FEATURE ARTICLE

## ASSESSING SINGAPORE'S
MANUFACTURING COST COMPETITIVENESS

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> The views expressed in this paper are solely those of the author and do not necessarily reflect those of the Ministry of Trade and Industry or the Government of Singapore.

BACKGROUND

Singapore is an open economy with total trade more than 3 times its GDP. In value terms, Singapore's non-oil domestic exports (NODX) are around 70 per cent Singapore's GDP. Historically, the performance of Singapore's NODX has shown a high degree of correlation with economic performance, and in particular the performance of the manufacturing sector[1] (Exhibit 1).

Exhibit 1: Growth of NODX, Manufacturing and GDP (1990 -2008)
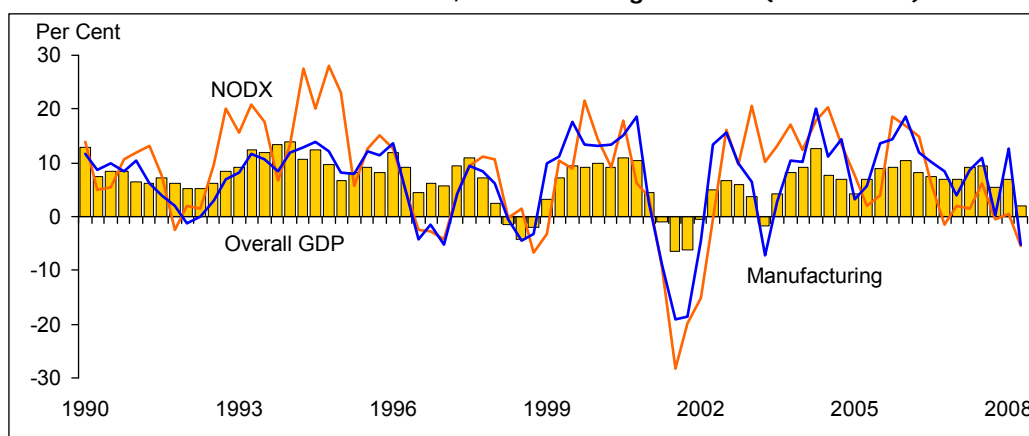
The growth performance of NODX in turn hinges on several factors, including the health of external economies as well as export competitiveness. Narrowly defined, export competitiveness is largely determined by the S$ real effective exchange rate (S$REER), which provides a measure of how Singapore goods are priced in relation to the goods of Singapore's competitors after accounting for differences in nominal exchange rates and domestic costs[2,3].

The Monetary Authority of Singapore (MAS) has maintained the policy of a modest and gradual appreciation of the Nominal Effective Exchange Rate (S$NEER) policy band since April 2004 against the backdrop of robust economic growth[4]. In October 2007, the policy was tightened through a slight increase in the slope of the band. Subsequently in April 2008, the MAS re-centred the policy band at the prevailing level of the S$NEER with no change to the slope or width of the policy band.

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[1] NODX has a growth correlation 74 per cent with manufacturing growth, and a 68 per cent correlation with GDP growth.

[2] See MAS (1998) for well argued justification for using ULC (rather than CPI) to compute the real exchange rate. As CPI is influenced by market structure (such as when different degree of market power and demand elasticities resulting in different mark-ups), it may be a less useful representation of economic competitiveness.

[3] Outside of International Economics literature, the understanding of export competitiveness would be broader.

[4] A stronger SGD will help Singapore contain imported inflation. See South China Morning Post, 1 April 2008.

At the same time, the USD has fallen to historic lows against the SGD, having depreciated by 24 per cent since April 2004. (Exhibit 2). The broad-based weakness of the USD in international financial markets is widely attributed to the US's large current account deficit and, more recently, the ongoing problems in the US financial sector and the slowing US economy. This trend has also increased concerns amongst analysts that Singapore might lose some degree of export competitiveness as a result. In this article, we assess the impact of a stronger SGD on the export competitiveness of Singapore's manufacturing sector.

Exhibit 2: SGD-USD Exchange Rate (2001-2008)
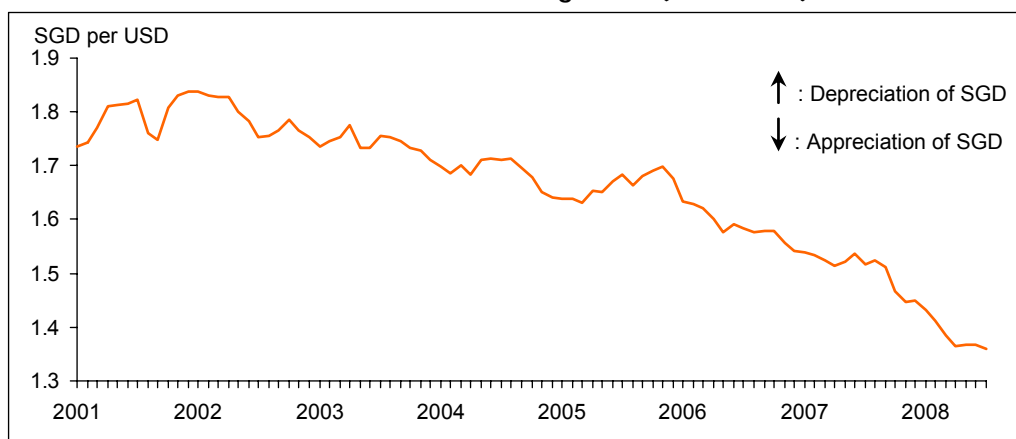
HIGH IMPORT CONTENT IN MANUFACTURING

As a small and open economy, Singapore is largely a price taker in the international marketplace. Singapore manufacturers by and large cannot set the prices of the goods they buy and sell internationally, and have to accept prevailing prices. Singapore manufacturers are therefore usually unable to pass on the effects of an appreciating currency to international buyers. Hence, an appreciation of the SGD would, in general, not lead to higher prices of Singapore exports relative to those of other countries[5]. However, when expressed in the local currency, a stronger SGD will erode the profit margins of Singapore manufacturers, and hence the sector's nominal VA, through the translation effect[6].

Nevertheless, one salient fact about manufacturing is the high level of import content and high export shares. Based on the computation from Input-Output (IO) tables, 93 per cent of the final demand (excluding intermediates) in this sector comes from external sources. This sector also has the highest import content which makes up 63 per cent of output.

The high level of import content therefore offers a certain "cushion" against a strengthening SGD since it translates into cheaper imported materials as well. From the firms' perspective, an appreciating currency restores the profit margin to some degree by reducing the cost of imported intermediates when expressed in the domestic currency. Taken for the sector as a whole, the fall in nominal VA is therefore cushioned.

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[5] The degree of pass through will obviously depend on market structure. If a manufacturer has some market power, he will be able to pass on some cost increase on its customers – after making the standard price-volume trade-off.

[6] For example, the sale of a semiconductor chip for USD100 might have generated SGD150 of revenue for a Singapore manufacturer in the past, but now only generates SGD135 because of currency appreciation. The Singapore manufacturer cannot raise the price of the semiconductor on the international market without losing competitiveness and market share, but will still have to pay its domestic costs in SGD – and hence it sees its profit margins shrink. However, the degree of margin erosion will also be determined by the import content – the higher the import content, the smaller the margin erosion expressed in domestic currency. Overall, since import content is less than 100 per cent of the value of final output, there will be a certain degree of margin erosion due to exchange rate appreciation.

EXPORT PRICE RELATIONSHIP WITH IMPORT PRICE AND DOMESTIC COST

In this article, an econometric analysis of the relationship between import and export prices of manufacturing is carried out using the same method used by Tilak Abeysinghe and Tan Lin Yeok (1998)[7].

As the authors have argued, given that import and export prices are recorded in SGD, they would have accounted for the impact of nominal exchange rate changes. In this exercise, we seek to test how export prices – which indicate how much local manufacturers are able to sell their output for internationally – change in response to import prices and domestic costs. Similar to Abeysinghe and Tan (1998), the regression takes the form of an Error-Correction-Model (ECM):

$$\Delta \log P_{X,t} = \alpha_0 + \alpha_1 \Delta \log P_{X,t-1} + \beta_0 \Delta \log P_{M,t} + \beta_1 \Delta \log P_{M,t-1} + \delta_0 \Delta \log C_t$$
$$+ \delta_1 \Delta \log C_{t-1} + \lambda \log P_{X,t-4} + \gamma \log P_{M,t-4} + \mu \log C_{t-4} + \varepsilon_t$$

Where
$P_{X,t}$ = Export price index of manufacturing at time t
$P_{M,t}$ = Import price index of manufacturing at time t
C_t = Unit Business Cost (UBC) of the manufacturing sector at time t
Δ = Fourth differencing (year-on-year changes for quarterly data)
ε_t = Error term

The relationship in logarithmic terms therefore represents the long-run equation we are trying to establish. The results of the estimation using quarterly data from 1990 to 2007 are presented in Exhibit 3.

Exhibit 3: Estimates of the Error Correction Model

Parameters	Estimate	Standard Error
α_0	-0.172	0.176
α_1	0.158**	0.098
β_0	0.709**	0.056
β_1	-0.396**	0.083
δ_0	0.047	0.040
δ_1	0.010	0.039
λ	-0.244**	0.068
γ	0.238**	0.055
μ	0.047*	0.024
Adjusted R^2	0.952	
DW	1.590	

*   10 per cent significance
**   1 per cent significance

As the results show that λ lies between 0 and -1, there is indeed a co-integrating relationship. The presence of a co-integrating relationship shows that while there are short-run fluctuations, there is indeed a long-run relationship between the variables of interest. The implied long run equation is:

$$\log P_X = 0.98 \log P_M + 0.19 \log C$$

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[7] In the original paper, the authors performed separate regressions for each manufacturing segments (where separate price indices were available). As the results are broadly similar for each segment, this article has chosen to present the result for manufacturing as a whole for the sake of brevity.

INTERPRETATION OF RESULTS

This long-run equation shows that import prices and export prices have in fact an almost one-to-one relationship, where a 1 per cent increase in import prices leads to 0.98 per cent increase in export prices in the long run. Statistically, this is no different from 1.

Suppose that the appreciation of the SGD causes import prices to fall by 1 per cent. This will lead to a fall in export prices of roughly 1 per cent. While the impact may be different for different manufacturing clusters, the profit margin for exports remains largely intact for manufacturing sector as a whole. Coupled with the fact mentioned earlier that the import content is very high for the manufacturing sector, the competitiveness effect arising from exchange rate movement in this sector will be somewhat dampened.

However, the results also show that a 1 per cent increase in domestic cost as measured by UBC will lead to an increase in export prices of around one-fifth the magnitude only. The fact that a 1 per cent rise in UBC results in only a corresponding rise in export prices one-fifth the magnitude has to be interpreted carefully. This could simply be the result of cost shares – that is, the share of domestic inputs in production is small enough so that any changes in domestic cost do not materially affect final prices even if they are completely passed on to customers.

However, the paper notes that the estimate of 0.19 is considerably smaller that the actual share of domestic inputs as computed from the IO table of around 40 per cent. This is indicative that manufacturers are unable to sufficiently raise export prices in line with increases in domestic costs. In other words, manufacturers are unable to pass on most of their domestic price increases to their foreign customers. This finding is entirely consistent with the notion of Singapore is largely a price-taker on the international market.

CONCLUSION

The export competitiveness of the manufacturing sector has a direct bearing on the health of the Singapore economy. Potentially, export margins can be eroded by an appreciating currency or higher domestic unit costs. The erosion of margins would translate into a lower rate of returns, and could therefore result in reduced investment. Admittedly, the long run quantitative impact on investment is not addressed in this study.

Nevertheless, a key result from this simple estimation is that since price-taking manufacturers are only able to pass on a small fraction of domestic cost increases, their profit margins would be quickly eroded by rising domestic costs.

Conversely, an increase in productivity (which leads to a decrease in unit costs such as the ULC and UBC) will improve both the pricing of Singapore goods as well as manufacturers' margins. Hence, it is imperative that Singapore guards against domestic cost escalation above productivity growth as this will have a clearly negative impact on export or even economic competitiveness.

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