086	4.1843	-0.1273	0.0472
	C19	-111.4020	114.0610	-3.1039	1.1160	-0.2741	0.1052
	C20	-240.1590	147.6270	52.5454	20.4564	0.9855	0.3791
	C21	-88.8809	72.2240	0.7545	0.2811	-0.3342	0.1301
	C22	-79.2134	62.3004	0.9937	0.0489	-0.1279	0.0488
	C23	-183.3200	260.5730	-29.3383	9.8128	-0.8268	0.3189
	C24	-96.3123	77.6220	7.8829	2.9702	0.0743	0.0299
	C25	-108.6680	114.8560	-6.0793	2.3373	-0.1959	0.0748
	C26	-95.1215	70.6939	11.6980	4.4536	0.0390	0.0164
	C27	-61.8297	41.4273	6.1597	2.0722	-0.0714	0.0271
	C28	-7.0352	3.4149	-4.4931	2.1419	-0.1078	0.0414
q1 Output of commodity c by industry 1	C1-C28	17.2211	10.5544	-1.8482	0.5305	-0.0743	0.0285
q1 Output of commodity c by industry 2	C1-C28	28.3329	17.6551	-4.1441	1.3659	-0.0991	0.0386
q1 Output of commodity c by industry 3	C1-C28	20.9769	15.7147	-2.6603	0.9345	-0.4982	0.1894
q1 Output of commodity c by industry 4	C1-C3,C5-C28	20.0000	7.7567	-6.5956	2.4036	-1.5922	0.6035
q1 Output of commodity c by industry 5	C1-C28	15.9443	26.4866	5.1123	1.9010	0.0199	0.0057

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
q1 Output of commodity c by industry 6	C1-C28	17.3550	10.5015	-1.8807	0.5379	-0.0667	0.0256
q1 Output of commodity c by industry 7	C1-C28	38.3569	41.2378	-2.9727	1.4571	-0.0698	0.0274
q1 Output of commodity c by industry 8	C1-C28	32.8167	34.6644	-4.0837	1.9063	-0.1752	0.0686
q1 Output of commodity c by industry 9	C1-C28	36.2938	8.6260	-12.8462	4.5665	-0.2936	0.1137
q1 Output of commodity c by industry 10	C1-C28	-15.2271	10.2322	-3.2737	1.6713	0.0714	0.0275
q1 Output of commodity c by industry 11	C1-C28	10.1661	16.9442	4.5475	1.8010	0.0305	0.0118
q1 Output of commodity c by industry 12	C1-C28	5.0023	18.0473	4.9381	1.7694	-0.0028	0.0015
q1 Output of commodity c by industry 13	C1-C28	18.4989	38.6106	8.2824	3.0160	0.1640	0.0632
q1 Output of commodity c by industry 14	C1-C28	19.7617	51.1627	12.5035	4.5567	0.2452	0.0944
q1 Output of commodity c by industry 15	C1-C28	-8.7348	10.5851	10.4698	3.9290	0.1356	0.0528
q1 Output of commodity c by industry 16	C1-C28	13.2802	30.8014	7.9373	2.9136	-0.0237	0.0101
q1 Output of commodity c by industry 17	C1-C28	2.9398	25.1253	8.7032	3.2073	0.1508	0.0582
q1 Output of commodity c by industry 18	C1-C28	-26.5060	7.5898	7.6994	2.8055	0.0495	0.0197
q1 Output of commodity c by industry 19	C1-C28	26.1786	25.9943	-0.9923	0.3574	-0.0773	0.0300
q1 Output of commodity c by industry 20	C1-C28	58.7563	125.3900	25.0399	9.0214	0.5770	0.2214
q1 Output of commodity c by industry 21	C1-C28	22.4945	23.0351	-5.1473	2.3162	-0.3619	0.1418
q1 Output of commodity c by industry 22	C1-C28	25.0248	33.6462	0.6800	0.0354	-0.0107	0.0042
q1 Output of commodity c by industry 23	C1-C28	61.4153	45.3391	-9.5006	3.5870	-0.2043	0.0793
q1 Output of commodity c by industry 24	C1-C28	9.1152	6.4088	-1.1620	0.4111	-0.0218	0.0085
q1 Output of commodity c by industry 25	C1-C28	39.6032	23.3228	-8.2012	2.9900	-0.1606	0.0622
q1 Output of commodity c by industry 26	C1-C28	7.3492	16.7238	4.5190	1.6764	-0.0063	0.0022
q1 Output of commodity c by industry 27	C1-C28	33.5920	47.4009	4.6599	1.6241	0.0392	0.0150
q1 Output of commodity c by industry 28	C1-C28	129.8060	115.9350	-9.8137	3.8768	-0.1457	0.0571
x2's Investment in commodity c by industry 1	C1-C28	-338.3050	345.4950	84.7649	32.9276	1.5754	0.6136
x2's Investment in commodity c by industry 2	C1-C28	90.8523	247.8470	62.5467	24.0455	1.3645	0.5275
x2's Investment in commodity c by industry 3	C1-C28	-972.0660	923.4740	76.9242	28.7984	-2.0371	0.7636
x2's Investment in commodity c by industry 4	C1-C28	71.7927	111.0940	12.0855	4.2146	16.0524	5.7719
x2's Investment in commodity c by industry 5	C1-C28	-11.7090	55.3153	31.6243	11.9663	0.5232	0.2001
x2's Investment in commodity c by industry 6	C1-C28	65.4476	110.7710	20.3400	7.7954	0.4017	0.1565
x2's Investment in commodity c by industry 7	C1-C28	53.7520	111.0690	18.1378	6.0343	0.3913	0.1516
x2's Investment in commodity c by industry 8	C1-C28	46.0987	102.0830	16.1551	5.1567	0.2266	0.0869
x2's Investment in commodity c by industry 9	C1-C28	105.8920	127.2120	-0.3022	0.7899	0.0413	0.0162
x2's Investment in commodity c by industry 10	C1-C28	-77.6257	10.9128	23.1605	7.9948	0.6732	0.2614
x2's Investment in commodity c by industry 11	C1-C28	31.2993	92.5658	30.5071	11.7197	0.5349	0.2078
x2's Investment in commodity c by industry 12	C1-C28	-972.5730	901.2980	31.6830	11.8854	0.4994	0.1934
x2's Investment in commodity c by industry 13	C1-C28	103.8670	185.2980	36.9334	13.8871	0.7556	0.2928
x2's Investment in commodity c by industry 14	C1-C28	43.6514	143.4640	43.5887	16.2983	0.8826	0.3415
x2's Investment in commodity c by industry 15	C1-C28	48.4871	128.9840	40.4495	15.3636	0.7171	0.2790
x2's Investment in commodity c by industry 16	C1-C28	105.5980	184.0120	36.8646	13.9208	0.4947	0.1909
x2's Investment in commodity c by industry 17	C1-C28	75.9050	160.5290	37.6884	14.2304	0.7377	0.2861
x2's Investment in commodity c by industry 18	C1-C28	72.1963	150.4610	35.0265	13.1374	0.5300	0.2068
x2's Investment in commodity c by industry 19	C1-C28	78.3986	182.7560	43.8502	16.4351	0.8100	0.3146
x2's Investment in commodity c by industry 20	C1-C28	544.5980	655.5970	41.1500	15.0492	0.9286	0.3580
x2's Investment in commodity c by industry 21	C1-C28	79.7503	173.0620	36.1508	12.9916	0.4953	0.1908
x2's Investment in commodity c by industry 22	C1-C28	156.9340	237.9280	30.9012	11.1821	0.5983	0.2325
x2's Investment in commodity c by industry 23	C1-C28	166.0070	196.4650	1.8393	0.3110	0.1108	0.0429

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
x2's Investment in commodity c by industry 24	C1-C28	97.8984	282.0670	75.4484	28.6616	1.5720	0.6114
x2's Investment in commodity c by industry 25	C1-C28	-19.6816	53.6430	27.8883	10.1447	0.6419	0.2496
x2's Investment in commodity c by industry 26	C1-C28	-556.2160	456.1920	47.7823	18.1963	0.8742	0.3403
x2's Investment in commodity c by industry 27	C1-C28	708.4610	836.3390	56.0533	20.9129	1.0150	0.3940
x2's Investment in commodity c by industry 28	C1-C28	200.5160	281.8710	29.8479	10.4999	0.7351	0.2851
x3's Household	C1	31.3104	27.4795	-21.8222	7.2669	-0.4712	0.1819
	C2	45.7990	3.3921	-17.6298	6.1045	-0.3538	0.1367
	C3	36.2789	6.3579	-17.6657	6.0997	-0.3032	0.1176
	C4	27.8588	12.4794	-16.8694	5.8390	-1.1046	0.4232
	C5	31.1222	11.8249	-17.8368	6.1468	-0.3722	0.1438
	C6	32.4332	7.8474	-17.0360	5.9085	-0.3473	0.1341
	C7	56.9849	61.5920	-3.3591	1.7130	0.0615	0.0242
	C8	45.8001	48.0197	-5.0169	2.3578	-0.0448	0.0174
	C9	35.9874	3.4710	-16.5764	5.7444	-0.3414	0.1318
	C10	-16.9585	13.4082	-4.7840	2.2804	0.0316	0.0125
	C11	33.3413	8.0580	-17.4271	6.0283	-0.3570	0.1379
	C12	22.7782	23.4530	-6.5745	2.9452	-0.1075	0.0418
	C13	29.9842	4.0725	-13.4653	4.9173	-0.2576	0.0995
	C14	31.8229	3.8967	-14.0881	5.1062	-0.2727	0.1054
	C15	31.0623	3.4967	-14.0435	5.0941	-0.2715	0.1049
	C16	34.4217	6.5750	-14.1023	5.1131	-0.2726	0.1054
	C17	18.0995	7.8928	-13.3987	4.8862	-0.2657	0.1026
	C18	26.6647	8.3473	-15.8547	5.5922	-0.3206	0.1238
	C19	48.3411	16.3425	-14.6802	5.2158	-0.2831	0.1094
	C20	656.0620	643.8730	-9.1881	3.7177	-0.1885	0.0722
	C21	20.9948	23.2842	-5.9084	2.7389	-0.4322	0.1694
	C22	25.1570	29.2240	-4.9900	2.4160	-0.0623	0.0241
	C23	62.3777	44.3822	-10.3267	3.8807	-0.2165	0.0839
	C24	127.6090	89.3146	-16.4494	5.8166	-0.3078	0.1194
	C25	63.2982	37.0641	-13.2050	4.8129	-0.2582	0.1000
	C26	133.9480	124.4970	-9.4964	3.8915	-0.1309	0.0514
	C27	151.5910	145.2090	-7.8106	3.2960	-0.0412	0.0164
	C28	94.8505	85.6501	-8.9345	3.6458	-0.1294	0.0505
p2's Investment in commodity c by industry 1	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-33.6548	41.9604	-2.5549	0.8598	-0.3954	0.1498
	C12	-10.4828	16.4903	-2.4502	0.8818	-0.0222	0.0084
	C13	-13.3643	18.5175	-1.9567	0.6903	-0.0426	0.0165
	C15	-8.5831	8.5729	0.0705	0.0313	-0.0011	0.0004
	C16	-9.7526	9.2648	0.1196	0.0502	0.0104	0.0042
	C17	2.7150	0.9132	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 2	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-21.0673	26.4862	-2.6154	0.8803	-0.4037	0.1529
	C12	-2.6853	7.9579	-2.4365	0.8769	-0.0220	0.0084
	C13	-3.3438	7.3385	-1.9549	0.6896	-0.0426	0.0165

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C15	-7.0320	6.8779	0.0706	0.0313	-0.0011	0.0004
	C16	-8.0366	7.6737	0.1029	0.0433	0.0089	0.0036
	C17	4.0134	2.2420	-1.1090	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 3	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-40.3941	47.9427	-2.5549	0.8598	-0.3954	0.1498
	C12	-13.9152	19.7738	-2.4502	0.8818	-0.0222	0.0084
	C13	-17.0781	21.9901	-1.9562	0.6901	-0.0426	0.0165
	C15	-9.4069	9.3755	0.0706	0.0313	-0.0011	0.0004
	C16	-10.6752	10.1977	0.1196	0.0502	0.0104	0.0042
	C17	1.8735	0.0760	-1.1086	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 4	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-22.2416	27.8573	-2.7232	0.9204	-0.4043	0.1532
	C12	-3.1961	8.4786	-2.4451	0.8797	-0.0220	0.0084
	C13	-4.4367	8.4186	-1.9567	0.6903	-0.0426	0.0165
	C15	-7.2134	7.0523	0.0706	0.0313	-0.0011	0.0004
	C16	-21.1190	18.5382	1.0783	0.4121	0.0108	0.0045
	C17	3.9915	2.2280	-1.1088	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 5	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-23.7006	29.2598	-2.6827	0.9043	-0.4099	0.1553
	C12	-3.0963	8.3416	-2.4332	0.8757	-0.0220	0.0083
	C13	-4.9732	8.9551	-1.9555	0.6899	-0.0426	0.0165
	C15	-7.0848	6.9251	0.0706	0.0314	-0.0011	0.0004
	C16	-7.4020	7.0339	0.1029	0.0433	0.0089	0.0036
	C17	4.5061	2.7402	-1.1091	0.4122	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 6	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.1326	26.0692	-2.8569	0.9698	-0.4124	0.1563
	C12	-3.2386	8.5133	-2.4415	0.8784	-0.0219	0.0083
	C13	-4.4292	8.4055	-1.9539	0.6892	-0.0426	0.0165
	C15	-7.2027	7.0411	0.0709	0.0315	-0.0011	0.0004
	C16	-11.3147	10.7919	0.1427	0.0597	0.0125	0.0050
	C17	4.0096	2.2457	-1.1087	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 7	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-22.3659	28.0566	-2.7143	0.9118	-0.4226	0.1601
	C12	-3.9472	9.1225	-2.4055	0.8651	-0.0217	0.0082
	C13	-4.4717	8.4535	-1.9564	0.6902	-0.0426	0.0165
	C15	-7.1733	7.0127	0.0705	0.0313	-0.0011	0.0004

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C17	4.1024	2.3384	-1.1086	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
p2's Investment in commodity c by industry 8	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-24.5938	30.4397	-2.7871	0.9332	-0.4415	0.1672
	C12	-2.6549	7.8709	-2.4170	0.8708	-0.0214	0.0081
	C13	-4.6244	8.5609	-1.9346	0.6820	-0.0423	0.0164
	C15	-7.1883	7.0246	0.0720	0.0319	-0.0011	0.0003
	C17	4.0928	2.3308	-1.1076	0.4116	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
p2's Investment in commodity c by industry 9	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-22.6509	29.0590	-3.0381	1.0237	-0.4613	0.1748
	C12	-3.5491	8.6568	-2.3599	0.8481	-0.0209	0.0079
	C13	-4.4943	8.4692	-1.9539	0.6893	-0.0425	0.0165
	C15	-7.2365	7.0748	0.0706	0.0313	-0.0011	0.0004
	C17	3.9515	2.1893	-1.1083	0.4119	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
p2's Investment in commodity c by industry 10	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-34.6114	38.1962	-1.7835	0.5716	-0.3625	0.1371
	C12	-3.0825	8.1425	-2.3729	0.8566	-0.0209	0.0079
	C13	-5.0336	9.0570	-1.9745	0.6968	-0.0429	0.0166
	C15	-7.0364	6.8765	0.0708	0.0314	-0.0011	0.0004
	C17	4.6234	2.8593	-1.1085	0.4119	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
p2's Investment in commodity c by industry 11	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-22.2917	27.8759	-2.6934	0.9083	-0.4091	0.1550
	C12	-3.2154	8.4650	-2.4353	0.8765	-0.0220	0.0083
	C13	-4.4248	8.4063	-1.9556	0.6899	-0.0426	0.0165
	C15	-7.1579	6.9977	0.0706	0.0314	-0.0011	0.0004
	C16	-8.5291	8.1315	0.1107	0.0465	0.0096	0.0039
	C17	4.1149	2.3494	-1.1090	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 12	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-17.8152	23.4440	-2.7162	0.9173	-0.4084	0.1547
	C12	-3.4254	8.6633	-2.4314	0.8750	-0.0220	0.0084
	C13	-2.9608	6.9439	-1.9557	0.6899	-0.0426	0.0165
	C15	-7.1828	7.0231	0.0706	0.0314	-0.0011	0.0004
	C16	-9.6143	9.2630	0.0720	0.0334	0.0073	0.0030
	C17	3.6737	1.9082	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 13	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.7578	26.3710	-2.7118	0.9158	-0.4080	0.1546
	C12	-3.0397	8.2825	-2.4294	0.8742	-0.0219	0.0083
	C13	-3.6666	7.6538	-1.9568	0.6903	-0.0426	0.0165
	C15	-7.1048	6.9459	0.0705	0.0313	-0.0011	0.0004

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C16	-11.9406	10.9059	0.3943	0.1532	0.0095	0.0039
	C17	3.9992	2.2334	-1.1088	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 14	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.6898	26.1373	-2.6341	0.8879	-0.4029	0.1527
	C12	-2.4846	7.7234	-2.4304	0.8750	-0.0220	0.0084
	C13	-2.7601	6.7431	-1.9538	0.6892	-0.0426	0.0165
	C15	-7.1007	6.9427	0.0706	0.0314	-0.0011	0.0004
	C16	-8.2209	7.8543	0.1029	0.0433	0.0089	0.0036
	C17	3.9894	2.2216	-1.1092	0.4122	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 15	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.1535	25.8517	-2.7453	0.9280	-0.4099	0.1553
	C12	-2.9537	8.1987	-2.4332	0.8757	-0.0220	0.0084
	C13	-3.4169	7.4010	-1.9553	0.6898	-0.0426	0.0165
	C15	-7.0918	6.9334	0.0704	0.0313	-0.0011	0.0004
	C16	-10.6673	10.3151	0.0331	0.0172	0.0056	0.0023
	C17	4.0192	2.2530	-1.1088	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 16	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.8249	26.5184	-2.7143	0.9118	-0.4226	0.1601
	C12	-3.7497	8.9294	-2.4055	0.8651	-0.0217	0.0082
	C13	-3.6664	7.6562	-1.9593	0.6913	-0.0426	0.0165
	C15	-7.1224	6.9640	0.0703	0.0312	-0.0011	0.0004
	C17	3.9748	2.2081	-1.1091	0.4122	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
p2's Investment in commodity c by industry 17	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.6702	26.2374	-2.6905	0.9084	-0.4047	0.1533
	C12	-3.1540	8.4072	-2.4387	0.8778	-0.0221	0.0084
	C13	-3.7422	7.7259	-1.9554	0.6898	-0.0426	0.0165
	C15	-7.0818	6.9227	0.0706	0.0313	-0.0011	0.0004
	C16	-7.8173	7.9373	-0.1769	0.0621	0.0041	0.0017
	C17	4.0270	2.2607	-1.1090	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 18	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.2139	27.0317	-3.2173	1.0882	-0.4754	0.1801
	C12	-2.2929	7.7778	-2.5222	0.9076	-0.0224	0.0085
	C13	-3.7083	7.6816	-1.9524	0.6889	-0.0425	0.0165
	C15	-7.1241	6.9661	0.0698	0.0311	-0.0011	0.0004
	C17	3.9090	2.1463	-1.1074	0.4115	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
p2's Investment in commodity c by industry 19	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C3	-20.9751	26.5871	-2.7073	0.9141	-0.4075	0.1544
	C12	-2.6674	7.9202	-2.4354	0.8765	-0.0221	0.0084
	C13	-3.2901	7.2764	-1.9553	0.6898	-0.0426	0.0165
	C15	-7.0120	6.8541	0.0705	0.0313	-0.0011	0.0004
	C16	-9.3246	8.9758	0.0720	0.0334	0.0073	0.0030
	C17	4.1736	2.4064	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 20	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-18.6996	24.2404	-2.6736	0.9021	-0.4049	0.1534
	C12	-1.4740	6.7224	-2.4322	0.8752	-0.0220	0.0084
	C13	-1.2182	5.2061	-1.9557	0.6899	-0.0426	0.0165
	C15	-6.7484	6.5906	0.0706	0.0313	-0.0011	0.0004
	C16	-10.4231	9.8190	0.1788	0.0738	0.0073	0.0030
	C17	4.3204	2.5531	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 21	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.7102	26.3025	-2.6995	0.9109	-0.4088	0.1549
	C12	-2.7345	8.0075	-2.4451	0.8800	-0.0221	0.0084
	C13	-3.2397	7.2243	-1.9553	0.6898	-0.0426	0.0165
	C15	-7.0545	6.8961	0.0705	0.0313	-0.0011	0.0004
	C16	-11.7344	11.0711	0.1952	0.0799	0.0064	0.0026
	C17	4.0896	2.3232	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 22	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-20.6491	26.2440	-2.7009	0.9119	-0.4070	0.1542
	C12	-3.1981	8.4448	-2.4342	0.8761	-0.0220	0.0084
	C13	-3.7493	7.7328	-1.9557	0.6899	-0.0426	0.0165
	C15	-7.1388	6.9796	0.0705	0.0313	-0.0011	0.0004
	C16	-10.2499	9.8468	0.0786	0.0352	0.0064	0.0026
	C17	3.9647	2.1989	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 23	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-21.7670	27.3454	-2.6971	0.9107	-0.4059	0.1538
	C12	-3.5352	8.7775	-2.4355	0.8765	-0.0220	0.0084
	C13	-4.4998	8.4775	-1.9557	0.6899	-0.0426	0.0165
	C15	-7.2347	7.0731	0.0705	0.0313	-0.0011	0.0004
	C16	-10.0140	9.6630	0.0581	0.0277	0.0067	0.0027
	C17	3.9706	2.2071	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 24	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-15.6648	21.1000	-2.8016	0.9503	-0.4068	0.1541

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C12	0.6302	4.5892	-2.4574	0.8846	-0.0221	0.0084
	C13	0.3010	3.4893	-1.9531	0.6890	-0.0425	0.0165
	C15	-5.3663	5.1751	0.0708	0.0314	-0.0011	0.0004
	C16	-9.5706	9.0723	0.1427	0.0597	0.0125	0.0050
	C17	5.3978	3.6355	-1.1091	0.4122	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 25	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-26.6239	32.1829	-2.6827	0.9043	-0.4099	0.1553
	C12	-2.8189	8.0638	-2.4332	0.8757	-0.0220	0.0083
	C13	-6.8606	10.8433	-1.9559	0.6900	-0.0426	0.0165
	C15	-7.7746	7.6148	0.0705	0.0313	-0.0011	0.0004
	C16	-13.3952	13.0269	0.1029	0.0433	0.0089	0.0036
	C17	7.6973	5.9322	-1.1088	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 26	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-47.9371	53.5337	-2.7002	0.9116	-0.4068	0.1541
	C12	-7.9558	13.2069	-2.4339	0.8759	-0.0220	0.0084
	C13	-15.1782	19.1661	-1.9557	0.6899	-0.0426	0.0165
	C15	-7.7748	7.6173	0.0705	0.0313	-0.0011	0.0004
	C16	-10.8465	10.5036	0.0520	0.0250	0.0064	0.0026
	C17	3.3778	1.6103	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 27	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	26.1256	20.5937	-2.6625	0.8963	-0.4101	0.1554
	C12	-39.3526	44.6395	-2.4464	0.8806	-0.0222	0.0084
	C13	-174.9370	178.9330	-1.9555	0.6898	-0.0426	0.0165
	C15	-9.1007	8.9459	0.0706	0.0314	-0.0011	0.0004
	C16	-7.2645	6.9475	0.0903	0.0381	0.0078	0.0032
	C17	1.3393	0.4307	-1.1088	0.4120	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p2's Investment in commodity c by industry 28	C1-C2,C4-C11,C14,C18-C19,C21-C25,C27-C28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C3	-19.9315	25.7509	-2.7992	0.9475	-0.4124	0.1563
	C12	-3.3313	8.5965	-2.4490	0.8816	-0.0223	0.0085
	C13	-3.7026	7.6908	-1.9574	0.6905	-0.0426	0.0165
	C15	-7.1427	6.9834	0.0705	0.0313	-0.0011	0.0004
	C16	-11.4227	10.9014	0.1427	0.0597	0.0125	0.0050
	C17	3.9715	2.2057	-1.1089	0.4121	-0.0089	0.0036
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
p3's Household	C1	-68.2449	71.7695	-0.4888	0.0475	-0.1201	0.0453
	C2	-50.6984	56.5631	-2.4805	0.7457	-0.1068	0.0409
	C3	-20.2236	24.9221	-2.3064	0.7779	-0.3544	0.1343

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C4	2.9532	12.4972	-6.5381	2.2810	3.7447	1.4764
	C5	-6.7051	9.8429	-1.3435	0.4730	-0.0159	0.0058
	C6	-11.7295	27.3818	-5.6768	1.9021	-0.1387	0.0535
	C7	-31.6197	42.5508	-7.3042	2.8537	-0.2518	0.0981
	C8	-20.8504	28.5685	-4.9400	1.8964	-0.1079	0.0417
	C9	-29.7206	49.8307	-7.9938	2.7621	-0.1675	0.0648
	C10	27.3200	17.9893	-5.2799	2.0167	-0.2114	0.0822
	C11	-13.8190	23.7703	-3.6066	1.2143	-0.0906	0.0349
	C12	-3.1136	8.8579	-2.6481	0.9522	-0.0240	0.0091
	C13	-5.9359	8.7001	-1.4148	0.4988	-0.0318	0.0123
	C14	-8.2037	7.1668	0.2810	0.1028	0.0032	0.0013
	C15	-7.3787	6.9668	0.1568	0.0625	0.0003	0.0002
	C16	-11.0865	10.1228	0.3444	0.1330	0.0034	0.0014
	C17	7.3813	4.6726	-1.6318	0.6050	-0.0133	0.0054
	C18	-0.5253	1.0285	-0.3507	0.1369	-0.0022	0.0009
	C19	-40.7771	49.7445	-4.5247	1.6388	-0.1200	0.0464
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C21	-2.3909	10.2681	-3.6525	1.2983	0.4201	0.1663
	C22	-5.7000	11.9142	-3.7788	1.4314	-0.0575	0.0224
	C23	-73.6166	95.0897	-9.2437	3.2440	-0.1291	0.0492
	C24	-87.6927	70.5380	7.4681	2.8264	0.0859	0.0343
	C25	-47.1299	49.5306	-2.1601	0.8292	-0.0309	0.0115
	C26	-62.0478	54.4897	3.1477	1.2022	0.0316	0.0130
	C27	-71.8153	67.1917	0.4111	0.0538	-0.0843	0.0322
	C28	-45.0992	40.1572	1.1417	0.3566	0.0068	0.0031
x0dom Total Supplies of Domestic Goods	C1	17.2211	10.5544	-1.8482	0.5305	-0.0743	0.0285
	C2	28.3329	17.6551	-4.1441	1.3659	-0.0991	0.0386
	C3	20.9769	15.7147	-2.6603	0.9345	-0.4982	0.1894
	C4	20.0000	7.7567	-6.5956	2.4036	-1.5922	0.6035
	C5	15.9443	26.4866	5.1123	1.9010	0.0199	0.0057
	C6	17.3550	10.5015	-1.8807	0.5379	-0.0667	0.0256
	C7	38.3569	41.2378	-2.9727	1.4571	-0.0698	0.0274
	C8	32.8168	34.6644	-4.0837	1.9063	-0.1752	0.0686
	C9	36.2938	8.6260	-12.8462	4.5665	-0.2936	0.1137
	C10	-15.2271	10.2322	-3.2737	1.6713	0.0714	0.0275
	C11	10.1661	16.9442	4.5475	1.8010	0.0305	0.0118
	C12	5.0023	18.0473	4.9381	1.7694	-0.0028	0.0015
	C13	18.4989	38.6106	8.2824	3.0160	0.1640	0.0632
	C14	19.7617	51.1627	12.5035	4.5567	0.2452	0.0944
	C15	-8.7348	10.5851	10.4698	3.9290	0.1356	0.0528
	C16	13.2802	30.8014	7.9373	2.9136	-0.0237	0.0101
	C17	2.9398	25.1253	8.7032	3.2073	0.1508	0.0582
	C18	-26.5060	7.5898	7.6994	2.8055	0.0495	0.0197
	C19	26.1786	25.9943	-0.9923	0.3574	-0.0773	0.0300
	C20	58.7563	125.3900	25.0399	9.0214	0.5770	0.2214
	C21	22.4945	23.0351	-5.1473	2.3162	-0.3619	0.1418

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C22	25.0248	33.6462	0.6800	0.0354	-0.0107	0.0042
	C23	61.4153	45.3390	-9.5006	3.5870	-0.2043	0.0793
	C24	9.1152	6.4088	-1.1620	0.4111	-0.0218	0.0085
	C25	39.6032	23.3228	-8.2012	2.9900	-0.1606	0.0622
	C26	7.3492	16.7238	4.5190	1.6764	-0.0063	0.0022
	C27	33.5920	47.4009	4.6599	1.6241	0.0392	0.0150
	C28	129.8060	115.9350	-9.8137	3.8768	-0.1457	0.0571
x0imp Total Supplies of Imported Goods	C1	-109.2590	174.0820	-22.2077	7.1942	-0.5907	0.2268
	C2	4.7407	28.8435	-14.9530	5.2332	-0.3977	0.1539
	C3	12.5525	11.1695	-0.8490	0.2005	-0.2652	0.1011
	C4	44.2561	19.0112	-22.2381	7.3456	4.7384	1.8785
	C5	21.0602	14.5218	-14.2488	4.8719	-0.3173	0.1226
	C6	3.6638	71.0349	-23.8560	7.7229	-0.5532	0.2134
	C7	42.5355	28.3715	-13.8258	5.5071	-0.3321	0.1292
	C8	30.8717	24.6856	-9.0709	3.7485	-0.2373	0.0924
	C9	6.3425	56.4287	-21.6495	7.1524	-0.4935	0.1909
	C10	14.1248	11.3467	-7.5421	3.2347	-0.0871	0.0341
	C11	9.1149	34.7759	-15.5742	5.1864	-0.4359	0.1682
	C12	35.6598	31.0431	-6.6055	2.6816	-0.1075	0.0419
	C13	34.7419	39.1690	0.3075	0.1092	0.0079	0.0026
	C14	14.6933	25.1238	3.0639	1.1094	0.0379	0.0143
	C15	-67.9560	35.5484	22.5127	8.5519	0.2153	0.0843
	C16	30.6651	11.7515	-9.9362	3.6056	-0.1909	0.0738
	C17	28.8443	65.6105	12.9610	4.6272	0.2911	0.1115
	C18	83.8501	73.9809	-7.2267	2.7666	-0.1109	0.0437
	C19	-89.0654	138.1280	-19.4303	6.5691	-0.4632	0.1788
	C20	-588.8400	579.7020	-2.8922	1.4743	0.0105	0.0016
	C21	30.3013	16.3932	-12.4565	4.8450	0.3699	0.1475
	C22	25.8915	22.8086	-7.3853	3.0606	-0.1222	0.0475
	C23	-172.5670	246.0500	-25.7774	8.4695	-0.4733	0.1816
	C24	-72.8219	70.2852	-2.1664	0.9412	-0.0780	0.0292
	C25	-64.0134	91.2173	-14.0670	5.0300	-0.2678	0.1028
	C26	-51.4924	25.2236	10.8591	4.0846	0.1362	0.0536
	C27	-37.4457	25.6061	-0.0025	0.3728	-0.1361	0.0521
	C28	-4.8386	3.5062	-6.8682	3.0727	-0.1157	0.0443
employ Employment by Industry	C1	64.4057	31.8866	-8.6121	2.6406	-0.2948	0.1133
	C2	113.5720	66.2551	-14.2993	4.5332	-0.3638	0.1413
	C3	78.7412	50.9264	-10.6493	3.6060	-1.4662	0.5555
	C4	-31.4358	100.1140	-22.0635	7.2509	22.9004	8.9066
	C5	11.7387	3.8402	-1.9065	0.7055	-0.2332	0.0948
	C6	-29.4534	82.0916	-14.2298	4.5727	-0.3941	0.1522
	C7	69.6647	42.6680	-16.3249	6.1681	-0.4079	0.1586
	C8	56.4529	26.6388	-18.2212	6.8253	-0.6255	0.2435
	C9	-43.4146	166.3990	-32.2872	9.9345	-0.8696	0.3360
	C10	-39.0889	48.2576	-11.2484	4.6200	-0.0342	0.0136
	C11	-14.9776	33.2234	-3.2199	0.9431	-0.2177	0.0845

		Scenario I		Scenario II		Scenario III	
Variable	Components	Mean	SD	Mean	SD	Mean	SD
	C12	-8.8412	9.7695	-1.8323	0.8051	-0.2648	0.1036
	C13	23.1782	37.9378	4.5693	1.4689	0.0753	0.0281
	C14	12.7133	51.2312	13.3553	4.6060	0.2443	0.0929
	C15	-34.6730	21.0156	9.1139	3.3359	0.0241	0.0096
	C16	12.0040	22.4132	4.4806	1.5134	-0.2710	0.1069
	C17	-10.1521	9.1755	5.5261	1.8908	0.0514	0.0191
	C18	-89.9568	79.8843	2.1930	0.5819	-0.2243	0.0859
	C19	22.2332	6.6848	-11.1399	3.8481	-0.3709	0.1438
	C20	-288.2550	200.4230	39.2468	14.3057	0.8873	0.3396
	C21	24.3334	17.7514	-9.0682	3.7737	-0.5168	0.2021
	C22	23.7929	19.6208	-5.9849	2.4287	-0.1799	0.0700
	C23	65.5919	89.5779	-40.0875	12.1644	-1.1064	0.4276
	C24	8.9179	5.5563	-1.4225	0.5057	-0.0274	0.0107
	C25	39.9832	1.0879	-16.3274	5.6848	-0.3512	0.1360
	C26	-0.2374	4.9252	2.7275	0.9959	-0.0698	0.0268
	C27	46.3174	45.4122	-3.2779	1.4265	-0.2021	0.0789
	C28	168.3560	142.4630	-14.6396	5.5485	-0.2457	0.0960
p1lab'o Price of Labour Composite	C1-C28	-99.3396	78.3709	9.1938	3.4727	0.0972	0.0388
p1prim Effective Price of Primary Factor Composite	C1	-98.2747	99.7865	0.7710	0.5750	-0.1482	0.0557
	C2	-89.1171	98.7923	-3.7634	1.0759	-0.1974	0.0757
	C3	-86.8415	85.5297	-0.8521	0.2364	-0.9851	0.3723
	C4	-181.7690	202.4620	-9.2419	3.2435	25.0744	9.8751
	C5	-122.4020	118.3100	1.8671	0.6656	-0.1561	0.0618
	C6	-170.7600	185.4500	-4.7194	1.5309	-0.2309	0.0882
	C7	-108.0500	112.1360	-6.0916	2.5365	-0.2415	0.0929
	C8	-114.5300	119.8350	-7.2068	2.9650	-0.3545	0.1370
	C9	-224.4490	265.8410	-15.8392	5.3391	-0.4814	0.1852
	C10	-131.3930	122.4750	0.0201	0.3009	-0.0084	0.0023
	C11	-145.6560	146.8230	1.0414	0.4891	-0.1512	0.0576
	C12	-125.8420	117.8750	2.1105	0.6892	-0.1650	0.0634
	C13	-95.8051	80.1608	5.4436	1.8980	0.0086	0.0038
	C14	-70.4926	41.5626	10.0203	3.5134	0.0964	0.0373
	C15	-125.3830	110.1800	7.8556	2.8915	-0.0143	0.0043
	C16	-105.5830	91.5729	5.6904	2.0395	-0.1505	0.0582
	C17	-111.4200	93.3540	5.9995	2.1430	-0.0022	0.0002
	C18	-168.3250	156.0460	3.5988	1.1864	-0.1768	0.0669
	C19	-132.5180	134.9890	-2.1356	0.7739	-0.1970	0.0753
	C20	61.7064	121.7390	21.4494	7.5977	0.4058	0.1559
	C21	-104.1700	88.0190	5.3326	1.8498	-0.0326	0.0119
	C22	-119.1520	112.4840	0.1418	0.0925	-0.1146	0.0435
	C23	-213.2420	269.9590	-23.4690	8.1369	-0.6577	0.2537
	C24	-99.8234	79.2928	8.9506	3.3769	0.0925	0.0370
	C25	-115.2440	108.7540	0.8764	0.2281	-0.0622	0.0230
	C26	-107.8790	90.0688	7.6225	2.8541	0.0443	0.0183
	C27	-100.0520	90.3727	2.1990	0.6734	-0.1041	0.0396
	C28	-90.2819	76.5766	4.1554	1.3971	0.0136	0.0062

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
p1tot Average Input/Output Price	C1	-68.5171	72.2813	-0.5617	0.0253	-0.1236	0.0467
	C2	-51.8879	62.0665	-4.1825	1.3129	-0.1563	0.0601
	C3	-14.3755	23.6142	-4.2926	1.4757	-0.5600	0.2124
	C4	11.7348	7.8711	-8.1881	2.8612	4.5022	1.7775
	C5	-9.1640	19.4096	-4.0658	1.4222	-0.0473	0.0173
	C6	-7.6607	26.1448	-6.6273	2.2225	-0.1602	0.0619
	C7	-34.8260	49.6885	-9.4953	3.6784	-0.3258	0.1269
	C8	-19.6564	29.5220	-6.1170	2.3428	-0.1320	0.0511
	C9	-27.6104	54.4252	-10.4891	3.6272	-0.2160	0.0837
	C10	39.9551	28.1314	-6.5058	2.4801	-0.2514	0.0978
	C11	-10.6216	25.1353	-5.1581	1.7430	-0.1250	0.0482
	C12	9.8750	0.5213	-4.6035	1.6616	-0.0421	0.0162
	C13	8.0851	1.5608	-3.0316	1.0831	-0.0595	0.0232
	C14	6.8884	10.8205	0.4950	0.1188	0.0233	0.0085
	C15	1.4918	2.3663	-1.3082	0.4703	-0.0217	0.0086
	C16	7.4613	2.0512	-2.4479	0.8900	0.0301	0.0119
	C17	17.0738	12.5351	-2.5509	0.9461	-0.0210	0.0086
	C18	47.9521	36.9261	-4.9949	1.8362	-0.0370	0.0150
	C19	-42.2063	51.4323	-4.6378	1.6780	-0.1232	0.0476
	C20	-300.0830	290.2940	2.5751	0.8515	0.1056	0.0398
	C21	-2.6322	10.8127	-3.7769	1.3410	0.4351	0.1723
	C22	-6.5327	13.3820	-4.1235	1.5571	-0.0630	0.0245
	C23	-75.0039	96.7603	-9.3342	3.2728	-0.1305	0.0497
	C24	-88.4394	71.1074	7.5659	2.8656	0.0870	0.0348
	C25	-47.3335	49.7437	-2.1683	0.8322	-0.0311	0.0115
	C26	-63.4725	55.7244	3.2349	1.2364	0.0325	0.0134
	C27	-72.9802	68.2707	0.4190	0.0548	-0.0859	0.0328
	C28	-61.4812	54.5849	1.6239	0.5093	0.0097	0.0044
p2tot Costs of Units of Capital	C1	-8.9746	9.0907	0.0063	0.0071	-0.0015	0.0005
	C2	-6.8896	6.8448	0.0030	0.0061	-0.0017	0.0006
	C3	-10.1894	10.2763	0.0071	0.0074	-0.0015	0.0005
	C4	-157.7270	153.0740	1.0785	0.3485	0.0513	0.0193
	C5	-157.9500	153.3050	1.0782	0.3484	0.0513	0.0193
	C6	-157.5470	152.8970	1.0783	0.3485	0.0513	0.0193
	C7	-157.3070	152.6580	1.0782	0.3484	0.0513	0.0193
	C8	-157.2800	152.6270	1.0798	0.3490	0.0513	0.0193
	C9	-158.0910	153.4350	1.0788	0.3486	0.0513	0.0193
	C10	-157.9490	153.3000	1.0792	0.3487	0.0514	0.0193
	C11	-157.4750	152.8290	1.0783	0.3484	0.0513	0.0193
	C12	-156.7760	152.1320	1.0783	0.3484	0.0513	0.0193
	C13	-155.7410	151.0990	1.0783	0.3484	0.0513	0.0193
	C14	-165.0870	160.4500	1.0783	0.3484	0.0513	0.0193
	C15	-158.0460	153.4060	1.0782	0.3484	0.0513	0.0193
	C16	-156.9050	152.2640	1.0779	0.3483	0.0513	0.0193
	C17	-153.8230	149.1810	1.0782	0.3484	0.0513	0.0193
	C18	-156.5270	151.8830	1.0785	0.3485	0.0513	0.0193

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C19	-156.8860	152.2490	1.0782	0.3484	0.0513	0.0193
	C20	-155.1050	150.4690	1.0782	0.3484	0.0513	0.0193
	C21	-157.0130	152.3730	1.0782	0.3484	0.0513	0.0193
	C22	-190.0260	184.3520	1.3188	0.4250	0.0632	0.0238
	C23	-202.6190	196.5920	1.3988	0.4505	0.0671	0.0252
	C24	-126.0590	121.2980	1.0783	0.3484	0.0513	0.0193
	C25	-168.7330	164.0870	1.0782	0.3484	0.0513	0.0193
	C26	-218.2500	212.3020	1.3845	0.4459	0.0664	0.0250
	C27	-182.5830	177.9610	1.0783	0.3484	0.0513	0.0193
	C28	-157.3730	152.7290	1.0783	0.3484	0.0513	0.0193
x1lab`o Effective Labour Input	C1	64.4057	31.8866	-8.6121	2.6406	-0.2948	0.1133
	C2	113.5720	66.2551	-14.2993	4.5332	-0.3638	0.1413
	C3	78.7412	50.9264	-10.6493	3.6060	-1.4662	0.5555
	C4	-31.4358	100.1140	-22.0635	7.2509	22.9004	8.9066
	C5	11.7387	3.8402	-1.9065	0.7055	-0.2332	0.0948
	C6	-29.4534	82.0916	-14.2298	4.5727	-0.3941	0.1522
	C7	69.6647	42.6680	-16.3249	6.1681	-0.4079	0.1586
	C8	56.4529	26.6388	-18.2212	6.8253	-0.6255	0.2435
	C9	-43.4146	166.3990	-32.2872	9.9345	-0.8696	0.3360
	C10	-39.0889	48.2576	-11.2484	4.6200	-0.0342	0.0136
	C11	-14.9776	33.2234	-3.2199	0.9431	-0.2177	0.0845
	C12	-8.8412	9.7695	-1.8323	0.8051	-0.2648	0.1036
	C13	23.1782	37.9378	4.5693	1.4689	0.0753	0.0281
	C14	12.7133	51.2312	13.3553	4.6060	0.2443	0.0929
	C15	-34.6730	21.0156	9.1139	3.3359	0.0241	0.0096
	C16	12.0040	22.4132	4.4806	1.5134	-0.2710	0.1069
	C17	-10.1521	9.1755	5.5261	1.8908	0.0514	0.0191
	C18	-89.9568	79.8843	2.1930	0.5819	-0.2243	0.0859
	C19	22.2332	6.6848	-11.1399	3.8481	-0.3709	0.1438
	C20	-288.2550	200.4230	39.2468	14.3057	0.8873	0.3396
	C21	24.3334	17.7514	-9.0682	3.7737	-0.5168	0.2021
	C22	23.7929	19.6208	-5.9849	2.4287	-0.1799	0.0700
	C23	65.5919	89.5779	-40.0875	12.1644	-1.1064	0.4276
	C24	8.9179	5.5563	-1.4225	0.5057	-0.0274	0.0107
	C25	39.9832	1.0879	-16.3274	5.6848	-0.3512	0.1360
	C26	-0.2374	4.9252	2.7275	0.9959	-0.0698	0.0268
	C27	46.3174	45.4122	-3.2779	1.4265	-0.2021	0.0789
	C28	168.3560	142.4630	-14.6396	5.5485	-0.2457	0.0960
x1prim Primary Factor Composite	C1	17.2211	10.5544	-1.8482	0.5305	-0.0743	0.0285
	C2	28.3329	17.6551	-4.1441	1.3659	-0.0991	0.0386
	C3	20.9769	15.7147	-2.6603	0.9345	-0.4982	0.1894
	C4	20.0000	7.7567	-6.5956	2.4036	-1.5922	0.6035
	C5	15.9443	26.4866	5.1123	1.9010	0.0199	0.0057
	C6	17.3550	10.5015	-1.8807	0.5379	-0.0667	0.0256
	C7	38.3569	41.2378	-2.9727	1.4571	-0.0698	0.0274
	C8	32.8168	34.6644	-4.0837	1.9063	-0.1752	0.0686

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C9	36.2938	8.6260	-12.8462	4.5665	-0.2936	0.1137
	C10	-15.2271	10.2322	-3.2737	1.6713	0.0714	0.0275
	C11	10.1661	16.9442	4.5475	1.8010	0.0305	0.0118
	C12	5.0023	18.0473	4.9381	1.7694	-0.0028	0.0015
	C13	18.4989	38.6106	8.2824	3.0160	0.1640	0.0632
	C14	19.7617	51.1627	12.5035	4.5567	0.2452	0.0944
	C15	-8.7348	10.5851	10.4698	3.9290	0.1356	0.0528
	C16	13.2802	30.8014	7.9373	2.9136	-0.0237	0.0101
	C17	2.9398	25.1253	8.7032	3.2073	0.1508	0.0582
	C18	-26.5060	7.5898	7.6994	2.8055	0.0495	0.0197
	C19	26.1786	25.9943	-0.9923	0.3574	-0.0773	0.0300
	C20	58.7563	125.3900	25.0399	9.0214	0.5770	0.2214
	C21	22.4945	23.0351	-5.1473	2.3162	-0.3619	0.1418
	C22	25.0248	33.6462	0.6800	0.0354	-0.0107	0.0042
	C23	61.4153	45.3390	-9.5006	3.5870	-0.2043	0.0793
	C24	9.1152	6.4088	-1.1620	0.4111	-0.0218	0.0085
	C25	39.6032	23.3228	-8.2012	2.9900	-0.1606	0.0622
	C26	7.3492	16.7238	4.5190	1.6764	-0.0063	0.0022
	C27	33.5920	47.4009	4.6599	1.6241	0.0392	0.0150
	C28	129.8060	115.9350	-9.8137	3.8768	-0.1457	0.0571
x1tot Activity Level or Value-Added	C1	17.2211	10.5544	-1.8482	0.5305	-0.0743	0.0285
	C2	28.3329	17.6551	-4.1441	1.3659	-0.0991	0.0386
	C3	20.9769	15.7147	-2.6603	0.9345	-0.4982	0.1894
	C4	20.0000	7.7567	-6.5956	2.4036	-1.5922	0.6035
	C5	15.9443	26.4866	5.1123	1.9010	0.0199	0.0057
	C6	17.3550	10.5015	-1.8807	0.5379	-0.0667	0.0256
	C7	38.3569	41.2378	-2.9727	1.4571	-0.0698	0.0274
	C8	32.8168	34.6644	-4.0837	1.9063	-0.1752	0.0686
	C9	36.2938	8.6260	-12.8462	4.5665	-0.2936	0.1137
	C10	-15.2271	10.2322	-3.2737	1.6713	0.0714	0.0275
	C11	10.1661	16.9442	4.5475	1.8010	0.0305	0.0118
	C12	5.0023	18.0473	4.9381	1.7694	-0.0028	0.0015
	C13	18.4989	38.6106	8.2824	3.0160	0.1640	0.0632
	C14	19.7617	51.1627	12.5035	4.5567	0.2452	0.0944
	C15	-8.7348	10.5851	10.4698	3.9290	0.1356	0.0528
	C16	13.2802	30.8014	7.9373	2.9136	-0.0237	0.0101
	C17	2.9398	25.1253	8.7032	3.2073	0.1508	0.0582
	C18	-26.5060	7.5898	7.6994	2.8055	0.0495	0.0197
	C19	26.1786	25.9943	-0.9923	0.3574	-0.0773	0.0300
	C20	58.7563	125.3900	25.0399	9.0214	0.5770	0.2214
	C21	22.4945	23.0351	-5.1473	2.3162	-0.3619	0.1418
	C22	25.0248	33.6462	0.6800	0.0354	-0.0107	0.0042
	C23	61.4153	45.3390	-9.5006	3.5870	-0.2043	0.0793
	C24	9.1152	6.4088	-1.1620	0.4111	-0.0218	0.0085
	C25	39.6032	23.3228	-8.2012	2.9900	-0.1606	0.0622
	C26	7.3492	16.7238	4.5190	1.6764	-0.0063	0.0022

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
	C27	33.5920	47.4009	4.6599	1.6241	0.0392	0.0150
	C28	129.8060	115.9350	-9.8137	3.8768	-0.1457	0.0571
x2tot Investment by Using Industry	C1	-338.3050	345.4950	84.7649	32.9276	1.5754	0.6136
	C2	90.8523	247.8470	62.5467	24.0455	1.3645	0.5275
	C3	-972.0660	923.4740	76.9242	28.7984	-2.0371	0.7636
	C4	71.7927	111.0940	12.0855	4.2146	16.0524	5.7719
	C5	-11.7090	55.3153	31.6243	11.9663	0.5232	0.2001
	C6	65.4476	110.7710	20.3400	7.7954	0.4017	0.1565
	C7	53.7520	111.0690	18.1378	6.0343	0.3913	0.1516
	C8	46.0987	102.0830	16.1551	5.1567	0.2266	0.0869
	C9	105.8920	127.2120	-0.3022	0.7899	0.0413	0.0162
	C10	-77.6257	10.9128	23.1605	7.9948	0.6732	0.2614
	C11	31.2993	92.5658	30.5071	11.7197	0.5349	0.2078
	C12	-972.5730	901.2980	31.6830	11.8854	0.4994	0.1934
	C13	103.8670	185.2980	36.9334	13.8871	0.7556	0.2928
	C14	43.6514	143.4640	43.5887	16.2983	0.8826	0.3415
	C15	48.4871	128.9840	40.4495	15.3636	0.7171	0.2790
	C16	105.5980	184.0120	36.8646	13.9208	0.4947	0.1909
	C17	75.9050	160.5290	37.6884	14.2304	0.7377	0.2861
	C18	72.1963	150.4610	35.0265	13.1374	0.5300	0.2068
	C19	78.3986	182.7560	43.8502	16.4351	0.8100	0.3146
	C20	544.5980	655.5970	41.1500	15.0492	0.9286	0.3580
	C21	79.7503	173.0620	36.1508	12.9916	0.4953	0.1908
	C22	156.9340	237.9280	30.9012	11.1821	0.5983	0.2325
	C23	166.0070	196.4650	1.8393	0.3110	0.1108	0.0429
	C24	97.8984	282.0670	75.4484	28.6616	1.5720	0.6114
	C25	-19.6816	53.6430	27.8883	10.1447	0.6419	0.2496
	C26	-556.2160	456.1920	47.7823	18.1963	0.8742	0.3403
	C27	708.4610	836.3390	56.0533	20.9129	1.0150	0.3940
	C28	200.5160	281.8710	29.8479	10.4999	0.7351	0.2851
x1lab'i Employment by Occupation	Skilled	-1.3081	1.0678	-0.1387	0.0729	0.0255	0.0097
	Unskilled	1.0873	0.8884	0.1148	0.0604	-0.0211	0.0080
delDebt Ordinary Change in Real Foreign Debt	Scalar	-38174.3008	12591.7002	8099.6699	3123.1399	362.7690	141.4220
delDebt'Ratio Ordinary Change in Debt/GDP ratio	Scalar	-0.0148	0.0050	0.0029	0.0011	0.0001	0.0001
delBT Ordinary Change in Real Trade Deficit	Scalar	-18338.8008	6049.0000	3891.0601	1500.3500	174.2730	67.9387
levDebt'Ratio Levels Debt/GDP ratio	Scalar	-0.0148	0.0050	0.0029	0.0011	0.0001	0.0001
f1lab'io Overall Wage Shifter	Scalar	-82.9125	57.3748	12.4727	4.7624	Exog	Exog
f1tax'csi Uniform % Change in Powers of Taxes on Intermediate Usage	Scalar	92.5275	76.9791	-6.6475	2.4414	-0.0354	0.0149
f3tot Ratio between x3tot and x0gdpexp	Scalar	14.7724	16.7225	-14.5708	5.2876	-0.2695	0.1041
f7tot Overall Shift Term Sexports	Scalar	38.6081	19.7454	-11.3901	4.2990	-0.2705	0.1049
f5tot2 Ratio between f5tot and x3tot	Scalar	-27.5567	11.6570	13.1205	5.4881	0.2713	0.1055
p0gdpexp GDP Price Index Expenditure Side	Scalar	-28.0212	32.2321	-1.8102	0.6038	0.0871	0.0344
p0realdev Real Devaluation	Scalar	22.0958	26.1162	1.8474	0.6263	-0.0870	0.0343
p0toft Terms of Trade	Scalar	-5.2497	11.7500	-2.8183	0.9940	-0.0020	0.0010
p1cap'i Average Capital Rental	Scalar	-148.5040	145.1390	1.3761	0.5147	0.0632	0.0255
p2tot'i Aggregate Investment Price Index	Scalar	-318.9250	313.6810	1.0457	0.3299	0.0513	0.0193

Variable	Components	Scenario I		Scenario II		Scenario III	
		Mean	SD	Mean	SD	Mean	SD
p3tot Consumer Price Index	Scalar	-18.5838	24.6241	-2.8719	1.0251	0.0972	0.0388
p3sub Subsistence Price Index	Scalar	-30.2914	37.4481	-2.9347	1.0240	0.1254	0.0502
p4'ntrad Price Non-Traditional Export Aggregate	Scalar	-17.4703	24.8918	-3.5212	1.2156	-0.2704	0.1030
p4tot Exports Price Index	Scalar	-5.2497	11.7500	-2.8183	0.9940	-0.0020	0.0010
p5tot "Other" Demands Price Index	Scalar	-70.2752	59.0336	4.7364	1.7991	0.0684	0.0274
p6tot Inventories Price Index	Scalar	4.2444	1.5478	-1.6715	0.6348	-0.0829	0.0317
p7tot Sexports Price Index	Scalar	-6.3615	13.2221	-3.4192	1.2426	0.1119	0.0447
q Number of Households	Scalar	31.3089	27.4821	-21.8224	7.2670	-0.4712	0.1819
utility Utility per Household	Scalar	-35.8649	4.4482	32.8980	13.7443	0.4045	0.1560
w0cif'c CIF A$ Value of Imports	Scalar	-2.9917	11.0583	7.1975	2.6980	0.0830	0.0323
w0gdpexp Nominal GDP from Expenditure Side	Scalar	-9.0575	2.9876	1.9218	0.7410	0.0861	0.0336
w0gdpinc Nominal GDP from Income Side	Scalar	-9.0575	2.9875	1.9218	0.7410	0.0861	0.0336
w0imp'c Value of Imports plus Duty	Scalar	-2.4762	12.0153	7.3260	2.7434	0.0861	0.0335
w0tar'c Aggregate Tariff Revenue	Scalar	2.4848	21.2239	8.5624	3.1805	0.1162	0.0447
w0tax'csi Aggregate Revenue from All Indirect Taxes	Scalar	652.7650	560.2820	-48.5358	18.5224	-0.2478	0.1050
w1cap'i Aggregate Payments to Capital	Scalar	-107.5690	83.8439	11.1013	4.2429	0.2972	0.1161
w1lab'io Aggregate Payments to Labour	Scalar	-99.3396	78.3709	9.1938	3.4727	0.0972	0.0388
w1lnd'i Aggregate Payments to Land	Scalar	-78.0521	90.7708	-4.5894	1.3122	-0.6694	0.2537
w1oct'i Aggregate Other Cost Ticket Payments	Scalar	14.7167	15.9544	-1.1164	0.4452	0.0688	0.0276
w1tax'csi Aggregate Revenue from Indirect Taxes on Intermediate	Scalar	2115.6599	1793.2500	-165.2210	62.8505	-0.8898	0.3737
w2tax'csi Aggregate Revenue from Indirect Taxes on Investment	Scalar	-61.4761	13.5261	38.0340	14.0754	0.6237	0.2407
w2tot'i Aggregate Nominal Investment	Scalar	-47.6765	26.6368	35.4052	13.0708	0.6567	0.2528
w3tax'cs Aggregate Revenue from Indirect Taxes on Households	Scalar	26.4717	8.7432	-12.5810	4.8529	-0.2243	0.0868
w3tot Nominal Total Household Consumption	Scalar	15.2948	10.7440	-13.8908	5.0838	-0.1736	0.0663
w4tax'c Aggregate Revenue from Indirect Taxes on Export	Scalar	15.1185	28.9939	7.9374	2.9007	0.2894	0.1107
w4tot A$ Border Value of exports	Scalar	-0.5813	16.6398	9.2939	3.4756	0.0818	0.0318
w5tax'cs Aggregate Revenue from Indirect Taxes on "Other"	Scalar	12.1742	5.4606	-3.2435	1.1973	-0.0044	0.0017
w5tot Aggregate Nominal Value of "Other" Demands	Scalar	-70.2752	59.0336	4.7364	1.7991	0.0684	0.0274
w6tot Aggregate Nominal Value of Inventories	Scalar	4.2444	1.5478	-1.6715	0.6348	-0.0829	0.0317
w7tax'cs Aggregatte Revenue from Indirect Taxes on Sexports	Scalar	42.8385	11.1181	-16.4365	5.9776	-0.3426	0.1327
w7tot Aggregate Nominal Value of Sexports	Scalar	31.1055	4.1087	-14.3665	5.2530	-0.1589	0.0604
x0cif'c Import Volume Index CIF Weights	Scalar	-2.9917	11.0583	7.1975	2.6980	0.0830	0.0323
x0gdpexp Real GDP from Expenditure Side	Scalar	12.4930	22.3616	3.8094	1.3931	-0.0010	0.0008
x0imp'c Import Volume Index Duty-Paid Weights	Scalar	-2.4762	12.0153	7.3260	2.7434	0.0861	0.0335
x1cap'i Aggregate Capital Stock Rental Weights	Scalar	8.2608	29.1636	9.5748	3.6290	0.2338	0.0905
x1prim'i Aggregate Output: Value-Added Weights	Scalar	5.0971	14.2754	3.9801	1.4866	-0.0057	0.0027
x2tot'i Aggregate Real Investment Expenditure	Scalar	107.4440	179.5860	33.9631	12.4982	0.6050	0.2332
x3tot Real Household Consumption	Scalar	38.6081	19.7454	-11.3901	4.2990	-0.2705	0.1049
x4'ntrad Quantity Non-Traditional Export Aggregate	Scalar	11.6550	41.4166	19.9151	7.5447	1.3649	0.5233
x4tot Export Volume Index	Scalar	-3.9553	18.3516	12.5118	4.7272	0.0837	0.0328
x7tot Aggregate Sexports	Scalar	38.6081	19.7454	-11.3901	4.2990	-0.2705	0.1049

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