

FEATURE ARTICLE

MEASURING SINGAPORE'S RELIANCE ON EXTERNAL DEMAND

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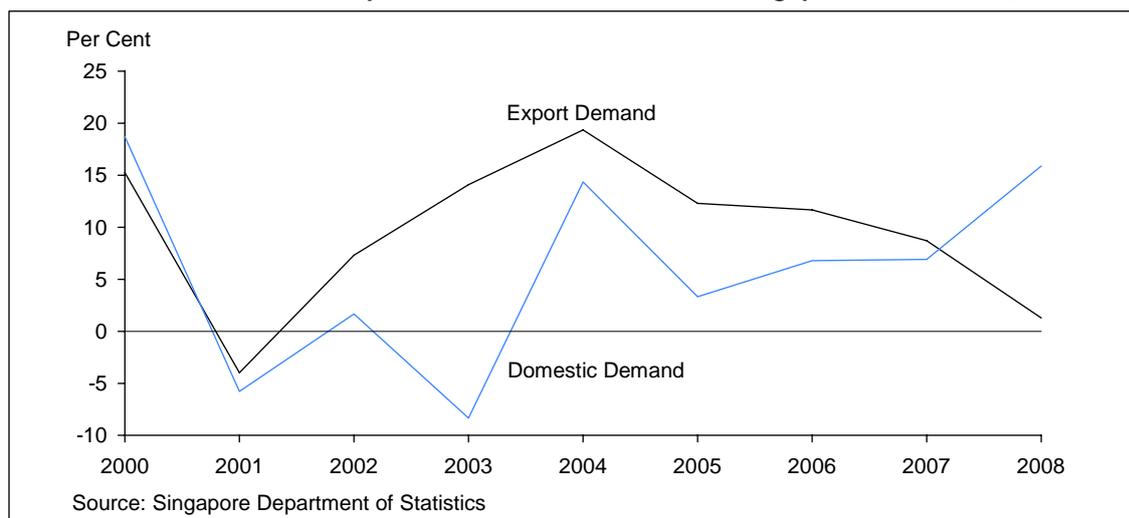
SUMMARY

- The conventional measure of external reliance of an economy is the ratio of exports to total demand. In Singapore, this measure suggests that our external reliance is high (74 per cent). However, this measure is an overstatement, as it does not factor in the high import content of exports.
- We calculate an alternative measure of the share of external demand in our economy, proposed by Kranendonk and Verbruggen (2008), to adjust for import content. This import-adjusted measure suggests a significantly lower (56 per cent) reliance on external demand in Singapore, and reduces the disparity between Singapore's external demand reliance and that of other countries.

INTRODUCTION

As a small, open, export-oriented economy, Singapore is reliant on external demand. From 2000 to 2008, export demand grew twice as fast as domestic demand ([Exhibit 1](#)). The severe impact of the global 2008/2009 economic recession on Singapore's growth has raised concerns over Singapore's reliance on external demand, and whether there is scope to boost domestic demand.

Exhibit 1: Growth Rates of Export and Domestic Demand in Singapore (2000-2008)



CONVENTIONAL METHOD

Underpinning this debate is the headline ratio of nominal **Exports to Total Demand**, i.e., **Exports / (GDP + Imports)**, which is the conventional measure of the share of external demand for an economy. Using the measure, external demand accounted for 74 per cent of Singapore's total demand in 2008, suggesting a very high reliance on external demand. We argue, along the lines of Kranendonk and Verbruggen (2008), that this measure is an over-estimate, and that an alternative measure should be used instead.

The conventional method measures total demand as the sum of export demand, and domestic investment and consumption across the public and private sector. It is equivalently the sum of the demand for goods and services produced in Singapore, and the demand for goods and services imported (Equation 1).

$$\begin{aligned}
 &\text{Total Demand (TD)} \\
 = &\quad \text{Private Consumption Expenditure (PCE) + Government Consumption Expenditure (GCE)} \\
 &\quad + \text{Gross Fixed Capital Formation (GFCF) + Changes in Inventories (\Delta S) + Exports (X)} \\
 = &\quad \text{GDP + Imports (M)} \qquad \qquad \qquad \text{[Equation 1]}
 \end{aligned}$$

However, this measure does not take two factors into account. First, due to Singapore's geographical location, a large proportion (approximately one-third) of Singapore's exports comprise re-exports. By definition, the value-added of re-exports to the Singapore's economy is very limited. The inclusion of re-exports in the conventional measure of reliance on external demand therefore overstates the external orientation of Singapore's economy.

Second, the import content of domestic exports (60 per cent) is higher than the import content of private (34 per cent) and government (36 per cent) consumption. The high import content of Singapore's domestic exports is not surprising, since Singapore's manufacturing sector imports most of the intermediates that go into the manufacturing of its exports. In contrast, the services industries, which constitute 66 per cent of domestic demand (i.e., private and government consumption), have lower import content.

In other words, for every dollar of external demand (i.e., demand for Singapore's exports), \$0.60 leaks out of the economy. Since the import content of domestic demand is lower, every dollar of domestic demand contributes more to domestically-produced goods and services. The conventional method of measuring external demand, which assumes that external and domestic demand both contribute to the economy to the same degree, thus overstates the contribution of external demand to the Singapore economy.

IMPORT-ADJUSTED METHOD

A more appropriate measure of the impact of external demand on domestically produced goods and services would be the contribution of External Demand to GDP instead, i.e. (Exports - Re-Exports - Import content of Domestic Exports) / GDP. This measure has been documented by Kranendonk and Verbruggen (2008), who carry out this calculation for selected European economies and the US. They find that the two methods tell rather different stories about the expenditure categories driving economic growth, and report that institutions in the Netherlands, Canada, France, and Belgium have begun to apply this method.

The import content of domestic exports is calculated in three steps. First, the import intensity of each sector is obtained by dividing its intermediate import requirements by its total production requirements. Next, the import content of each sector is calculated by multiplying its import intensity by the total final demand for domestic exports from that sector. Summing up the import content of exports of all sectors yields the total import content of exports in the economy.

Mathematically, the import content of domestic exports for an economy with N sectors is given by Equation 2:

$$\text{IMP} = M * (I-A)^{-1} * F \quad \text{[Equation 2]}$$

where A is the industry-by-industry flow matrix of dimensions [N x N], M is the [N x N] diagonal matrix of intermediate import demand for each sector, and F is the vector of final domestic exports.

We estimate that after adjusting for import content, 55.6 per cent of Singapore's GDP can be attributed to external demand. To re-cap, this ratio is lower than the ratio of Exports to Total Demand (73.9 per cent) because Singapore is a small open economy with a large volume of re-exports, and high import content in its domestic exports. The corollary of this finding is that the contribution of domestic demand to GDP, at 44.4 per cent, is higher than the 26.1 per cent implied by the conventional measure.

CHANGES OVER TIME

Exhibit 2 shows the change in share of external demand in the Singapore economy between 2000 and 2008, using both the conventional and import-adjusted method. Both methods suggest that our reliance on external demand has grown over time.

Exhibit 2: Share of External to Total Demand in the Singapore Economy

	Per Cent	
	Conventional Method	Import-Adjusted Method
2000	69.4	51.3
2008	73.9	55.6

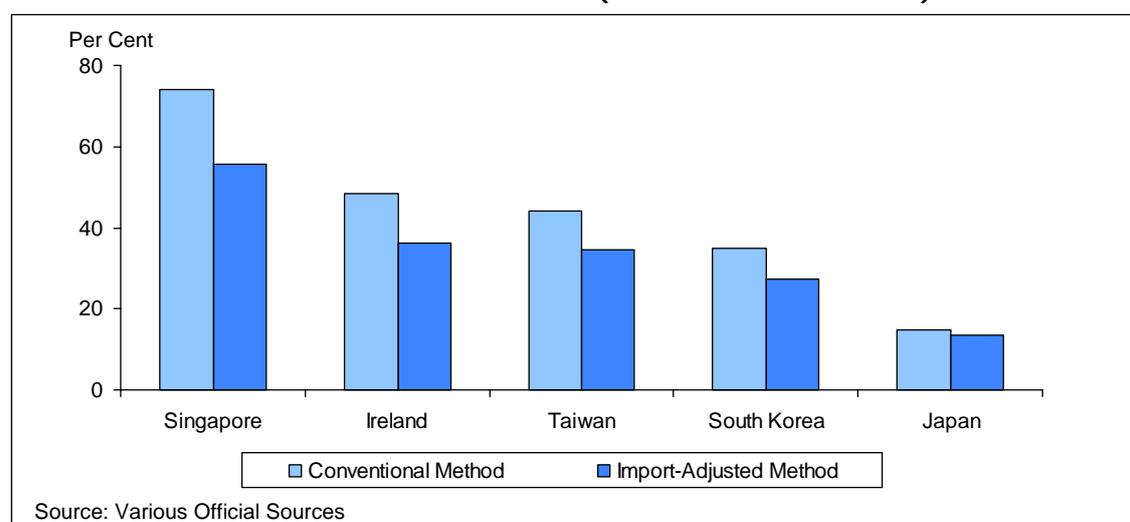
CROSS-COUNTRY/REGION COMPARISON

To contextualise our findings on Singapore's reliance on external demand, we carry out a similar exercise across four other developed, relatively export-oriented economies for 2008 using both the conventional and import-adjusted methods. The economies were Japan, South Korea, Taiwan and Ireland. We use latest publicly available Input-Output tables sourced from the respective statistical agencies for these economies.

For all four economies and Singapore, the import content of exports is higher than the import content in domestic demand (Exhibit 3). Hence, the conventional method of measuring import content of similarly overstates these economies' reliance on external demand (Exhibit 4). Nonetheless, Singapore's share of external demand is still higher than the other economies.

Exhibit 3: Import Content of Components of GDP

	Domestic Demand				Per Cent
	Private Consumption	Government Consumption	Gross Fixed Capital Formation	Total	External Demand
					Exports
Ireland	15	15	20	17	50
Japan	10	3	10	9	19
Singapore	34	36	56	43	60
South Korea	16	9	17	16	40
Taiwan	26	6	47	29	52

Exhibit 4: Reliance on External Demand in 2008 (% Share of Total Demand)**CONCLUSION**

Compared to the headline share of external demand, our analysis – which accounts for the import content of production – suggests that Singapore's economy is more balanced between domestic and external demand than conventional estimates suggest. The share of external demand in the Singapore economy remains higher than other similar economies under both methods, but the distinction is less stark in the import-adjusted method.

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Henk Kranendonk & Johan Verbruggen, 2008. "Decomposition of GDP Growth in Some European Countries and the United States," *De Economist*, Springer, vol. 156(3), pages 295-306, September.

Low, Linda and Toh, Mun Heng, "Input-Output Tables Models and Applications", Monograph, Singapore Department of Statistics, 1994.

Singapore Department of Statistics, "Singapore Input-Output Tables 2000".

Input-Output Tables:

Ireland: <http://www.statcentral.ie/>
Japan: <http://www.stat.go.jp/english/data/>
Korea: <http://ecos.bok.or.kr/>
Taiwan: <http://eng.stat.gov.tw/>