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A POLICY ANALYSIS BASED ON A CGE MODEL**

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**RECOVERY FROM THE 1930S GREAT DEPRESSION IN AUSTRALIA : A  
POLICY ANALYSIS BASED ON A CGE MODEL**

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## ABSTRACT

*The striking similarities of economic problems facing Australia in the early 1990s with those of the 1930s warrant a revisit to the recovery effort during the depression. This paper examines the effectiveness of various economic policies adopted to deal with the depression by simulating a computable general equilibrium (CGE) model of the 1930s in Australia. The analysis focuses on the relative importance of the exchange rate devaluation, the protection policy, the government demand expansion and the wage policy. It also evaluates the impact of alternative policies which would have provided a different outcome that may have been crucial to the recovery.*

## I Introduction

The depression of the 1930s influenced the economic activity of practically every country and was a worldwide phenomenon. The severity and the duration of the depression however differed from one country to another. Australia experienced a 10 per cent decline in its GDP between 1929 and 1931. Unemployment reached a record high level by 1933, representing 19 per cent of the labour force in Australia (Gregory and Butlin, 1988, pp.2-7).<sup>1</sup> Domestic investment declined under the pressure of profits squeeze, collapse of the business confidence and more importantly, with the drying up of foreign capital inflow. Australia's terms of trade deteriorated by about 38 percent between 1929 and 1932. The loss of export revenue immediately created balance of payments deficits, depressed national income levels and generated unmanageable budget deficits.<sup>2</sup>

These developments led to a debate in Australia in the early 1930s over the appropriate goals for economic policy and the mix of policy tools which should be adopted to achieve them. The economic policy making during the depression generally concentrated upon reducing costs, minimising expenditure, curbing imports and stimulating investment. The specific policies adopted in Australia to arrest the depression were the increase in tariff protection, the devaluation, the budgetary policy towards balanced budget, the lowering of interest rates and the reduction of real wages. These instruments reflect a mixture of contractionary and expansionary policies. However, it has been argued that the deliberate policy measures have had relatively little effect towards the speed of recovery (Schedvin, 1970; Valentine, 1988). This paper examines the effectiveness of various economic policies used to deal with the depression by simulating

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<sup>1</sup> According to Trade Union Returns, the unemployment rate in Australia was 28 per cent in 1932 (Schedvin, 1970, p.4).

<sup>2</sup> See Valentine (1987) and Siriwardana (1994) for a detailed analysis of the causes of the depression in Australia.

a computable general equilibrium (CGE) model of the 1930s Australia.<sup>3</sup> The analysis also focuses on the impact of alternative policies which would have provided a different outcome that may have been crucial to the recovery.

The paper is organised as follows. Section II provides an overview of the policy mix and the consequent debate over the economic policy making in Australia during the depression. This is required to put the ensuing analysis in a proper perspective. Section III briefly outlines the CGE model used in the paper. Section IV describes the calibration procedure of the model and Section V sets out the simulations. The simulation results are analysed in Section VI. Finally, Section VII summarises the main conclusions.

## **II The Policy Debate**

It is generally believed that economic analysis played a minor role in formulating policies during the early 1930s in Australia. The newly elected Scullin government was confronted with a diversity of opinions emerged from politicians, economists and various interest groups. Though the initial response of the government to the depression was expansionary, the eventual policy package turned out to be basically contractionary. The debt repayment, the cutting of costs to improve the competitiveness, the balancing of the budget and the restoration of Australia's financial reputation were considered to be the prime goals of economic policies. These objectives eventually led to a wide range of proposals to promote economic recovery (Spenceley, 1990).

The growing budget deficits of Commonwealth and State governments was a reflection of the financial crisis fuelled by the deflationary effects of the depression. It created a serious political controversy leading to a clash within the members of the Labour Party and between the banking system and the Labour government. The government had two alternatives in relation to the budget, i.e. either to maintain the deficit at the existing level or to adopt the balance budget strategy. The latter was in fact the view of the Commonwealth Bank. Sir Otto Niemeyer, a representative from the Bank of England, visited Australia in 1930 at the request of the Commonwealth Bank. He formally expressed the view that the only solution to the problems facing Australia was to reduce the expenditure. This advice however was not popular as it tended to place the burden on the working class.

The government formed a basic strategy at the Premiers' Conference of February 1931 to reach a compromise. The debate over the policy prescriptions was advanced by the two

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<sup>3</sup> See Siriwardana (1994) for details of the CGE model used in this paper.

leading economists at the time, namely L.F. Giblin and D.B. Copland, who supported a middle path between deflationists and inflationists (Dyster and Meredith, 1990, p.136). Their influential contributions formed the basis of the Premiers' Plan of June 1931. Beside the primary goal of reducing the budget deficit, the plan comprised other ambitious objectives. There were three basic elements in the plan, namely, a 20 per cent reduction in government current expenditure, increase in Commonwealth income and sales tax, and the reduction of public and private interest rates by 22.5 per cent. It was intended simultaneously to sustain growth and reduce the potential post-depression inflation. It was also realised within the plan that unless Australia reduced its cost structure into line with its trading partners, competitiveness would deteriorate and export growth, the force behind the expansion, would slow.

Alternatives to the fundamental elements of the Premiers' Plan were proposed by the Federal Treasurer E.G. Theodore and the Labour Premier of New South Wales, J.T. Lang. Theodore's proposal involved basically expansionist policies and gave considerable attention to the welfare of the unemployed. He suggested maintaining the budget deficit at the 1930/31 level, providing additional expenditure for unemployment relief programs and subsidising adversely affected wheat farmers. It was the basic rationale of the Theodore's plan that the monetary stimulation would increase economic activity thus providing employment opportunities for the unemployed. The economic growth induced by this process was intended to bring additional revenue, eventually leading towards a balanced budget. Theodore's approach was indeed expansionary, and was attractive on equity grounds.

Similar to Theodore, Lang's proposal shared the view that the depression was basically a period of an underconsumption so that the further cut in expenditure should not be entertained. He explored primarily three avenues to promote economic recovery. The reduction of interest on all government borrowing to 3 per cent, moving away from the Gold Standard of currency and refusing to pay the interest to British bondholders. Critics argued that some of the elements in Lang's proposal were unrealistic and were not feasible. Lack of definite budget strategy was a clear deficiency in his plan. Though the lack of demand was recognised, Lang did not advocate any definite program to improve the effective demand of the economy.

The participants of the debate agreed that the pre-depression policy mix had become untenable. The focus on short-run goals in fiscal policy ignored the longer-term consequences for capital formation. The continuing budget deficit absorbed an increasing share of private saving and forced Australia to borrow abroad. The net effect of the Premiers' Plan was to come to agreement on a new policy mix. The government and its

critics were of the opinion that a concern for saving and capital formation must play a wider role in the formation of fiscal and monetary policy.

Copland (1934) argued that the deliberate economic policies of the government, partly originated from the Premiers' Plan, played a vital role in the process of recovery. It is suggested, however, that the Australian recovery from the depression was largely due to the market driven forces of the early 1930s rather than due to the government's strategic plan (Schedvin, 1970). The deterioration of competitiveness, the considerable trade imbalance and the reduction of profit margins that drew firms out of industries forced ultimately the devaluation of the Australian currency in 1931, the basic wage reduction of 1930 and the continuing support of tariff protection to manufacturing. The elements of the Premiers' Plan were also interpreted as reactions to external market pressure placed upon the government.

Whether the Australian recovery was led by a recovery of exports or the development of import-competing manufacturing industry is an unresolved issue today. Schedvin (1970) has argued that the manufacturing sector played the key role in the post-depression growth. The argument is based on the belief that a substantial import substitution occurred as a result of the protective benefits of high tariffs and the inflationary impact of the currency devaluation. The reduction in costs largely stemmed from wage cuts acted as a further stimulation to manufacturing and enhanced competitiveness. Domestic manufacturers filled the substantial gap in the markets which resulted from the dramatic fall in imports.

Recent observations on the efficacy of manufacturing in the process of recovery have cast considerable doubts on the manufacturing-led recovery. Thomas (1988) questions the significance of import replacement as a cause of the manufacturing recovery and its employment-creating effects. It is also argued that the expansion of agricultural exports during the depression and the initial stage of the recovery has been a significant factor in support of the view that Australia experienced an export-led recovery in the 1930s (Davidson, 1988).

### **III Overview of the Model**

The CGE model used in this paper belongs to the tradition of multisectoral models pioneered by Johansen (1974). The specification of the model follows closely the ORANI model of the Australian economy developed by Dixon *et al.* (1982). There are five categories of economic agents in the model: domestic producers of current goods, domestic producers of capital goods, households, government and foreigners who import

and consume Australian goods. The model consists of nine sectors: agriculture, pastoral, other rural, mining, manufacturing, construction, transport, trade services and other services. The output of the latter four sectors are nontraded. The producers of current goods use two types of primary factors, capital and labour, and intermediate inputs in their production process. On the other hand, the producers of capital goods require intermediate inputs as direct inputs and use of labour and capital indirectly. The major behavioural postulates that governing the producer and consumer behaviour are cost minimisation and utility maximisation.<sup>4</sup> The equations of the model in the linear percentage change form are listed in Table A1 in the Appendix. The variables are defined in Table A2 and coefficients are described in Table A3. As can be seen from Table A1, the equations of the model are grouped under six headings.<sup>5</sup>

### *Final Demands*

Final demands are divided into four categories: household consumption, investment, exports and government demand. Consumers are assumed to maximise a nested utility function subject to an aggregate budget constraint. At the first level, we use the Leontief function implying no substitution between effective units of commodities. The effective units of commodities are the Cobb-Douglas aggregation of imported and domestic goods belonging to the same commodity group. Thus at this second level, consumers have the substitution possibilities between domestic and imported commodities of the same type according to a Cobb-Douglas function. The resultant set of household demand functions for domestic and imported commodities are given by equation (1.1) in Table A1.

It is assumed that each industry uses sector specific capital goods. These capital units for use in a given sector are created in a perfectly competitive environment under constant returns to scale two-tiered production technology. At the first level, industry  $j$  chooses effective intermediate inputs to minimise the total cost of capital creation subject to a Leontief production function. At the second level, industry  $j$  chooses its inputs for capital creation from domestic and imported sources to minimise costs subject to a Cobb-Douglas production function. The input demand functions derived from this specification are given by equation (1.2) in Table A1.

In relation to exports, each commodity faces less than perfectly elastic demand curve. The relevant export demand functions of the model are represented by equation (1.3). The elasticity of export demand facing producers vary across industries. Government demand

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<sup>4</sup> See Dixon *et al.* (1982, ch.3) for details.

<sup>5</sup> More details regarding the theory and the derivation of the equation system of the model are available in Siriwardana (1994).

for domestic and imported commodities is explicitly recognised though the model contains no particular theory to describe the government behaviour. These demand functions appear as equation (1.4).

### ***Industry Demands for Inputs***

Producers of current goods are assumed to minimise the production costs subject to two-level nested production function. The first level contains the constant returns to scale Leontief production technology. This technology implies no substitution between different types of intermediate inputs and between intermediate inputs and primary factors. At the second level, producers substitute between domestically produced intermediate inputs and imports, and between different types of primary factors according to a Cobb-Douglas technology. The cost minimisation subject to this production technology gives demand functions for intermediate inputs and for primary factors (see equations (1.5), (1.6) and (1.7) in Table A1).

### ***Zero Pure Profits***

The assumption of constant returns to scale in production and competitive pricing behaviour in each of the economic activity ensure that zero pure profits are earned in equilibrium. Equations (1.8), (1.9), (1.10) and (1.11) in Table A1 impose these zero profit conditions for production, capital creation, exporting and importing respectively.

### ***Market clearing***

Equations (1.12), (1.13), and (1.14) indicate that supply equals demand for domestically produced commodities, labour and fixed capital respectively. However, it is important to notice that the latter two equations do not necessarily imply full employment conditions for factors.

### ***Miscellaneous Equations***

Most of the equations listed under this heading are self-explanatory. Equation (1.15) represents the consumption function of the model. The characteristics of a Keynesian type consumption function are embodied in this equation. Equation (1.16) gives real aggregate consumption and equation (1.17) defines the aggregate real investment. The capital accumulation of the economy is described by equation (1.18). It implies that the variables which influence the capital stock at the end of one period are the current capital stock, the depreciation rate and the current level of investment. The consumer price index

of the model is given by equation (1.19). Import volumes in domestic currency terms are described by equation (1.20). Equations (1.21) and (1.22) give total import bill and export revenue in terms of foreign currency respectively. The balance of trade for the Australian economy is defined by equation (1.23). Equation (1.24) provides a flexible way of handling wages by indexing money wages to the consumer price index. Equations (1.25) and (1.26) define the aggregate tariff revenue and export subsidies respectively. Equation (1.27) is included in the model to project the changes in real gross domestic product (GDP). Finally, equation (1.28) defines the ratio of real aggregate consumption to real aggregate investment.

#### **IV Calibration of the Model**

The calibration process of the model involves the assignment of numerical values for a large number of parameters. Our approach to parameterize the model is typical of that generally adopted in applied general equilibrium analysis. The data required include various shares or weights (e.g., sales and cost shares) and estimates of the elasticity parameters such as household demand elasticities, capital-labour substitution elasticities and export demand elasticities. In choosing the values for parameters, a reference is made to the existing econometric studies so as to be consistent with a given historical benchmark data set. The use of Leontief and Cobb-Douglas functional forms in the present model allows almost all the parameters to be derived from input-output tables.<sup>6</sup> For the present model a benchmark database was compiled for the Australian economy for the year 1934/35.<sup>7</sup>

The export demand elasticities which are required to implement the export demand functions of the model are not available for Australia for the time period under consideration. Thus, plausible values for export demand elasticities were determined by reference to an econometric study for the United Kingdom and the United States (1921-1938) by Zelder (1958). The values for export demand elasticities chosen for the simulations of the model are 2.0 for agriculture, pastoral and mining and 20.0 for other sectors.

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<sup>6</sup> Detailed technical discussions concerning the computational procedure of these parameters and coefficients from input-output tables can be found in Dixon *et al.* (1982, ch.2) and Higgs (1987, pp.41-56).

<sup>7</sup> M.F. Rola provided an excellent research assistance in compiling this input-output data base. Full details of the data tables are available from the author upon request. See also Siriwardana (1987) for details on the construction of historical input-output tables.

## V Economic Environment of the Simulations

The model described in the previous sections could be used to explore the implications of various policies implemented and proposed during the depression. We have chosen the following four policies to analyse using the model: (1) the increase in tariffs, (2) the reduction in government expenditure, (3) the devaluation of the Australian currency and (4) the reduction in real wages. Experiments (1) to (3) reflect the major policy changes that were supposed to have contributed to the recovery. To evaluate the impact of these policies we impose exogenously on the model a 30 per cent increase in all tariffs, a 20 per cent reduction in government current expenditure and a 30 per cent devaluation of the Australian pound. Experiment (4) dealing with the reduction of real wages is concerned with the decision by the Arbitration Court in January 1931 to cut real wages by 10 per cent.<sup>8</sup>

Some of the features of the macroeconomy are not projected endogenously by the model. Therefore, having decided the exogenous shocks to be imposed, we should specify the macroeconomic environment under which the proposed simulations would be carried out. The CGE model as described earlier contains 573 variables and 480 equations (see Tables A1 and A2). Thus, the number of variables exceeds the number equations by 93. To obtain a solution for the model, this number of variables must be declared exogenous. Table A4 in the Appendix contains the chosen list of exogenous variables for the above experiments. The selection of exogenous variables and assignment of values for them and for the wage indexation parameter of the model create the economic environment for the simulations.<sup>9</sup>

The model is simulated to examine the impact of various policies under a number of alternative sets of assumptions concerning the macroeconomic environment. The particular assumptions underlying the simulations are as follows: (1) industry-specific fixed capital in use are exogenous; (2) the real wages are constant; (3) real private consumption varies with real disposable income; (4) the shares of real private consumption, real government consumption and real investment in total real domestic absorption remain unchanged; and (5) the nominal exchange rate is exogenous. Assumption (1) implies that the analysis is concerned with the short-run effects of the

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<sup>8</sup> It is apparent that many employers could not implement the wage cut as proposed due to the labour unrest. Therefore it is doubtful whether the wage policy has produced its full impact towards the recovery.

<sup>9</sup> The computation of the solution for the present model was performed by using the (4.2.02) version of GEMPACK. This allows the use of multi-step solution approach which minimizes the Johansen linearization errors of the model. See Codsì and Pearson (1988) for details on GEMPACK.

policies considered. Assumption (2) indicates a slack labour market for the Australian economy and this is appropriate for the depression period. Assumptions (3) and (4) imply that the real domestic absorption is endogenously determined in all simulations. Finally, assumption (5) sets the numeraire of the model. Thus, all domestic price changes are measured relative to the world prices.

## **VI Simulation Results**

Tables 1 and 2 report the projected effects of the four policy simulations on a number of macroeconomic and industry variables. The results are typically presented in percentage change form so that they can be interpreted as elasticities. Furthermore, the simultaneous impact of the four policies on a given endogenous variable can be obtained by summing across the four columns in Tables 1 and 2. The findings of course depend on the model assumptions and the economic environment under which the policies were simulated. We discuss below the macroeconomic and sectoral impact of each of the four policies.

### **(i) The Effects of the Increase in Tariffs**

The tariff increase was one of the important policies adopted in the early 1930s to aid the recovery in Australia.<sup>10</sup> The projections reported in column I of Table 1 indicate the likely impact of the across-the-board increase in protection by 30 per cent on the main macroeconomic variables. Overall, these results tend to suggest that the tariff increases were relatively unimportant at macro level in the recovery process. The negligible improvement in aggregate employment (a 0.07 per cent) of the economy reflects the fact that the protection has had a little impact on recovering the lost ground in employment. It appears that the increased employment in the import-competitive manufacturing sector is largely offset by the decline of employment in export sectors of the economy. The tariff increase improves the competitive position against imports of the import-competitive industries, resulting employment and output gains in those industries. However, this induces a rise in the economy's domestic cost structure particularly with the full wage indexation, thus worsening the competitiveness of exporting sectors. These sectors heavily rely on world markets and are unable to pass on the cost increases in the form of higher selling prices. As a result, the primary goods producing exporting sectors experience a decline in outputs and employment.

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<sup>10</sup> Australia is one of the countries which has very long history of protective tariff policies. The origins of protection as an integral part of the industrial policy goes as far back as 1850s with the aftermath of the gold rush during the colonial period. For details see Siriwardana (1991).

**Table 1** Projected Macroeconomic Effects of Various Policies<sup>(a)</sup>

<b>Variable</b>	<b>30% increase in tariffs</b>	<b>20% cut in government expenditure</b>	<b>30% devaluation</b>	<b>10% reduction in real wages</b>
	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>
Real GDP	0.04	-1.20	5.09	8.94
Real Income	1.33	-1.56	4.55	8.22
Terms of trade	8.26	-1.78	-2.10	-5.06
Real domestic absorption	2.79	-2.47	4.43	7.58
Aggregate exports <sup>(b)</sup>	-8.26	1.78	2.31	5.06
Aggregate imports <sup>(b)</sup>	0.83	-5.71	0.09	-2.52
Balance of trade	-1.36	1.01	0.34	1.09
Consumer price index	28.92	-6.22	20.84	-16.97
Aggregate demand for labour <sup>(c)</sup>	0.07	-2.12	9.17	15.76
Money wages	28.92	-6.22	14.64	-26.97
Real wages <sup>(d)</sup>	0.00	0.00	-6.20	-10.00
Nominal exchange rate	0.00	0.00	30.00	0.00
Real exchange rate <sup>(e)</sup>	-28.92	6.22	9.16	16.97

Notes: (a) All projections are in percentage changes except the balance of trade which is expressed as a percentage of base period GDP.

(b) These are in foreign currency terms.

(c) This projection shows the effective demand for labour.

(d) Calculated by deflating movements in money wages by movements in the model's consumer price index.

(e) Calculated by subtracting the percentage change in the model's consumer price index from the percentage change in the nominal exchange rate.

It is interesting to note that the 30 per cent across-the-board increase in tariffs raises the real income by 1.3 per cent and the real domestic absorption by 2.7 per cent. The improvement in domestic consumption induces demand for imports by 0.8 per cent despite the increased protection. This finding leads to some scepticism over the importance of the protectionist policy to the recovery process by switching from imports to domestic production. As Thomas (1988) pointed out, it appears that the growth in domestic demand has served as the main driving force of the manufacturing recovery rather than the process of substitution of domestic production for imports. The results show an 8.2 per cent decline in exports leading to a balance of trade deficit which is equivalent to a 1.3 per cent decrease in GDP in the base period.

The sectoral results which appear in column I of Table 2 help further to explain the macroeconomic picture of the economy under increased protection levels. They reveal that the three export sectors (i.e., agriculture, pastoral and mining) are the losers from the policy of protection. The output and employment contraction in these three sectors is explained by the cost-price squeeze imposed on primary producers by the inflationary effects of tariffs. It is clear that the manufacturing sector together with the rest of the economy benefited from increased protection at the expense of the exporting sectors.

#### **(ii) The Effects of the Reduced Government Expenditure**

The reduction of government current expenditure was an important aspect of the Premier's plan. One of the objectives behind this policy was to create savings within the government in order to make repayments of Australia's overseas debts. The deflationary impact of the contraction was supposed to improve the competitiveness which would boost exports, helping balance of payments. Column II of Table 1 shows the macroeconomic impact of the slashing government expenditure by 20 per cent. The most striking result is the 2.1 per cent decline in the aggregate demand for labour in response to this contractionary fiscal policy. Corresponding with this, there is a 1.2 per cent decline in the real GDP. The improvement in the competitiveness stemmed from the deflationary impact has produced an increase in exports by 1.7 per cent. The real domestic absorption declines by 2.4 per cent. This in turn reduces the demand for imports by 5.7 per cent. These movements in exports and imports have created a very moderate surplus (i.e. 1 per cent of the base period GDP) in the balance of trade. Though this is helpful in an attempt to overcome balance of payment difficulties, it appears to have cost considerable amount of employment opportunities in the economy. When weighed against the employment loss, the contractionary fiscal policy does not appear to have been that attractive in the recovery process from the depression.

**Table 2 Projected Sectoral Effects of Various Policies<sup>(a)</sup>**

<b>Sector</b>	<b>30% increase in tariffs</b>	<b>20% cut in government expenditure</b>	<b>30% devaluation</b>	<b>10% reduction in real wages</b>
	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>
<b>Outputs</b>				
Agriculture	-10.31	2.50	9.28	17.94
Pastoral	-6.90	1.47	3.68	7.64
Other rural	1.80	-0.51	4.42	8.01
Mining	-16.82	3.45	10.75	20.88
Manufacturing	2.16	-0.48	5.54	10.09
Construction	2.79	-1.55	4.43	7.58
Transport	0.86	-1.26	4.15	7.16
Trade services	1.90	-1.38	4.52	7.81
Other services	2.49	-4.01	4.53	6.75
<b>Employment</b>				
Agriculture	-13.24	3.21	12.08	23.04
Pastoral	-31.81	6.82	18.16	35.24
Other rural	4.23	-1.21	10.74	18.86
Mining	-22.48	4.62	14.63	27.91
Manufacturing	4.49	-1.01	11.86	20.99
Construction	3.69	-2.05	5.90	10.02
Transport	0.91	-1.34	4.42	7.62
Trade services	3.61	-2.63	8.77	14.86
Other services	3.90	-6.27	7.17	10.55
<b>Export volume</b>				
Agriculture	-53.49	11.15	19.93	40.20
Pastoral	-17.09	3.83	2.02	5.72
Mining	-48.00	10.42	19.59	39.33

Note: (a) All projections are in percentage changes.

The sectoral output and employment responses to the 20 per cent cut in government expenditure is reported in column II of Table 2. The three exporting sectors gain output and employment at the expense of the rest of the economy. The prime force behind this improvement is the expansion in export sales which have emerged due to the enhanced competitiveness, arising from the reduction in cost of production in these sectors. The manufacturing sector is very sensitive to the domestic demand response so that its output contracts as a consequence of the decline in domestic economic activity. Because the government buys relatively more of the services produced by the nontrading sectors, their output and employment losses are higher than that of the manufacturing sector. Overall, these sectoral results indicate that the reduction in the government expenditure, by and large, has resulted in a reallocation of output and employment from the nontraded to traded sectors, with the end result being more unemployment and less real GDP.

### **(iii) The Effects of the Devaluation**

The role of devaluation is to generate an increase in the domestic prices of the traded goods relative to the nontraded goods, thereby encouraging more resources to be employed in exportable goods producing sectors. The macroeconomic impact of the 30 per cent devaluation in the Australian pound is shown in column III of Table 1. The depreciation of the currency leads to a 20.8 per cent increase in the consumer prices. This implies a 9 per cent depreciation in the real exchange rate. The key to this improvement in the competitiveness in the traded goods sector is the 6.2 per cent contraction in real wages following the devaluation.<sup>11</sup> The exports expand at 2.3 per cent in response to the gained competitiveness. Since the real domestic absorption increases by 4.4 per cent, the imports show very negligible increase (0.09 per cent). This suggests that the Australian economy has been severely import dependent. This is clearly reflected in the very moderate improvement in the balance of trade following the devaluation. The expansion in real domestic absorption coupled with the improved balance of trade has produced 4.5 per cent increase in real GDP. This real expansion of the economy brings about a 9 per cent increase in the aggregate demand for labour in the economy. This implies that the devaluation would have had an immediate impact on the unemployed labour force during the depression.

At the sectoral level, the improvement in the trade balance has ensured the growth in the traded-goods producing sectors (both exporting and import competing) while the increase in domestic demand has strengthened the performance of the nontrading sectors

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<sup>11</sup> Note that this simulation was carried out with a 72.2 per cent wage indexation. This level of wage indexation was selected as it is the half-way mark with regard to the impact on real variables of the devaluation under zero and full wage indexation.

of the economy. As can be seen from the sectoral output and employment projections, the devaluation has favoured the export sectors as usual. The largest output gains are projected for mining and agriculture followed by manufacturing. However, the devaluation has also provided an even stimulation to the nontrading sectors which have experienced output growth in line with that of the economy as a whole.

#### **(iv) The Effects of the Reduction in Real Wages**

The results indicate that reduction in real wages would have had a very significant impact over the economy. Our findings are somewhat surprising, given the different views concerning the implementation of the 10 per cent real wage cut proposed by the Arbitration Commission in early 1931. The macroeconomic results of the simulation reported in column IV of Table 1 indicate that the wage reduction has been the most attractive policy. An increase in aggregate employment of 15.7 per cent is projected following the 10 per cent cut in real wages. This does imply that the employment recovery during the depression was heavily dependent on the wage flexibility downward. This employment gain in turn produces 8.9 per cent expansion in real GDP. Since there is a deterioration in the terms of trade, the real income increases slightly less than this (i.e. 8.2 per cent). This overall expansion in the economy results in a 7.5 per cent improvement in the real domestic absorption.

It is further evident from the results that the 10 per cent wage cut has generated a 17 per cent reduction in the consumer price index. The implied cost reduction in the domestic economy stemmed from this deflationary impact has improved the competitiveness of exports and import-competing sectors of the economy. This is clearly shown by the 17 per cent depreciation of the real exchange rate. Consequently, aggregate exports increase by 5 per cent and aggregate imports decline by 2.5 per cent, creating a positive trade balance which is equivalent to 1 per cent of real GDP.

The sectoral level projections reported in Table 2 (see column IV) indicate clearly the advantage of the reduced wage costs and the resulting adjustments at industry level. The major beneficiaries of the wage cut are the trading sectors of the economy. Among these, agriculture, mining, pastoral and manufacturing sectors experience very significant output and employment gains. They in turn reflect their improvement in competitiveness. The expansion in the former three sectors are mainly explained by the increased export sales following the reduction in costs stemmed from the wage decline. The manufacturing sector has benefited from the domestic demand expansion. The nontrading sectors of the economy also follow the same trend, reflecting output and employment gains in line with the overall performance of the economy.

### **An Alternative Policy Mix**

The simulation results presented in the previous section indicate the economic impact of various policies adopted during the depression. A glance at these results confirm that real wages and the devaluation have been the key to economic recovery. The diverging results of these policies also imply that there would have been alternative policies or mix of policies that would have produced more successful outcome. In this section we consider four such policy prescriptions. In order to facilitate the comparison, the four simulations are calibrated so that each option results in a 9 per cent increase in aggregate employment. The employment growth of this magnitude was expected to be sufficient to reach the pre-depression level of economic stability. Table 3 contains a summary of the policy mix simulated under this scenario. According to our model, it is apparent that the target of 9 per cent increase in employment could be achieved by any of the following alternatives: (1) a 5.41 per cent real wage cut; or (2) a 29.42 per cent nominal devaluation; or (3) a 84.83 per cent increase in real current government expenditure; or (4) a 6.69 per cent increase in real current government expenditure combined with 4.98 per cent real wage cut. As Table 3 reveals, the latter simulation is intended to achieve two targets; the 9 per cent employment growth while having zero impact on the balance of trade.

Tables 4 and 5 contains the projected impact of this alternative policy mix on macroeconomic and sectoral variables respectively. Column I of Table 4 suggests that the employment recovery through a real wage cut which is substantially less than that proposed by the Arbitration Commission would have been a feasible option. A wage reduction of this magnitude could have improved the competitiveness in the traded goods sector significantly. The sectoral output and employment projections reported in Table 5 show that the real wage cut would have favoured the traded good sector.

Our projections also point out that the success of the nominal devaluation in achieving the employment target was conditioned by a reduction in real wages. Though the inflationary impact of the devaluation was an unavoidable outcome, such policy would have provided a useful solution to the balance of payments problem during the depression. The substantial growth in traded sectors of the economy supports this observation.

**Table 3      The Components of the Alternative Policy Mix<sup>(a)</sup>**

Variable	Simulation			
	Wage cut	Devaluation	Government demand expansion	Government demand expansion with a wage cut
<b>Target:</b>				
1. Aggregate employment	9.00	9.00	9.00	9.00
2. Balance of trade	-	-	-	0.00
<b>Policy:</b>				
1. Real wages	-5.41	0.00	0.00	-4.98
2. Real current government expenditure	0.00	0.00	84.83	6.69
3. Nominal devaluation	0.00	29.42	0.00	0.00

Note: (a) Numbers in the table represent the magnitude of the exogenous shocks in percentage changes.

The projection in column III of Table 4 show that a massive increase in the government real expenditure would have been necessary to achieve a useful answer to the unemployment problem during the depression. This outcome casts doubt on the efficacy of the proposal to increase government expenditure as an anti-depression policy. It appears that the policy of government demand expansion alone would have aggravated the already unmanageable budget deficit, resulting in severe inflationary impact over the economy. The latter feature would have been detrimental to the competitiveness of the exportable goods producing sectors, leading to severe balance of payments difficulties. As revealed by the sectoral projections in Table 5, one unhealthy feature of the government demand expansion of this magnitude is the unbalanced sectoral growth, having disproportionate employment growth being created in the public sector (see column III of Table 5).

**Table 4** Projected Macroeconomic Effects of an Alternative Policy Mix<sup>(a)</sup>

Variable	5.41% cut in real wages (I)	29.42% devaluation (II)	84.83% increase in government expenditure (III)	6.68% increase in government expenditure plus 4.98% cut in real wages (IV)
Real GDP	5.11	5.51	5.11	5.10
Real Income	4.59	4.95	6.62	4.75
Terms of trade	-2.34	-2.53	7.58	-1.56
Real domestic absorption	4.45	4.80	10.51	4.92
Aggregate exports <sup>(b)</sup>	2.34	2.52	-7.58	1.55
Aggregate imports <sup>(b)</sup>	-0.09	-0.10	24.24	1.83
Balance of trade	0.37	0.39	-4.29	0.00
Consumer price index	-7.79	21.00	26.40	-5.10
Aggregate demand for labour <sup>(c)</sup>	9.00	9.00	9.00	9.00
Money wages	-13.20	15.16	26.40	-10.08
Real wages <sup>(d)</sup>	-5.41	-5.84	0.00	-4.98
Nominal exchange rate	0.00	29.42	0.00	0.00
Real exchange rate <sup>(e)</sup>	7.79	8.42	-26.40	5.10

- Notes: (a) All projections are in percentage changes except the balance of trade which is expressed as a percentage of base period GDP.  
(b) These are in foreign currency terms.  
(c) This projection shows the effective demand for labour.  
(d) Calculated by deflating movements in money wages by movements in the model's consumer price index.  
(e) Calculated by subtracting the percentage change in the model's consumer price index from the percentage change in the nominal exchange rate.

The results in column IV of Table 4 imply that an increase in real government expenditure combined with a reduction in real wages, while having zero impact on the balance of trade, would have been an attractive policy package. It seemed to have had enough strength to turn around the effects of the isolated public demand expansion policy. The other attractive feature of this package is that it involves with a smaller wage cut and a smaller increase in government expenditure. The sectoral results presented in Table 5 suggest that such government demand expansion coupled with a wage moderation would have generated balanced stimulation of the economy, creating more evenly distributed employment growth between public and private sectors.

## **VII Conclusion**

The simulation results presented in this paper proved the fact that the CGE model is a useful tool for the analysis of the impact of various policies during the depression. While this approach is widely used at present for economic policy analysis, it is still novel to studies in historical context. Of the four policies examined in this paper, the nominal devaluation and the real wage reduction appeared to have contributed to the relatively speedy recovery from the 1930s depression in Australia. The wage flexibility downward would have been a crucial factor to success of the recovery process. In contrast to the widely held conventional view, the increased tariff protection in the early 1930s is likely to have contributed very little towards the employment recovery. It is also apparent from the present analysis that the contractionary fiscal policy such as the reduction in government expenditure would have cost substantial job opportunities though it would have had some favourable impact on the balance of payments.

Our analysis of the alternative policy-mix brings into light many implications for policies proposed in different plans canvassed in this period. It is clear that the implementation of the Theodore's Plan which was fundamentally based on the expansion of the public expenditure would have created massive budgetary problems with severe adverse impact on the balance of payments. It is likely that the extra expenditure resulting from such expansion in the government sector would be absorbed partly by imports and partly by nontradables. This familiar Keynesian type employment creation program would have undoubtedly deteriorated the balance of trade and would have retarded the growth of the primary goods producing exporting sectors which were fundamental to the Australian recovery.

**Table 5** Projected Sectoral Effects of an Alternative Policy Mix<sup>(a)</sup>

<b>Sector</b>	<b>5.41% cut in real wages</b>	<b>29.42% devaluation</b>	<b>84.83% increase in government expenditure</b>	<b>6.68% increase in government expenditure plus 4.98% cut in real wages</b>
	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>
<b>Outputs</b>				
Agriculture	9.15	9.87	-10.61	7.59
Pastoral	3.80	4.10	-6.27	3.01
Other rural	4.45	4.80	2.19	4.26
Mining	10.53	11.36	-14.67	8.54
Manufacturing	5.57	6.01	2.06	5.28
Construction	4.45	4.80	6.60	4.61
Transport	4.15	4.48	5.35	4.24
Trade services	4.53	4.89	5.88	4.63
Other services	4.55	4.91	17.03	5.53
<b>Employment</b>				
Agriculture	11.75	12.68	-13.62	9.75
Pastoral	17.55	18.94	-28.92	13.87
Other rural	10.47	11.30	5.15	10.04
Mining	14.07	15.19	-19.61	11.41
Manufacturing	11.58	12.50	4.29	11.00
Construction	5.88	6.34	8.72	6.09
Transport	4.42	4.77	5.69	4.52
Trade services	8.63	9.31	11.18	8.88
Other services	7.11	7.67	26.60	8.63
<b>Export volume</b>				
Agriculture	19.27	20.79	-47.32	14.00
Pastoral	2.24	2.42	-16.27	0.78
Mining	18.96	20.46	-44.21	13.97

Note: (a) All projections are in percentage changes.

The paper illustrates that the 10 per cent real wage cut proposed by the Arbitration Commission was more than what was required to achieve the employment goal. Our simulation results imply that little more than half of the proposed reduction (i.e., 5.4 per cent) would have been sufficient to create the employment opportunities for unemployed by reducing inflation and improving the international competitiveness of the economy. Another interesting finding from the alternative policy-mix is the likely combined impact of the government demand expansion with a real wage moderation. This Keynesian-neoclassical policy package would have required only 6.68 per cent increase in government expenditure and 4.98 per cent real wage cut to create the necessary employment growth. Of course this employment creation is under the assumption that the expansion in government expenditure and the real wage cut do not affect the balance of trade. All in all, the present analysis implies that the reduction in real wages combined with a moderate expansion in the domestic demand would have been the best policy prescription for Australia to reach the non-inflationary recovery from the depression in the 1930s.

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Table A1 Equations of the CGE Model in Linear Percentage Change Form

No.	Equation	Subscript Range	No.	Description
<b>Final Demands</b>				
(1.1)	$x_{(is)}^H = \varepsilon_{(is)}c + \sum_{q=1}^9 \sum_{r=1}^2 \eta_{(is)(qr)}p_{(qr)}$	$i = 1, \dots, 9$ $s = 1, 2$	18	Household demands for commodities by source
(1.2)	$x_{(is)j}^I = y_j - (p_{(is)} - \sum_{r=1}^2 \alpha_{(ir)j}^I p_{(ir)})$	$i = 1, \dots, 9$ $s = 1, 2$ $j = 1, 2, \dots, 9$	162	Demand for inputs to capital creation
(1.3)	$p_{(i1)}^* = -\gamma_i x_{(i1)}^E + f_{(i1)}^E$	$i = 1, \dots, 9$	9	Export demands
(1.4)	$x_{(is)}^G = c_R h_{(is)}^G + f_{(is)}^G$	$i = 1, \dots, 9$ $s = 1, 2$	18	Government demands for commodities by source
<b>Demand for Inputs</b>				
(1.5)	$x_{(is)j}^O = x_j - (p_{(is)} - \sum_{r=1}^2 \alpha_{(ir)j}^O p_{(ir)})$	$i = 1, \dots, 9$ $s = 1, 2$ $j = 1, \dots, 9$	162	Demand for intermediate inputs by source
(1.6)	$x_{(10,1)j}^O = x_j - [p_{(10,1)j} - (\alpha_{(10,1)j}^O p_{(10,1)j} + \alpha_{(10,2)j}^O p_{(10,2)j})]$	$j = 1, \dots, 9$	9	Demand for labor
(1.7)	$x_{(10,2)j}^O = x_j - [p_{(10,2)j} - (\alpha_{(10,1)j}^O p_{(10,1)j} + \alpha_{(10,2)j}^O p_{(10,2)j})]$	$j = 1, \dots, 9$	9	Demand for capital
<b>Zero Pure Profits</b>				
(1.8)	$p_{(j1)} = \sum_{i=1}^9 \sum_{s=1}^2 p_{(is)} S_{(is)j}^O + p_{(10,1)} S_{(10,1)j}^O + p_{(10,2)} S_{(10,2)j}^O$	$j = 1, \dots, 9$	9	Zero pure profits in production
(1.9)	$\pi_j = \sum_{i=1}^9 \sum_{s=1}^2 p_{(is)} S_{(is)j}^I$	$j = 1, \dots, 9$	9	Zero pure profits in capital creation
(1.10)	$p_{(i1)}^* + v_i + \phi = p_{(i1)}$	$i = 1, \dots, 9$	9	Zero pure profits in exporting
(1.11)	$p_{(i2)}^* + t_i + \phi = p_{(i2)}$	$i = 1, \dots, 9$	9	Zero pure profits in importing
<b>Market Clearing</b>				
(1.12)	$x_{(i1)} = \sum_{j=1}^9 x_{(i1)j}^O B_{(i1)j}^O + x_{(i1)}^I B_{(i1)}^I + x_{(i1)}^H B_{(i1)}^H + x_{(i1)}^E B_{(i1)}^E + x_{(i1)}^G B_{(i1)}^G$	$i = 1, \dots, 9$	9	Demand equals supply for domestically produced commodities
(1.13)	$l = \sum_{j=1}^9 x_{(10,1)j}^O W_{(10,1)j}^O$		1	Demand for labor equals employment of labor
(1.14)	$x_{(10,2)j}^O = k_j(0)$	$j = 1, \dots, 9$	9	Demand equals employment of capital in each industry

Table A1 (continued) Equations of the CGE Model in Linear Percentage Change Form

No.	Equation	Subscript Range	No.	Description
<b>Miscellaneous Equations)</b>				
(1.15)	$c = f_c + \Phi_1[\sum_{j=1}^9 (p_{(10,1)j} + x_{(10,1)j}^0)N_{(10,1)j}] + \Phi_2[\sum_{j=1}^9 (p_{(10,2)j} + x_{(10,2)j}^0)N_{(10,2)j}] + \Phi_3 t - \Phi_4 v$		1	Consumption function
(1.16)	$c_R = c - \xi^H$		1	Real aggregate consumption
(1.17)	$y_R = \sum_{j=1}^9 W_j^I y_j$		1	Aggregate real investment
(1.18)	$k_j(1) = k_j(0)(1 - G_j) - 100\Delta D_j G_j^* + y_j G_j$	$j = 1, \dots, 9$	9	Capital accumulation
(1.19)	$\xi^H = \sum_{i=1}^9 \sum_{s=1}^2 p_{(is)} W_{(is)}^H$		1	Consumer price index
(1.20)	$x_{(i2)} = \sum_{j=1}^9 x_{(i2)}^O B_{(i2)}^O + x_{(i2)}^I B_{(i2)}^I + x_{(i2)}^H B_{(i2)}^H + x_{(i2)}^G B_{(i2)}^G$	$i = 1, \dots, 9$	9	Import volume
(1.21)	$m = \sum_{i=1}^9 (p_{(i2)}^* + x_{(i2)}) M_{(i2)}$		1	Foreign currency value of imports
(1.22)	$e = \sum_{i=1}^9 (p_{(i1)}^* + x_{(i1)}^B) E_{(i1)}$		1	Foreign currency value of exports
(1.23)	$100\Delta B = (Ee - Mm)$		1	Balance of trade
(1.24)	$p_{(10,1)j} = \xi^H h + f_{(10,1)j} + f_{(10,1)}$	$j = 1, \dots, 9$	9	Flexible handling of wages
(1.25)	$t = \sum_{i=1}^9 [\zeta_i^t t_i + p_{(i2)}^* + x_{(i2)}] T_i^t$		1	Aggregate tariff revenue
(1.26)	$v = \sum_{i=1}^9 [\zeta_i^v v_i + p_{(i1)}^* + x_{(i1)}^B] T_i^v$		1	Aggregate export subsidies
(1.27)	$gdp = \sum_{i=1}^9 V_j x_j$		1	Real gross domestic product
(1.28)	$f_R = c_R - y_R$		1	Ratio of real aggregate consumption to real investment
			Total =	480

Table A2 Variables of the Model in Percentage Change Form

Variable	Subscript Range	Number	Description
$x_j$	$j = 1, \dots, 9$	9	Industry outputs
$x_{(is)}^O$	$i = 1, \dots, 9$ $j = 1, \dots, 9; s = 1, 2$	162	Demands for inputs for current production
$x_{(10,1)}^O$	$j = 1, \dots, 9$	9	Industry demand for labor
$x_{(10,2)}^O$	$j = 1, \dots, 9$	9	Industry demand for capital
$x_{(is)}^I$	$i = 1, \dots, 9$ $s = 1, 2; j = 1, 2, \dots, 9$	162	Demands for inputs (domestic and imported) for capital creation
$y_j$	$j = 1, 2, \dots, 9$	9	Sectoral capital formation
$x_{(is)}^H$	$i = 1, \dots, 9$	18	Household demand for domestic and imported goods
$x_{(i1)}^B$	$i = 1, \dots, 9$	9	Export demands
$x_{(is)}^G$	$i = 1, \dots, 9; s = 1, 2$	18	Government demands
$p_{(is)}$	$i = 1, \dots, 9; s = 1, 2, \dots, 9$	18	Price of good $i$ from source $s$
$p_{(10,1)j}$	$j = 1, \dots, 9$	9	Wage rate
$p_{(10,2)j}$	$j = 1, \dots, 9$	9	Rental rate on capital
$p_{(i1)}^*$	$i = 1, \dots, 9$	9	Foreign currency export prices (f.o.b.)
$p_{(i2)}^*$	$i = 1, \dots, 9$	9	Foreign currency import prices (c.i.f.)
$\pi_j$	$j = 1, \dots, 9$	9	Cost of units of capital
$c$		1	Nominal aggregate consumption
$f_{(i1)}^B$	$i = 1, \dots, 9$	9	Export demand shift variable
$f_{(is)}^G$	$i = 1, \dots, 9; s = 1, 2$	18	Government demand shift variable
$\phi$		1	Nominal exchange rate
$v_i$	$i = 1, \dots, 9$	9	One plus the ad valorem export subsidies
$t_i$	$i = 1, \dots, 9$	9	One plus the ad valorem tariffs
$k_j(0)$	$j = 1, \dots, 9$	9	Employment of capital in each industry
$k_j(1)$	$j = 1, \dots, 9$	9	Future capital stocks
$100\Delta D_j$	$j = 1, \dots, 9$	9	Depreciation rate
$c_R$		1	Real aggregate consumption
$y_R$		1	Real aggregate investment
$\xi^H$		1	Consumer price index
$x_{(i2)}$	$i = 1, \dots, 9$	9	Aggregate imports by commodity
$l$		1	Aggregate employment
$\Delta B$		1	Balance of trade
$e$		1	Foreign currency value of exports
$m$		1	Foreign currency value of imports
$f_{(10,1)j}$	$j = 1, \dots, 9$	9	Shift term for sectoral wages
$\hat{f}_{(10,1)}$		1	Aggregate wage shift variable
$gdp$		1	Real gross domestic product
$t$		1	Aggregate tariff revenue
$v$		1	Aggregate export subsidy
$f_c$		1	Shift in the average propensity to consume
$f_R$		1	Ratio of real aggregate consumption to investment
Total =		573	

Table A3 Coefficients of the Model

Coefficient	Description
$\varepsilon_{(is)}$	Expenditure elasticities in household consumption for good $i$ from source $s$ .
$\eta_{(is)(qr)}$	Own and cross price elasticities in household demands.
$\gamma_i$	Reciprocals of the foreign demand elasticities for Australian exports of commodity $i$ .
$\alpha_{(ir)}^O$	Share of commodity $i$ from source $r$ (domestic or imported) in industry $j$ 's purchases of $i$ for current production.
$\alpha_{(ir)}^I$	Share of commodity $i$ from source $r$ (domestic or imported) in sector $j$ 's purchases of $i$ for capital creation.
$\alpha_{(10,1)}^O$	Share of wages in total primary factor costs of industry $j$ .
$\alpha_{(10,2)}^O$	Share of rentals in total primary factor costs of industry $j$ .
$S_{(is)}^O$	Share of industry $j$ 's production costs represented by intermediate inputs good $i$ from source $s$ .
$S_{(10,1)}^O$	Share of industry $j$ 's production costs represented by labor inputs.
$S_{(10,2)}^O$	Share of industry $j$ 's Production costs represented by capital inputs.
$S_{(is)}^I$	Share of industr $j$ 's investment costs represented by input $i$ from source $s$ .
$B_{(i1)}^O$	Share of the total sales of domestic good $i$ absorbed by industry $j$ as intermediate inputs.
$B_{(i1)}^I$	Share of the total sales of domestic good $i$ used in capital creation.
$B_{(i1)}^H$	Share of the total sales of domestic good $i$ used in household consumption.
$B_{(i1)}^E$	Share of the total sales of domestic good $i$ absorbed by exports.
$B_{(i1)}^G$	Share of the total sales of domestic good $i$ absorbed by the government demand.
$W_{(10,1)}^O$	Share of industry $j$ in aggregate employment.
$W_j^I$	Share of total investment accounted for by industry $j$ .
$G_j$	Ratio of gross investment to next period capital stock of sector $j$ .
$G_j^*$	Ratio of the current capital stock to next-period capital stock of sector $j$ .
$W_{(is)}^H$	Expenditure weight of good $i$ from source $s$ in the consumer price index.
$B_{(i2)}^O$	Share of the total sales of imported good $i$ absorbed by industry $j$ as intermediate inputs.
$B_{(i2)}^I$	Share of the total sales of imported good $i$ absorbed by capital creation.
$B_{(i2)}^H$	Share of the total sales of imported good $i$ absorbed by household consumption.
$B_{(i2)}^G$	Share of the total sales of imported good $i$ absorbed by the government demand.
$M_{(i2)}$	Share of total foreign currency costs accounted for by imported good $i$ .
$E_{(i1)}$	Share of total foreign currency export earnings accounted for by exported good $i$ .
$E$	Aggregate foreign currency value of exports.
$M$	Aggregate foreign currency value of imports.
$h$	Wage indexation parameter.
$\Phi_i$	Share in domestic income accounted for by wage income, tariff revenue, export subsidies and capital income.
$N_{(10,1)j}$	Share of industry $j$ in total wage payments,
$N_{(10,2)j}$	Share of industry $j$ in total returns to capital.
$\zeta_i^t$	Ratio of the power of the tariff on good $i$ to the ad valorem rate.
$T_i^t$	Share of total tariff revenue accounted for by tariffs on good $i$ .
$\zeta_i^v$	Ratio of the power of the export subsidy on good $i$ to the ad valorem rate.
$T_i^v$	Share of total export subsidies accounted for by export subsidies on good $i$ .
$V_j$	Share of sector $j$ in GDP.

Table A4 The Selection of Exogenous Variables

Variable	Subscript Range	Number	Description
$P_{(i2)}^*$	$i = 1, \dots, 9$	9	Foreign currency import prices (c.i.f.)
$t_i$	$i = 1, \dots, 9$	9	One plus the ad valorem tariffs
$v_i$	$i = 1, 2, 4$	3	One plus the export subsidy for the major export commodities
$x_{(i1)}^E$	$i = 3, 5, \dots, 9$	6	The export volumes for the minor export commodities
$f_{(i1)}^E$	$i = 1, \dots, 9$	9	Export demand shift variables
$k_j(0)$	$j = 1, \dots, 9$	9	Employment of capital in each industry
$f_{(is)}^G$	$i = 1, \dots, 9$ $s = 1, 2$	18	Shifts in government demands
$100\Delta D_j$	$j = 1, 2, \dots, 9$	9	Depreciation rate
$\pi_j$	$j = 1, 2, \dots, 9$	9	Cost of units of capital
$f_{(10,1)j}$	$j = 1, \dots, 9$	9	Shift term for sectoral wages
$f_{(10,1)}$		1	Aggregate wage shift variable
$\phi$		1	Nominal exchange rate
$f_c$		1	Shift in the average propensity to consume
Total =		93	

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