MEASURES OF EXTERNAL AND INTERNAL COMPETITIVENESS

This article by Ulf Schoefisch examines various measures of competitiveness of New Zealand’s tradeable goods sector.

Introduction
Concepts of competitiveness are relevant to the analysis of an economy’s position in international trade and of trends in the external balance. Focus of the analysis is the tradeable goods sector which produces output that is actually traded or potentially tradeable in international markets1.

The analysis of competitiveness requires comprehensive statistical measures. Ideally, a competitiveness indicator should reflect the ability of the tradeable goods sector to both compete on price and quality in international markets, as well as attract resources from the domestic non-tradeable goods sector. Given that this requires information that relates to distinctly different concepts, the analysis is usually carried out on the basis of separate measures. External competitiveness indicators are designed to reflect the ability to compete internationally, while internal competitiveness measures indicate incentives for production to shift between the non-tradeable and tradeable goods sectors.

There is little conclusive information about underlying competitiveness equilibria which would enable us to attach a meaningful interpretation to the level of the measures. Therefore, both types of competitiveness indicators are usually expressed in terms of indices, thereby shifting the focus of the analysis on trends, i.e. changes over time.

This article discusses the theoretical foundations of various competitiveness measures and interprets actual movements in such indices for New Zealand over the past decade.

Classification of Economic Activities
The lack of unambiguous criteria for the classification of output into tradeable and non-tradeable goods is a general problem for any analysis of competitiveness of the tradeable goods sector. In the absence of superior alternatives, export/sales and import/sales ratios for the various industries are widely used as proxies for the degree of international competition which distinguishes the tradeable and non-tradeable goods sectors. On the basis of those criteria the following industry classifications have been adopted in this study:

1 International markets, as defined here, include foreign markets and the domestic market for tradeable goods to which foreign competitors have access.

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Considerable ambiguity arises with respect to the Distribution and Transport sectors which encompass both tradeable and non-tradeable activities of significant proportions. Therefore, half of the output of those industries has been classified ‘tradeable’, while the other half has been allocated to the non-tradeable goods sector. While this is a very general approximation, it is preferable to allocating 100 per cent of the Distribution and Transport industries to either output group. Variations in the sectoral allocation of Distribution and Transport, however, imply significantly different paths of internal competitiveness measures over the past decade (as discussed below).

While the creation of internal competitiveness indices requires the appropriate classification of domestic economic activities, ideal external competitiveness measures would, in addition, necessitate the identification of the tradeable goods sectors of New Zealand’s trading partners. Since the latter would multiply the degree of arbitrariness, the analysis of external competitiveness of the tradeable goods sector in this study will be restricted to the widely applied approach of using composite indices (covering tradeable and non-tradeable goods) as proxies. However, external competitiveness of the manufacturing sector - a sub-sector of the tradeable goods category - will be analysed on the basis of sector specific indices which are available for New Zealand and its relevant trading partners.

External Competitiveness

- Price Versus Quality Competitiveness

The ability of New Zealand producers of tradeable goods to compete in international markets is usually analysed in terms of relative international prices. This, however, ignores the importance of quality competitiveness, which not only encompasses the relative quality of traded goods but also the relative performance in sales related services (reliability of supply, maintenance service, etc.). Ideally, sophisticated techniques of price index construction should take account of quality changes, with changed quality at the same price being recorded as a price movement at constant quality. However, currently used statistical methods do not capture these aspects adequately. This implies that external competitiveness measures either over- or understate true underlying trends, depending on the path of international quality competitiveness not captured by the price indices, thereby adding to the imprecision inherent in any analysis of international competitiveness.
Relative Cost Indices Versus Relative Price Indices

External competitiveness measures are ratios of domestic and foreign price or cost variables for tradeable goods, expressed in the same currency.

\[ E_{\text{EXT}} = \left[ \frac{P}{(P^*/e)} \right] \]

where

- \( E_{\text{EXT}} \) External competitiveness measure
- \( P \) Domestic price or cost index for tradeable goods
- \( P^* \) Price or cost index for competing tradeable goods in international markets
- \( e \) Effective nominal exchange rate

An increase in the ratio indicates a loss in competitiveness.

The definition of external competitiveness as the ‘ability to compete’ refers to the relative cost of selling goods. However, movements in a comprehensive relative cost index can be misleading if the changes do not constitute a gain or loss in competitiveness. This would apply, for example, in a situation where weakening relative international demand for a country’s products leads to a decline in output prices. In such a case, subsequent cost improvements to restore producer margins should not be interpreted as competitiveness gains. A further weakness of a relative cost index is its inability to capture the full influence of subsidies and taxes which affect the ability to compete.

Since comprehensive cost measures (encompassing all cost components) are usually not available, relative price indices are widely used as proxies. This is based on the assumption that, in competitive markets, price and cost movements are likely to deviate only in the short-run.

Price based competitiveness measures implicitly assume some scope for price differentiation. Such measures would remain at an unchanged level - and therefore be meaningless - if the tradeable goods sector exclusively produces output that tends to be uniformly priced in international markets, i.e. for which relative price shifts do not occur.

Apart from short-run distortions, the interpretation of price based measures can be complicated by long-run economic trends that are not related to competitiveness changes. This includes such things as the redirection of international demand, which - by causing the price level in the benefiting economies to rise - would incorrectly suggest a deterioration in external competitiveness of their tradeable goods sectors.
Weighting Structure For Effective External Competitiveness Indices

Cooper (1988) argued that a comprehensive external competitiveness measure should be based on a global weighting system which captures both bilateral and third market competition. The official Reserve Bank Real Exchange Rate Index, measuring relative international consumer prices, uses a weighting structure that is based on those principles. However, due to the problems of availability of reliable data for the wide range of countries included in the optimal weighting structure, it is not practical to create global indices with cost measures or price series other than the Consumer Price Index (CPI). Therefore, a second best, but common approach of using New Zealand’s five main trading partner weighting system\(^2\) for all non-consumer price based measures has been adopted in this study.

Measurement Bias in External Competitiveness Indices

The common approach of using price or cost measures that are based on both tradeable and non-tradeable output as proxies for unobtainable pure tradeable goods measures, can lead to a bias in the competitiveness index. The degree of such a bias depends on the share of non-tradeable goods covered. Empirical evidence suggests that the pressure of international competition causes productivity to increase at a higher rate and price inflation to be less in the tradeable goods sector than in the non-tradeable goods sector\(^3\). This implies that proxy indices exaggerate price or cost increases of tradeable goods. For countries that experience a larger differential in the change of productivity between tradeable and non-tradeable goods production than their trading partners, an external competitiveness measure based on composite price data would be biased towards indicating a deterioration in competitiveness.

Sectoral price information suggests that New Zealand experienced strong productivity increases in the tradeable goods sector during the period of goods market and trade liberalisation beginning in 1985. As the analysis of internal competitiveness below shows, prices of non-tradeable goods increased at significantly higher rates than prices of tradeable goods. If this differential was greater for New Zealand than for our trading partners, the external competitiveness measure would be biased upwards, i.e. show New Zealand’s competitive position to be worse than the true position.

Commonly Used Measures of External Competitiveness

- Relative Consumer Price Index

Consumer price indices are heavily weighted with non-tradeable goods (including housing related items), which implies that the bias of consumer price based competitiveness indices can be potentially significant\(^4\). While these indices are probably better

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\(^2\) The 5-country weighting structure used below is identical to that underlying the official trade weighted nominal exchange rate index (TWI). The trading partners included are the United States, the United Kingdom, Australia, Japan and Germany. The indices are geometrically weighted and chain linked.

\(^3\) The phenomenon of productivity driven differential price increases - due to wage equalisation across sectors - is known as the ‘Balassa Effect’.

\(^4\) If used for external competitiveness analysis, consumer price indices should be adjusted for estimated influences of changes in indirect taxes.
measures of relative international purchasing power than of external competitiveness, they are widely used for reasons of ready availability.

- Relative Producer Price Index (Output)

In general, producer prices are superior proxies than consumer prices for actual prices charged in international trade, since they exclude distortions arising at the retail level. Furthermore, producer price indices for total output are influenced by non-tradeable goods prices to a lesser extent than consumer price indices, which implies a smaller potential bias in the corresponding external competitiveness measure. No composite index bias arises with a relative producer price index for manufactured output (which is usually exclusively classified 'tradeable'). However, such a measure only covers part of the tradeable goods sector.

Further price based external competitiveness indices are relative Gross Domestic Product/Gross National Product (GDP/GNP) deflators and relative export price indices. GDP/GNP deflators are inferior to relative producer price indices for total output, as they include government items in addition to a wide range of non-tradeable goods. Export price indices, on the other hand, are based too narrowly on output that is actually sold internationally and, thereby, cover only part of the tradeable goods sector.

- Relative Unit Labour Cost Index (Manufacturing)

While this measure, which exclusively covers tradeable goods, is not affected by the above problem of bias, it applies only to a sub-set of the tradeable goods sector and covers only part of total input costs. Therefore, several conditions have to be met for a relative unit labour cost index for manufacturing to be a good indicator of the total tradeable goods sectors' ability to compete, including: (i) the share of manufacturing labour cost in the total cost of tradeable goods production has to be the same across countries; and (ii) relative changes in non-labour costs per unit of tradeable output (including non-labour cost of manufactured goods production and total cost of non-manufactured tradeable goods production) have to be the same as movements in relative unit labour costs for manufacturing. Given that these conditions are unlikely to hold at any point in time, the index can be misleading if interpreted as an indicator of competitiveness changes.

The relative producer price index for manufactured output appears to be the most appropriate measure of external competitiveness of the tradeable goods sector in the case of New Zealand. Most importantly, it is not influenced by prices of non-tradeable goods. Furthermore, the index is likely to be a good proxy for competitiveness trends of the total tradeable goods sector, given that a high proportion of the other traded goods are commodities that tend to be uniformly priced internationally. The latter implies that a more comprehensive external competitiveness measure would display a lesser degree of variability than the manufacturing index.
The Data

All indices discussed show similar trends in the external price competitiveness of the New Zealand tradeable goods sector, as shown in Figure 1. Gains in competitiveness prior to 1984 and after the exchange rate devaluation of 1984 were reversed in subsequent years through currency appreciation and high domestic inflation. This deterioration ended with the nominal exchange rate depreciation of 1988 and the success of disinflationary policies thereafter. The significant depreciation in the nominal exchange rate in the second half of 1991 has since improved competitiveness far beyond levels experienced in the early 1980's. Using the producer price index for manufacturing as the preferred measure, external competitiveness of New Zealand's tradeable goods sector - assuming constant quality competitiveness - has improved by around 13 per cent since 1980.

The relative producer price index for total output shows a weaker pattern than the corresponding index for the manufacturing sector. International price equalisation for traded commodities, which are included in this index, is likely to be one cause of this divergence. Furthermore, during the post-1984 period of economic liberalisation in New Zealand, prices of non-tradeable goods have risen significantly faster than prices for non-traded goods (as shown in the analysis of internal competitiveness below), which is likely to have created an upward bias in the relative producer price index for total output.

\[\text{FIGURE 1}\]

\textbf{External Competitiveness}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Values for the December quarter 1991 are partially estimated}
\end{figure}

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The examined external competitiveness indices do not directly reflect the reduction in tariff rates and export subsidies since 1984. However, domestic price variables include the respective flow-on effects. As Wong (1989) has shown, while these policies have worsened international competitiveness of some import competing and export sectors, they improved the relative position of tradeable goods industries with a high share of imported intermediate inputs. Overall, the analysis showed that the net effect of the reduction in protectionism has been nearly balanced, and it may therefore be justifiable to ignore these changes in this study.

Internal Competitiveness

- Relative Profitability

The ability of the tradeable goods sector to attract resources from the non-tradeable goods sector can be proxied by the relative profitability of non-tradeable and tradeable goods production:

\[ E_{\text{INT}} = \left( \frac{PR_N}{PR_T} \right) \]

where:

- \( E_{\text{INT}} \) Internal competitiveness measure
- \( PR_N \) Profitability of non-tradeable goods production
- \( PR_T \) Profitability of tradeable goods production

A decrease in the index indicates increased incentives to shift resources into the tradeable goods sector.

- Commonly Used Measures of Internal Competitiveness

The internal competitiveness indices below have been created by geometrically weighting the individual sectoral indices with the relative size of the respective industries (contributions to total market sector output during each period)\(^5\).

The unavailability of precise profitability measures has led to the use of various proxies. All approaches are based on relative profits rather than profitability. Therefore, the assumption of constant relative capital intensity of production over time is required if the measures are to be interpreted as indicators of changes in relative profitability and changing incentives for inter-sectoral resource shifts.

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\(^5\) Profitability is defined as the rate of profit (profits relative to the value of the sectoral capital stock).

\(^6\) Sectoral output data for the post 1989/90 period is not yet available. Therefore, constant sectoral shares have been assumed after 1989/90.

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• Relative Producer Price Index (Output)

This 'internal terms of trade' measure uses changes in sectoral producer prices as proxies for changes in profits earned in the non-tradeable and tradeable goods sectors respectively.

\[ E_{INT} = \left( \frac{PPIO_N}{PPIO_T} \right) \]

where \( PPION \) Producer Price Index (Output) for non-tradeable goods

\( PPITO \) Producer Price Index (Output) for tradeable goods

For relative output prices to reflect changing incentives to shift resources into the production of tradeable goods, relative input costs between the two sectors have to remain constant over time. Empirical evidence presented below shows that this condition has not been met in the New Zealand case. Prices for intermediate inputs into the production of non-tradeable goods have risen significantly faster than corresponding costs in the tradeable goods sector. A similar development over the past decade is suggested for unit labour costs. That makes the Relative Producer Price Index (Output) unsuitable as an indicator of internal competitiveness.

• Relative Producer Price Index (Output/Input)

This index is based on the ratios of producer output and input prices in the non-tradeable and tradeable goods sectors.

\[ E_{INT} = \left\{ \left( \frac{PPION}{PPIIN} \right) / \left( \frac{PPITO}{PPIIT} \right) \right\} \]

where \( PPION, PPITO \) Producer Price Index (Output) for non-tradeable, tradeable goods

\( PPIIN, PPIIT \) Producer Price Index (Input) for non-tradeable, tradeable goods

While the inclusion of sectoral input prices is intended to take account of changes in relative production costs, input prices for intermediate goods reflect only part of total input costs. Therefore, for this index to be an indicator of internal competitiveness, it is still required that (i) the share of intermediate inputs in total production costs of the non-tradeable and tradeable goods sectors is the same, and (ii) aggregate relative labour and capital costs change by the same magnitude as relative intermediate input costs. However, neither of these conditions has been met in the New Zealand case. Relatively stronger productivity increases occurred in tradeable goods production, which suggests different growth rates in unit labour costs in the two sectors. In
addition, the share of labour costs is higher in non-tradeable goods production. Therefore, the Relative Producer Price Index (Output/Input) is also an unreliable indicator of internal competitiveness.

Apart from the incomplete coverage of cost components, general problems exist with the approximation of profitability changes through price movements. Firstly, if aggregate sectoral profit bases are not of equal size at the outset, such indices will only indicate the direction of change in internal competitiveness, but not the true magnitude. Furthermore, price movements do not reflect the effect of changing degrees of capital utilisation, which would impact on relative profitability through quantity rather than price effects.

- Relative Operating Surplus Index

This index is based on sectoral operating surplus data, adjusted for changing sector size over time (as measured by the contribution to total market sector output).

\[
E_{INT} = \left\{ \frac{OS_N}{N} \right\} / \left\{ \frac{OS_T}{T} \right\}
\]

where \(OS_N\), \(OS_T\) Operating Surplus in non-tradeable, tradeable goods sector

\(N, T\) Total value of non-tradeable, tradeable goods production

The Relative Operating Surplus Index comes closest to a theoretically optimal measure of relative profitability, given its direct measurement of relative profits, which takes into account price and cost movements, as well as direct and indirect producer subsidies. While it is superior to other indices as an indicator of trends in relative profits, the index still requires the above assumption that relative capital intensity of production between the tradeable and non-tradeable goods sectors remains constant over time in order to make it a useful measure of relative sectoral profitability, i.e. internal competitiveness.

- The Data

Figure 2 shows that the theoretical considerations discussed are confirmed by empirical evidence. The path of the Relative Producer Price Index (Output), which assumes constant relative input costs, implies a deterioration in internal competitiveness for the tradeable goods sector of close to 30 per cent since the beginning of the last decade. When prices of intermediate inputs are taken into account as a proxy for changes in relative costs, this deterioration reduces to only around 5 per cent.

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The incomplete coverage of input costs through price series is documented by the operating surplus based measure, which exhibits a significantly different pattern over time compared to the (relative) price based measures. The significant deterioration in this index over the period from 1985 to 1988 reflects the external and internal liberalisation of the economy, which impacted on the tradable goods sector in particular, and the loss in external competitiveness. This was followed by a gradual adjustment to the changed market conditions and a correction of the real exchange rate overvaluation, which, in combination, has led to a recovery in relative profitability of tradable goods production. Latest trends suggests that, compared to the early 1980s, tradable goods industries have, in aggregate, become more profitable than the non-traded goods sector.

Figure 3 demonstrates the significant effect on the path of the relative operating surplus measure arising from different allocations of the economy's Distribution and Transport industries to the non-tradeable and tradeable goods sectors respectively. The 100 per cent allocation of the two sectors to the traded goods category shows a lower degree of internal competitiveness of traded goods activities overall, compared to the base case used in this study. The complete allocation of the two industries to the non-tradeable goods sector, on the other hand, shows the reverse, which reflects the considerable degree of ambiguity involved in analysing the behaviour of any internal competitiveness index.

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7 Annual operating surplus series have been transformed into quarterly series by cubic splining.
Final Comments

It should be noted that movements in the competitiveness indices over the past decade do not show the position of the economy relative to some fundamental long-term equilibrium. The choice of the year 1980 as a starting date for the analysis has been arbitrary and does not imply a judgement that the economy was in equilibrium at that time. Therefore, external and internal competitiveness alignment should not be measured against the level of the respective indices in 1980, but against an estimated underlying equilibrium at the present time. Such an equilibrium is subject to change over time due to structural influences on external goods and capital flows, and no attempt has been made here to estimate its current position.

Overall, the various measures of external price competitiveness indicate that the tradeable goods sector is at present more competitive than at the beginning of the last decade. Moreover, latest trends suggest that the same is true with respect to internal competitiveness, which implies improved incentives for resources to shift into tradeable goods production.

Differences in the movement of external and internal competitiveness indices have implications for the macroeconomic interpretation of changes in external competitiveness. An improvement in external competitiveness, as defined above, leads to a positive effect on the trade balance if incentives exist - in the case of full employment of production factors - for a shift of resources from the non-tradeable to the tradeable goods sector, or - in the case of under-employment - for the use of spare resources for  

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additional production of tradeable goods\(^8\). If, on the other hand, incentives for resource shifts are insufficient, improvement in the external balance will not occur. The tradeable goods sector, although externally competitive, may even lose resources if profitability is higher for non-tradeable goods production.

The reverse applies to the interpretation of internal competitiveness measures. Although incentives may increase for a resource shift into the tradeable goods sector, an improvement in the external balance is unlikely to occur without that sector being sufficiently competitive in international markets. It should be noted, however, that the divergence of external and internal competitiveness trends is inconsistent with a long-run equilibrium. Nevertheless, for short- and medium-term analysis it is useful to consider the two competitiveness concepts simultaneously, as external and internal competitiveness measures address different issues, each containing information relevant to the analysis of external disequilibria that is not reflected by the other.

**BIBLIOGRAPHY**


\(^8\) This assumes that the traditional elasticity conditions hold and that the supply side response is stronger than the relative price and income related demand side effects on the external balance.