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THE REAL RATE OF EXCHANGE REVISITED:
REFLECTIONS ON POLICIES ENCOURAGING
INTERNATIONAL COMPETITIVENESS

by

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SUMMARY

There are a wide range of price ratios that fit the definition of the real exchange rate. Any price ratio which compares domestic output prices/costs with comparable foreign prices/costs is a real rate of exchange. Attention in this paper is focussed on price ratios affecting the New Zealand agriculture sector. The key factors in the analysis are foreign demand for output, domestic inflation and exchange rates. The relevance of changes in the exchange rate and macro-policy are discussed particularly with attention to the recent period of floating exchange rates. Future prospects appear to rest on the emergence and adjustment of industries that can benefit from the lower rate of inflation currently being achieved consistent with a floating exchange rate and particular market prospects.

Key words: real rate of exchange, inflation, domestic costs, macro-economic policy.

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This paper was written when the author was C.Alma Baker Research Fellow, in the Centre for Agricultural Policy Studies, Massey University, Palmerston North, New Zealand. The author acknowledges valuable discussions with Ralph Lattimore (Lincoln College) and Massey University colleagues. Usual caveat applies.

MEASURING THE REAL RATE OF EXCHANGE

The measurement of the real rate of exchange is subject to some differences of opinion in the literature. Some authors interpret the rate as a ratio of currency values and base their analyses on deflated nominal exchange rates; other authors claim that the rate is simply a ratio of foreign and domestic prices and that it measures comparative profitability when suitably defined. The literature demonstrates that a large body of international price comparisons exist which can loosely be defined as measures of the real rate of exchange, but few of these strictly conform to the requirements of specific economic models. In particular it is important to focus on the distinction between foreign price (cost) comparisons and domestic price (cost) comparisons.

In a major review of real effective exchange rate indices, Maciejewski (1983) provides a framework for classifying the numerous ratios found in the literature. He distinguishes between indices of export competitiveness and indices of competitiveness for the import substituting sector. He then subdivides each group into sets based on international price ratios, international cost ratios and domestic price ratios. This produces the scheme set out in Table 1. To complete the scheme I have added a fourth set based on domestic profitability ratios. Annex 1 sets out the various ratios in each set identified by Maciejewski.

He points out that most of the indices of relative prices (costs) focus on manufactured goods and are expected to depict relevant developments in international price (cost) competitiveness. However, because their purpose is inter-country comparisons, the ratios provide little information on underlying developments in relative prices (costs) of traded goods to non-traded goods within any single country. Fundamentally, the first group is concerned with movements on the production possibility curve between domestic and foreign competitors in common markets, while the latter is concerned with competition for resources between trading and protected sectors of the same economy. The economics of the latter case have recently been analysed by Snape (1988).

He considers a small economy that cannot affect its terms of trade, that the terms of trade remain unchanged, that any trade barriers or subsidies remain constant in ad valorem terms, and that import competing goods are close substitutes for imports. Under these assumptions, the domestic prices of imports and exports are governed by international prices and the nominal

exchange rate, and exportable and importable goods (including imports and exports) can be aggregated into a composite good, tradables. Then there is a second set of goods, which for reasons of transaction costs or trade barriers are not traded internationally, these are the composite good, non-tradables.

These distinctions are clearly evident in the various studies recently undertaken in New Zealand. These are summarised in Annex 2. Both the Reserve Bank and NZIER have published indices of relative labour costs in manufacturing and of wholesale prices between New Zealand and other trading partners. Both use the consumer price index as a proxy for producer/wholesale prices where data is unavailable or not up to date. The Bank of New Zealand also publishes a competitiveness index based on comparisons of wholesale prices. More recently, BNZ have produced a manufactures competitiveness index based on groups 5-12 of the producers price index (PPI) by quarters from March 1985 to June 1988. Real effective exchange rates are calculated for each group and weighted together with weights based on the value of each production groups exports to their major trading partners. In 1988, the Reserve Bank reviewed its major series on real effective exchange rates and published 5 new weighted indices based on consumer price comparisons.

On the other hand, Lattimore *et al* (1986,1987) and Philpott (1986) have attempted to analyse the domestic resource problem by using sub-groups of the producers price index (outputs) to identify prices of industries in the traded and non-traded goods sectors. This approximate categorisation is based on groups 1-13 for tradables and groups 14-21 for non-tradables. The Reserve Bank has also estimated a real rate of exchange for the agricultural sector in terms of prices of exports and prices of farm inputs, which obviously belongs to the second group of measures comparing domestic resource allocation. Finally, Lattimore *et al* estimate commodity real rates of exchange in terms of export prices (unit values) and prices of domestic non-traded goods (second group); in terms of export prices and the OECD GDP deflator (first group); and in terms of foreign prices for manufactures and the domestic price of non-tradables (second group).

Characteristic of all these estimates is a tendency to utilise second-best data because of the absence of more precise indices appropriate to the economic model being specified. For example, unit labour costs are used as a proxy for all inputs, consumer prices are used as a substitute for producer prices, and GDP prices (OECD) are used as a substitute for manufacturing export prices. Secondly, the New Zealand producers price index does not clearly distinguish between groups of industries which are fully

protected or fully open to world trade, and hence tends to mix tradable output prices with those of non-tradables (Liquid milk is the classic example of a non-tradable industry sitting in the midst of the tradables). As is clear from Maciejewski's comments, all the general price indices like CPI WPI and GDP deflators, blur the distinction between traded and non-traded goods.

It is also useful to distinguish between price competitiveness and profit competitiveness. Price ratios are the standard tools of economic analysis but they are only part of the total profit identity. In the New Zealand export sector, product prices are the dominant determinant of farm profit but obviously changes in input prices, product volumes and input volumes can have an influence on producers decisions to expand or contract, and hence the demand for resources. In other industries the relative importance of these factors may be different. The relative importance of the four components of the profit identity can be demonstrated by an analysis of the average sheep farm accounts kept by the New Zealand Meat and Wool Boards' Economic Service (1986). Over the period 1970-86, the variation in the price series was 5 times the variation in the volume series. The coefficients of variation for each set of index numbers are as follows:

| | |
|---------------------------------|-------|
| Weighted prices of outputs | 0.501 |
| Implicit index of output volume | 0.087 |
| Weighted prices of inputs | 0.612 |
| Implicit index of input volumes | 0.090 |

In the longer run, absolute profit will also be determined by shifts in the average scale of operation and by changes in technology. It would therefore be misleading to base longer-term competitiveness industry comparisons on the real rate of exchange alone.

Measures of relative profitability are not generally available in the literature and presumably this reflects rather sizable data collection and standardisation problems. The measures that are available are either input or output price measures and these can only give general indications of trends in the relative competitiveness of whole economies, sectors or particular industries (if data is available). Presumably, individual export/import companies can do their own sums, when considering expansion into new markets and/or new investment. For example, it has recently been indicated (Ferry, 1987) that Fletcher Challenge operated on a criteria of delivered cash cost per tonne of newsprint relative to other suppliers (foreign) in deciding whether to acquire a newsprint mill in N. America. This ratio

appears to be the correct application of the concept of the real rate of exchange, taken to some final measuring point (See Table 1).

In measuring effective real rates of exchange against foreign competitors it is normal to weight the bilateral price comparisons by trade data to obtain suitably adjusted average real rates of exchange. This is discussed in the relevant publications of the Reserve Bank (1985,1988) and NZIER (Kay, 1983). Over a period of time, different country weighting systems can lead to quite different results (Reserve Bank, 1988).

Examination of Annex 2 shows that there is no uniformity in the choice of denominator in the various measures of competitiveness. The main requirement is to express the price ratio in domestic prices. If competitor's prices are in \$US, then the real rate of exchange for an industry is:

$$R = \frac{P^* \text{ \$NZ}}{P \text{ \$US}} = \frac{\text{Foreign price in Domestic Currency}}{\text{Domestic prices}}$$

where P^* = foreign prices
 P = domestic prices

This is the basis of the 1981 Reserve Bank estimates where a rise in the ratio indicates an improvement in competitiveness. If, however, the ratio is approached by the conventional nominal exchange rate expression \$US/\$NZ then the real rate of exchange is set out:

$$R' = \frac{\text{\$US}}{\text{\$NZ}} \frac{P}{P^*} = \frac{\text{Domestic prices}}{\text{Foreign price in domestic currency}}$$

In this connection a rise in the real rate of exchange indicates a fall in competitiveness and vice versa. This is the basis of more recent Reserve Bank (1985,1988) and NZIER and BNZ estimates.

The ratio of prices of tradable goods to non-tradable goods is equivalent to the first definition, but with specific regard for prices in the open and protected sectors, thus:

$$\frac{\text{Foreign prices in domestic currency}}{\text{Domestic prices}} = \frac{\text{Price of tradables}}{\text{Price of non-tradables}}$$

Some authors (eg. Rayner and Lattimore 1987) reverse this latter ratio to conform to Reserve Bank practice. Snape (1986) conducts his discussion in terms of the ratio as presented above. This formulation is also adopted in this paper to preserve its similarity to the parity ratio.

An alternative formulation for the real exchange rate, following Higgs (1988), brings out some of the definitional problems. He defines the percentage change in the real exchange rate, θ_R , as:

$$\theta_R = \theta_{NZ/US} + \mu_{US} - \mu_{NZ}$$

where $\theta_{NZ/US}$ = The percentage change in the nominal exchange rate

μ_{US} = the percentage change in a US index of prices

μ_{NZ} = the percentage change in the comparable NZ index

In this formulation, a 5 per cent depreciation of the nominal exchange rate depreciates the real exchange rate by 5 per cent, and exports are 5 per cent more competitive, other factors held constant. Higgs points out that if wage rates, or consumer prices are substituted in the price variables in the above equation, then domestic economic policy changes will have quite different effects on these two definitions of the real exchange rate.

COMPETITIVENESS IN AGRICULTURE

The remainder of this paper is concerned with domestic competition for resources and the influence of exchange rates, foreign prices and internal costs. The international or foreign competitiveness of New Zealand agriculture was discussed in an earlier paper to this society (Johnson, 1988). In a formal sense, it is most appropriate to measure domestic price levels by the PPI for protected industry groups. Competition for resources takes place between this group and the export/import replacement group. Farming must be seen as simply a sub-set of this general group of export industries which compete for the available resources.

As already noted, the Reserve Bank employed a price ratio of agricultural export prices to farm input prices in its 1981 analysis. This was a domestic resource cost comparison in an otherwise international competitiveness framework. Formally, export prices are industry prices and an index of industry cost prices is needed to match it. This should include a weighted

average of farm input prices, processing prices and transport to wharf prices. The best approximation to these prices remains the PPI set of output prices of protected New Zealand industries selling goods to the export sector. It is not perfect, of course, as the index was not designed with this purpose in mind. Farm input price indices could be regarded as a substitute for this industry set (as the Reserve Bank appears to assume) or it might be more appropriate to refine the numerator to represent export prices at the farm gate - this then brings us to the conventional farmers' terms of exchange as agricultural economists generally understand it.

Indeed, parity ratios have a long history in the United States going back well before the Heady revolution and international trade models. Indices of product prices and input prices became the basis of income compensation for US farmers in the inter-war years and are still enshrined in the US legislation. In Australia and New Zealand, priority has also been given to their estimation and they have taken on a role as national barometers of farmer pressure systems (and widely understood as such) without much thought for their economic under-pinnings!

It is useful to examine the disaggregation of the export sector in New Zealand at four levels:

- (a) we can compare the domestic competitiveness of all exporters/importers by analysing the ratio of tradable prices to non-tradables using the PPI;
- (b) compare the domestic competitiveness of all exporters by analysing the ratio of all export prices to non-tradables;
- (c) compare the domestic competitiveness of pastoralists/processors by analysing the ratio of the all pastoral price index of external trade to non-tradables;
- (d) compare the domestic competitiveness of manufactures exporters by analysing the ratio of the manufacturers price index of external trade to non-tradables.

This selection involves moving from producer prices of outputs in (a) to export prices of outputs in (b) (c) and (d). Industry outputs could be used from the PPI outputs groups as the BNZ has done for manufacturing. In general, there is a fairly close correspondence between PPI output prices and export prices (see Graph 1). Resulting trends in the real rate of exchange for the New Zealand tradable sector and its components since 1970 are shown in Graph 2. A fall in the index represents a decline in competitiveness and vice-versa as with normal parity ratios. In

the case of manufacturers exporters, the same calculation is shown if the OECD GDP price index is used as a proxy for export markets for manufacturers (following Lattimore, 1986).

The results indicate the marked commodity boom in the early 1970's and the exchange rate depreciation boomlet of 1984-85. In the case of the latter, however, OECD GDP prices also peaked in 1984-85. The results also indicate the steady depreciation of the New Zealand currency over the longer period as "world" commodity prices steadily climbed from 1974. There appears to be evidence of improving competitiveness of manufactures vis a' vis pastoral agriculture in the period 1981-86.

The exchange rate effect is more clearly shown in Graph 3. This is the 1981 Reserve Bank ratio for farm exports for the whole period 1961-86. In effect the heavy line shows what the real rate of exchange for pastoral exports would have been if exchange rates were stabilised at their 1961-62 levels. The Reserve Bank trade weighted exchange rate index is used to convert export prices to "foreign prices". In the period since 1960 the steady devaluation of the \$NZ has tended to maintain the real rate of exchange for farm producers (and other exporters) at a higher level than would otherwise have been the case. During revaluation in the early 1970's this trend was reversed. Following the floating of the nominal exchange rate in 1985 and its subsequent appreciation, the competitiveness of export agriculture fell sharply in 1985-86. Manufacturers exports were heavily affected by exchange appreciation in 1985-86 but have since maintained their real exchange rate. More detail of the latter is shown in the BNZ analysis (BNZ, 1988).

The components of the movements in the real exchange rate are the nominal exchange rate, foreign export prices, and domestic input prices. Table 2 shows the decomposition of the pastoral exporters real exchange rate into these 3 components. This approach follows the Higgs formulation.

In 1985, the real rate of exchange for pastoral industry was dominated by the devaluation of July 1984. In 1986, appreciation of the \$NZ by 7.1 per cent on average depressed otherwise static foreign prices, which, combined with high internal inflation, lead to a massive decline in the real rate of exchange by 18.3 per cent. In 1987, the \$NZ depreciated by 5 per cent, but high inflation still brought down the real rate of exchange by 4.1%. In 1988 the \$NZ appreciated again, domestic product prices were static in spite of world wide commodity recovery, and a further decline in the real exchange rate took place.

DISCUSSION

Of the three components of the real exchange rate, foreign prices are least in the control of the authorities (in the small country case), but nominal exchange rates and internal inflation are largely determined by macro-policy decisions. However, unilateral actions by major trading partners can change nominal exchange rates outside the control of domestic authorities as well. Without further discussion, it is assured that many macro-policies followed in the past (eg. industrialisation and full employment) had the effect of steadily driving upwards internal resource prices.

In the post-war period up to 1979 the exchange rate mechanism was controlled by the Government. There were numerous periodic adjustments of exchange rates from 1948 onwards, including several revaluations in the early 1970's. Presumably government decisions were dominated by the prosperity of the agricultural sector in this period due to its dominance in exporting. Balance of payments arguments come out strongly in such publications as the World Bank Report on New Zealand (1968) and the report of the Agricultural Development Conference (1966). Whether the cost of debt servicing was a factor in decision making is not clear. The author does remember inflation control being advanced for revaluation policies in the 1970's. Increasingly, in the 1960's and 1970's growth in agricultural exports was paramount in maintaining farm incomes and investment. In this sense, exchange rate adjustment was employed to compensate for changes in agriculture's terms of trade and changes in internal costs.

In analysing this period, the Reserve Bank (1981) notes how successive devaluations affected the manufacturing and agricultural export sectors differentially. The devaluations of 1975 and 1976 (occasioned by the sharp falls in commodity prices) lowered relative unit labour costs in manufacturing significantly and gave export manufacturing a welcome boost. This slowly deteriorated in the years up to 1979 when the crawling peg was introduced (a total decline of 41 per cent in the uncompensated index). The extent of the protection given agriculture in 1975 and 1976 is shown in Graph 3 where about one third of the outside decline in the terms of exchange was mitigated by exchange rate adjustments. The period 1976-79 was a stable one for the farm ratios hence government was not moved to compensate the manufacturers (RB, 1981, p.264). Both sectors then received a devaluation boost with the introduction of the crawling peg in 1979.

The crawling peg regime lasted from June 1979 to June 1982. Regular adjustments were made according to the amount by which inflation in New Zealand (as indicated by movements in consumer price and export costs) differed from average overseas inflation rates. As might be expected, this change brought a period of stability to real exchange rates with only unexpected windfalls likely to change basic competitiveness. Such measures, of course, do nothing to control the basic factors which continued to drive up internal costs.

From 1982 to 1984, the country returned to a fixed basket of currencies, culminating in a 20 per cent devaluation in July 1984. Since cost and interest controls were imposed in this period the competitiveness status quo was preserved for another 2 years. It was a period of weak commodity prices, however, and considerable amounts of assistance were passed to primary producers in lieu of the traditional devaluation method (which was eschewed because of the stabilisation policy in place).

Foreign exchange controls were lifted in 1984 (along with those on interest rates and wages), and the exchange rate was floated in March 1985. The period since has therefore been characterised by a de-coupling of the exchange rate from the export sector's competitiveness indices. At the same time, the heavy emphasis on macro-policies, especially monetary policy, has seen a new pressure put on internal cost escalation as a means of maintaining export competitiveness among other things. Due to built-up pressures and the introduction of a value-added tax in 1986, it is still internal inflation which has dominated the real rate of exchange for agriculture since 1984. As Graph 2 indicates, manufacturer exports have performed better than agriculture exports, though both industries are relatively depressed at the present time. The question is whether macro-control of inflation can rescue the export industries from their despondency within a floating exchange rate regime?

The burden of value-added tax (GST) is taken up by the CPI and this index reached a peak increase of 18.9 per cent in the 1987 June year (Table 3). By the June year to 1988 the CPI had dropped to 6.3 per cent, and current indications are for a rate below 5. The PPI for inputs and outputs have not increased to the same extent but had tracked down to below 5 per cent in the June 88 year. Farming input prices (Statistic Department definition) have tracked below the CPI over the last 3 years. But the pressure has been much greater on the tradables sector than the non-tradable sector. Here we see tradable industries (on average) adjusting to external conditions and current macro-policies, while service industries continue to maintain higher output prices, well above the general rate of inflation. In all

probability, labour market reform and removal of monopoly pricing among public utilities is required to bring these internal prices down to desirable levels.

The monetary policies of the Government have been challenged by a number of economists. A study group recommended in December that the Reserve Bank should intervene in the exchange market and depreciate the \$NZ. The Bank should end its emphasis on fighting inflation and instead favour a policy aimed at increasing output and employment. In particular attention should be paid to policies stimulating export-led growth. The Bank should manage the exchange rate to achieve a sustainable rate of growth and a sustainable balance of payments (Dominion, Dec.16,1988). In effect, these recommendations say that the government has got the balance of policies wrong. They involve a return to the status quo where the exchange rate is coupled with tradable goods prices, even if it increases the pressure on domestic costs.

The effects on inflation are at the centre of the Bank's reply. The Bank agreed that the fortunes of the traded goods sector would improve if the policy mix could be altered to include further reductions in the fiscal deficit, further reductions in border protection, and labour market reforms. They state that theory and evidence suggests that the real exchange rate cannot be controlled through monetary policy, and that attempts to do so can be highly destabilising. Monetary policy could be used to bring down the nominal exchange rate, but if wage and price setters knew that a loose monetary policy was to be adopted in an attempt to keep a permanently reduced real exchange rate, the devaluation gains would quickly be reflected in wage and price increases and there would be no real exchange rate benefits (Dominion, Dec. 19, 1988; NBR, Dec 20, 1988).

My own preference would be to have a more managed exchange rate regime alongside further trade reform and industry/civil service restructuring. I feel that the floating exchange rate has increased uncertainty in the export sector and current risk-averse strategies will inhibit any growth and expansion. I believe the level of business risk has now been built up to unacceptable levels for smooth business operation, and that exporters are seriously discouraged from taking on financial risk. I believe these factors have been completely understated in the current policy macro-mix.

In summary, the export sector has been the main beneficiary of the Governments monetary policies though the official rhetoric seldom makes this clear. Sustained control of inflation is still required to keep New Zealand cost increases under those of foreign competitors. The real rates of exchange for exports need

a reasonable period of sustained control to gain profitable international competitiveness. Stimulus through export prices (as is currently happening in the dairy sector) encourages internal inflation. Government policy itself is in a state of flux as the trade-offs between monetary controls, low growth rates, and rising unemployment are assessed. Even with general rates of inflation down to levels below 5 per cent per annum, there is considerable evidence to suggest that resource prices for export industries are still highly protected and are increasing at rates well in excess of the general rate of inflation.

MACIEJEWSKI'S SCHEME

Table 1.

| Prescription | Export Competitiveness | Import Competitiveness |
|--|--|------------------------|
| International Price Ratios | $\frac{\text{own unit export values}}{\text{foreign competitors unit values}}$ | Ibid |
| International Profitability Ratios | $\frac{\text{own unit costs}}{\text{foreign competitors unit costs}}$ | Ibid |
| Domestic Price Ratios | $\frac{\text{own export unit values}}{\text{own domestic prices (WPI etc)}}$ | Ibid |
| <p>?</p> Domestic Profitability Ratios | $\frac{\text{own unit costs}}{\text{domestic competitors unit costs}}$ <p>newsprint?</p> | Ibid |

Table 2

Decomposition of Real Rate of Exchange of
Pastoral Products 1979 - 87

Annual Percentage Change in :

| | Average Foreign Prices | Trade Weighted Exchange Index | Pastoral Export Price Index | Domestic Prices | Real Rate of Exchange |
|------|------------------------------|--|--------------------------------------|--------------------|--------------------------|
| 1979 | + 16.6 | + 0.4 | + 17.2 (-) | + 16.4 (*) | + 0.6 |
| 1980 | + 13.7 | + 7.7 | + 22.5 | + 17.9 | + 2.5 |
| 1981 | + 1.6 | + 6.3 | + 8.1 | + 16.4 | - 7.1 |
| 1982 | + 7.0 | + 6.6 | + 14.0 | + 13.7 | + 0.2 |
| 1983 | - 1.4 | + 5.1 | + 3.6 | + 3.1 | + 0.5 |
| 1984 | - 2.7 | + 7.8 | + 4.8 | + 4.9 | 0 |
| 1985 | - 0.1 | + 20.8 | + 20.8 | + 13.8 | + 6.1 |
| 1986 | - 0.5 | - 7.1 | - 7.6 | + 13.2 | - 18.3 |
| 1987 | + 1.1 | + 5.1 | + 6.3 | + 10.9 | - 4.1 |
| 1988 | + 11.3 | - 8.5 | + 1.8 | + 8.5 | - 6.1 |

Notes:

Average Foreign Prices: Pastoral Export Price Index x Reserve Bank Trade Weighted Exchange Rate Index, June years.

Trade Weighted Exchange Rate Index : \$NZ per unit F.E.,
+ ve = devaluation.

Pastoral Export Price Index : Price Indices of External Trade,
(unsubsidised).

Domestic Prices : Index of Prices of Non-tradeable outputs
(Lattimore 1986), -ve sign indicates summation across table.

Real Rate of Exchange : Ratio of Pastoral Index in \$NZ to Domestic
Prices in \$NZ, +ve = increase in competitiveness.

Table 3

Cost Price Indices 1985 - 86

| | Percentage change June year ending | | |
|---|---------------------------------------|--------|-------|
| | 1986 | 1987 | 1988 |
| GPI | + 10.4 | + 18.9 | + 6.3 |
| PPI (outputs) | + 7.5 | + 9.7 | + 5.1 |
| PPI (inputs) | + 3.9 | + 8.7 | + 4.9 |
| PPI (tradables) | + 3.8 | + 8.7 | + 2.1 |
| PPI (non-tradables) | + 13.2 | + 10.9 | + 8.5 |
| All farming inputs (excluding livestock) | + 6.0 | + 5.6 | + 4.1 |

Source : Abstract of Statistics, Nov/Dec 1988

Annex 1.

IMF List of Relative Price (Cost) Indices Adjusted for Exchange Rate Movements

(a) Relative price (cost) indices of export competitiveness.

1. Relative price indices of international price competitiveness.
 - Index of export unit values of home country to those of competitors.
 - Index of wholesale prices of home country to those of competitors.
2. Cost indices of profitability relative to foreign sales.
 - Index of unit labour costs of home country to those of competitors.
 - Index of normalised unit labour costs of home country to those of competitors.
 - Index of consumer prices of home country to those of competitors.
 - Index of GDP deflator of home country to those of competitors.
3. Alternative indicators : profitability relative to domestic sales or production.
 - Ratio of export unit values to wholesale prices.
 - Ratio of export unit values to consumer prices.
 - Ratio of export prices to unit labour costs.
4. Other possible indicators
 - Ratio of price deflator for exports of goods and services to own GDP deflator.

(b) Relative price (cost) indices of competitiveness for import substituting sector.

1. International price competitiveness.
 - Index of home country's wholesale prices to foreign export unit values.
 - Index of home country's wholesale prices to foreign wholesale prices.
2. Cost indices of profitability relative to foreign purchases.

- Index of home country's unit labour costs to foreign costs.
 - Index of home country's consumer prices to foreign prices.
3. Alternative indicators of profitability relative to foreign purchases or to production.
- Ratio of import unit values to wholesale prices.
 - Ratio of import unit values to consumer prices.
 - Ratio of import unit prices to unit labour costs.
 - Ratio of wholesale prices to unit labour costs
4. Other possible indicators.
- Ratio of price deflator for imports of goods and services to GDP deflator.

Source: Maciejewski, (1983) op cit.

Annex 2.

Expressions of Real Exchange Rate in New Zealand

1. Reserve Bank (1981)

- (a) Index of foreign competitors unit labour costs to domestic costs.
- (b) Index of foreign competitors wholesale prices of outputs to domestic wholesale prices.
- (c) Index of agricultural export prices in foreign markets to domestic farm input prices.

2. NZIER (1983)

- (a) Index of domestic unit labour cost in manufactures to foreign unit labour costs.
- (b) Index of domestic wholesale prices to foreign wholesale prices (updated by CPI).

3. Reserve Bank (1985)

- (a) Index of domestic producer prices of outputs to foreign competitors producer prices.
- (b) Index of domestic consumer prices to foreign consumer prices (proxy for (a)).

- (c) Index of domestic input prices for manufactures to foreign input prices for manufactures.
- (d) Index of domestic unit labour costs for manufacturers to foreign unit labour costs.
- (e) Index of domestic input prices of agriculture to export prices of agriculture.

4. Lattimore (1986) (1987)

- (a) Ratio of domestic prices of non-tradable outputs to domestic prices of tradable outputs (PPI).
- (b) Ratio of domestic prices of non-tradable outputs to unit export values of commodities.
- (c) Ratio of export price indices in \$US to OECD GDP deflator in \$US.
- (d) Ratio of domestic prices of non-tradable outputs to foreign manufactures output (OECD GDP).

5. Philpott (1986)

- (a) Ratio of domestic prices of non-tradable outputs to domestic prices of tradable outputs (PPI).

6. Bank of New Zealand (1987)

- (a) Index of domestic wholesale prices (outputs) to weighted average wholesale prices of major trading partners.

7. Bank of New Zealand (1988)

- (a) Index of groups 5-12 of producers price index (outputs) to foreign producer prices, separably and together weighted by value of each production groups' exports to major trading partners.

8. Reserve Bank (1988)

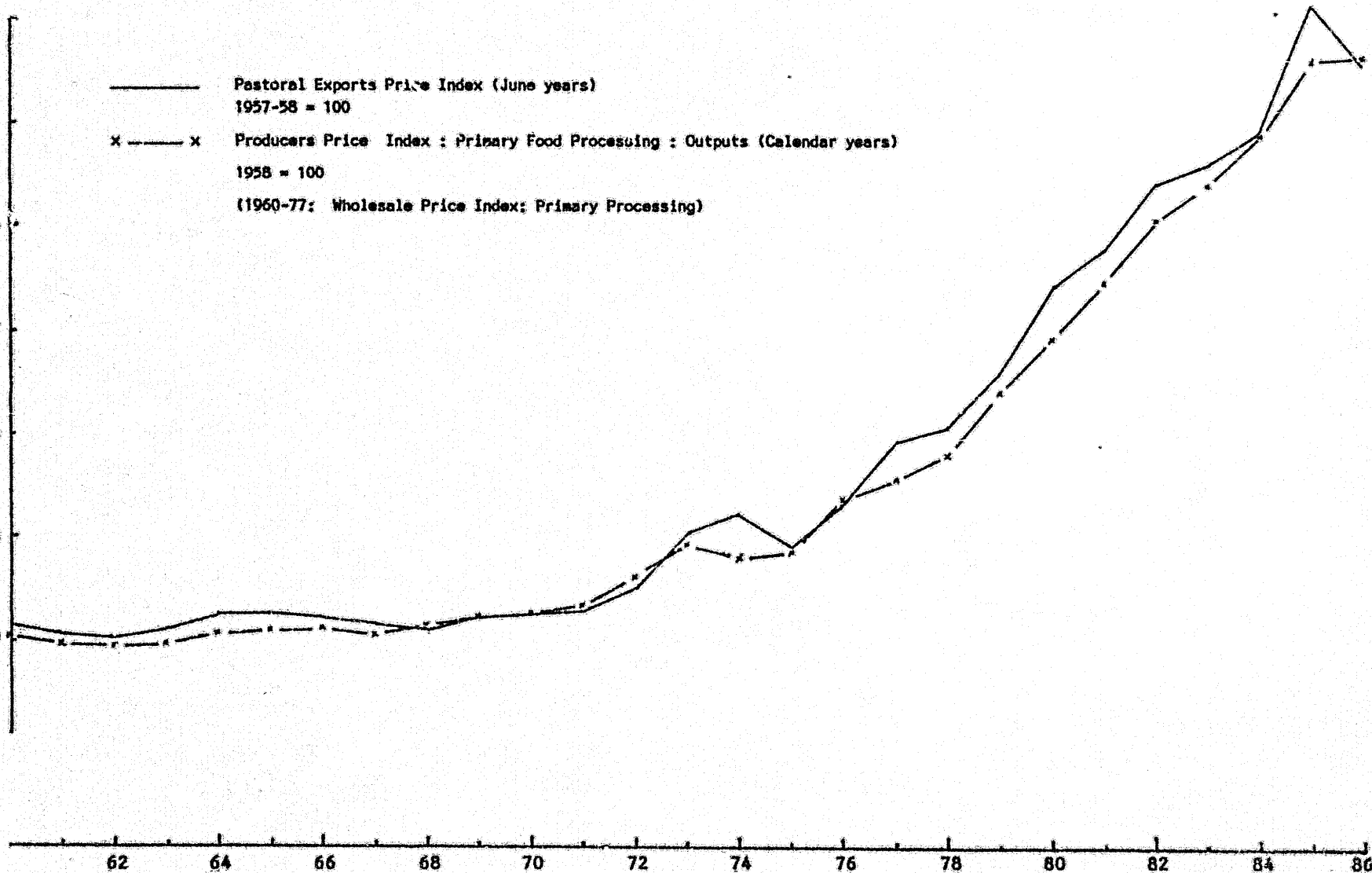
- (a) Index of domestic consumer prices to foreign consumer prices:
- (i) weighted by proportion of NZ exports to countries concerned
(bilateral export index)
 - (ii) weighted by countries' share of world exports in particular commodities
(global export index)
 - (iii) weighted by proportion of imports derived from each country
(bilateral import index)
 - (iv) weighted by average of aggregate bilateral and global measures
(composite index)
 - (v) weighted by total exports and imports to 5 major trading partners.

Sources: See references.

1. WHOLESALE PRIMARY PROCESSING PRICES RECEIVED AND
PASTORAL EXPORT PRICES COMPARED 1960-86

Index
numbers

- Pastoral Exports Price Index (June years)
1957-58 = 100
- x — x Producers Price Index : Primary Food Processing : Outputs (Calendar years)
1958 = 100
(1960-77: Wholesale Price Index; Primary Processing)



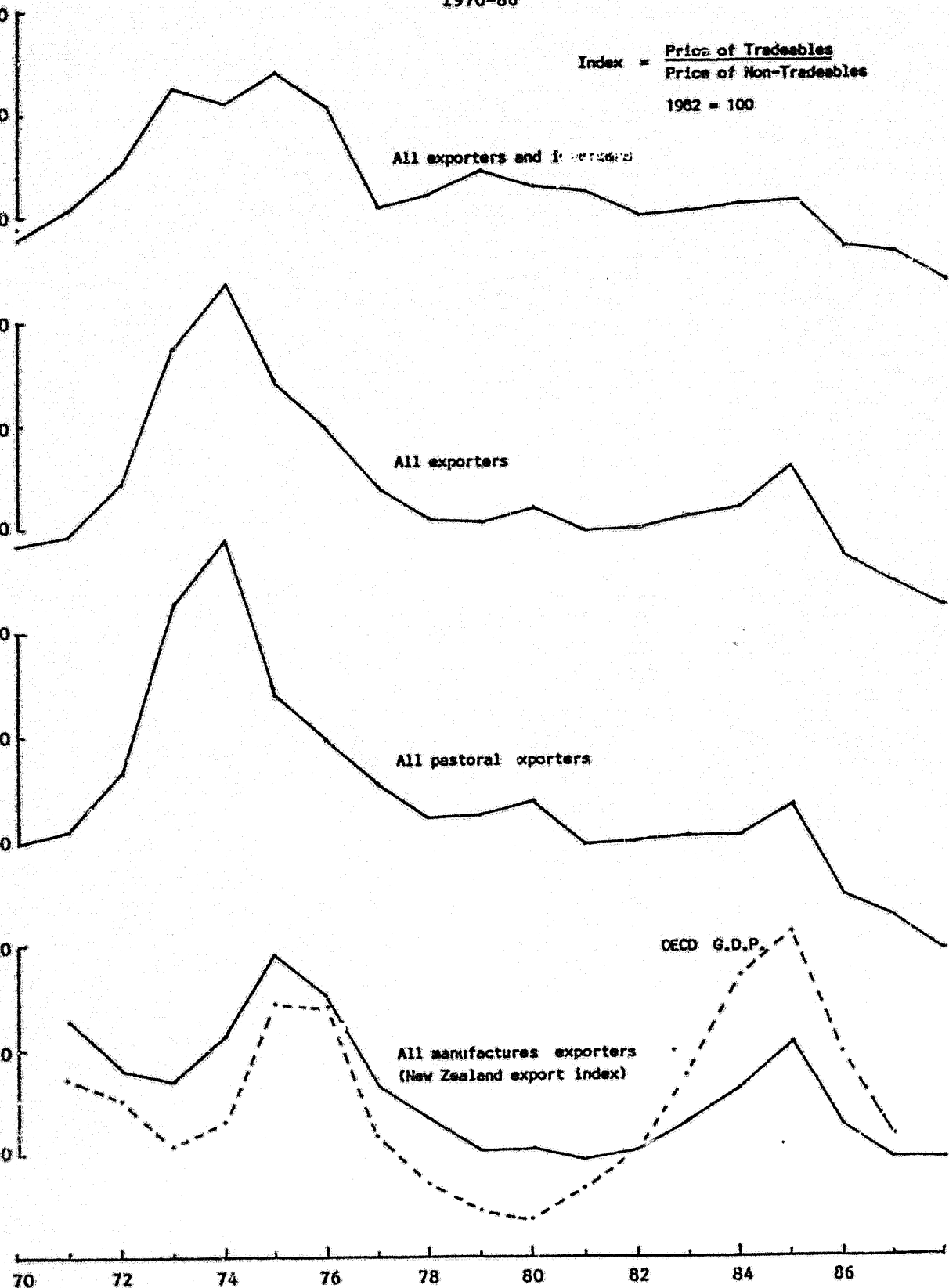
2. REAL RATE OF EXCHANGE FOR EXPORTS

1970-86

Index
Numbers

$$\text{Index} = \frac{\text{Price of Tradeables}}{\text{Price of Non-Tradeables}}$$

1962 = 100



3. TERMS OF EXCHANGE FOR PASTORAL EXPORTS

----- Pastoral Export Price Index 1962-65 = 1000
Farm Prices Paid Index

————— Pastoral Export Price Index X Foreign Exchange Index
Farm Prices Paid Index

(June years)

Index
Number

1200

1000

800

600

400

62

64

66

68

70

72

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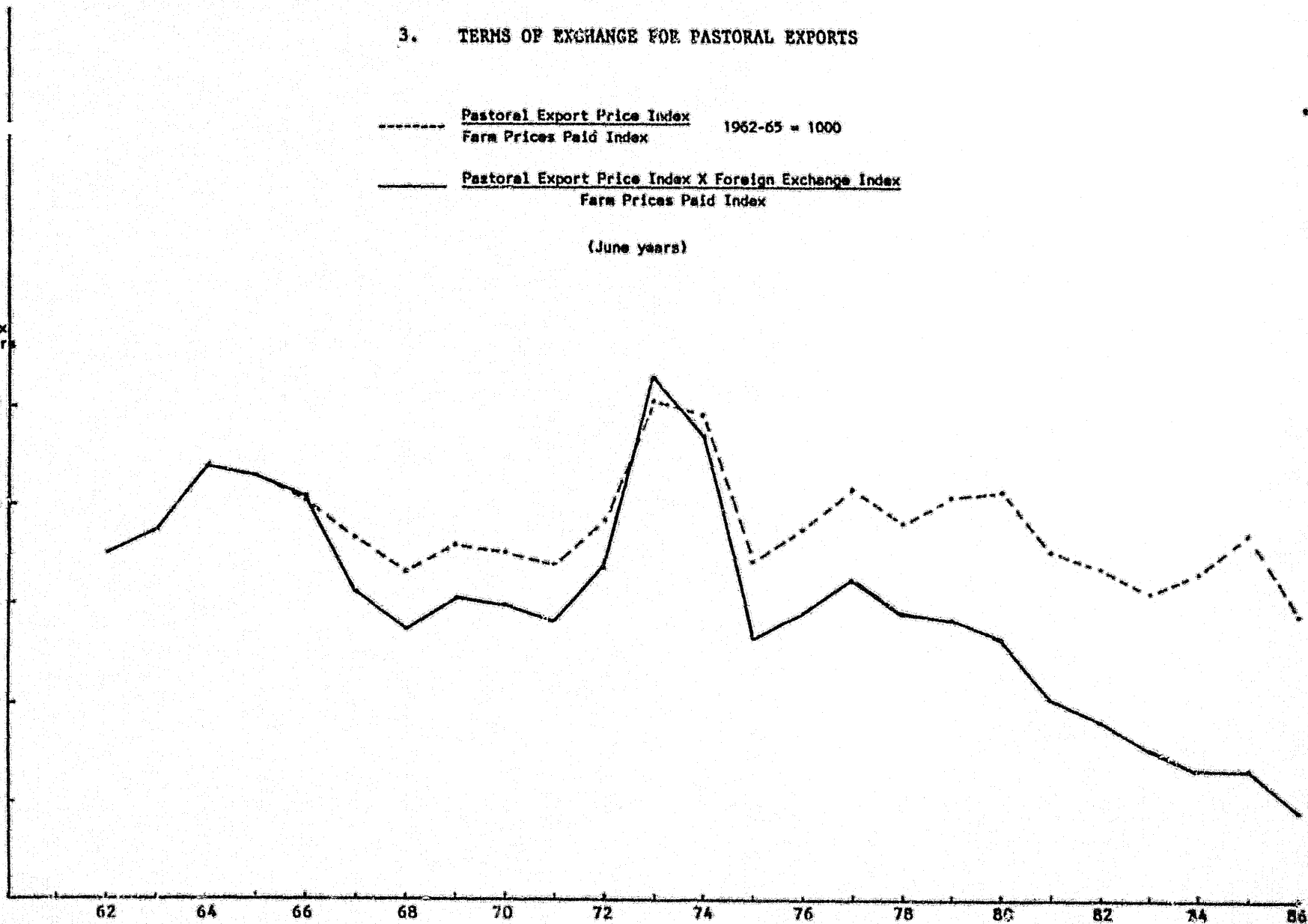
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