

## REVISITING SARS: IMPACT ON THE SINGAPORE ECONOMY

by

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'No data yet,' he answered. 'It is a capital mistake to theorize before you have all of the evidence. It biases the judgement.'

Sherlock Holmes  
*A Study in Scarlet*

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### Introduction

After recovering from the worst recession since independence with modest growth of 2.2% in 2002, the Singapore economy stagnated during the first nine months of this year. Compared to previous recessions, the bounce-back from the 2001 downturn has been exceptionally muted partly because of what seemed like an unending sequence of unexpected shocks to have buffeted Singapore, including repeated terrorist attacks, the Iraq war and the recent outbreak of the Severe Acute Respiratory Syndrome (SARS).

The most devastating of these shocks was undoubtedly SARS. Like the Asian financial crisis before it, the disease spread rapidly throughout the region by contagion. By the time the epidemic was contained in June this year, it had exacted a heavy toll on victims, their families and the domestic economy. Official estimates from the *Economic Survey of Singapore, Third Quarter 2003* indicate that service industries that were directly or indirectly affected by the viral outbreak, such as hotels, restaurants and air transport, shrank by 10–30% in the second quarter of 2003.

Experts have warned that SARS may re-emerge during this winter season. A study of the history of major epidemics in the twentieth century by the Monetary Authority of Singapore in its *Macroeconomic Review, October 2003* issue also revealed that in each of the past outbreaks, there were two waves of infection. In the light of these warnings, our objectives here are two-fold: to reassess, with the aid of econometric models, the impact of SARS on

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\* We would like to thank Peter Wilson for his valuable comments and suggestions.

Singapore's economic growth in 2003, and thereby to project growth for 2004 in the unwelcome event that SARS should revisit us.

## **An Intervention Analysis of the SARS Economic Impact**

One problem encountered by researchers attempting to estimate the economic impact of SARS is the current lack of data. Despite Holmes' exhortation to the contrary, we proceeded to carry out a preliminary assessment of its impact on Singapore using published statistical data up to the third quarter of this year and forecasts for the fourth quarter.<sup>1</sup>

The econometric methodology we utilized goes by the name of 'intervention analysis'. This time series technique is ideal for modelling the effects of rare, but known, events that have either a transitory or permanent impact on variables of interest. In this case, the SARS outbreak was represented by a 'pulse' dummy variable for 2003Q2 in a regression model that incorporates other explanatory variables as control variables. The role of the dummy variable is to capture effects not otherwise explained by the included regressors. We assume that the SARS shock is transitory, but since its impact might not be purely confined to the second quarter of this year, we adopted a technical specification which allows for persistent effects that decay exponentially over time in the post-intervention period.<sup>2</sup>

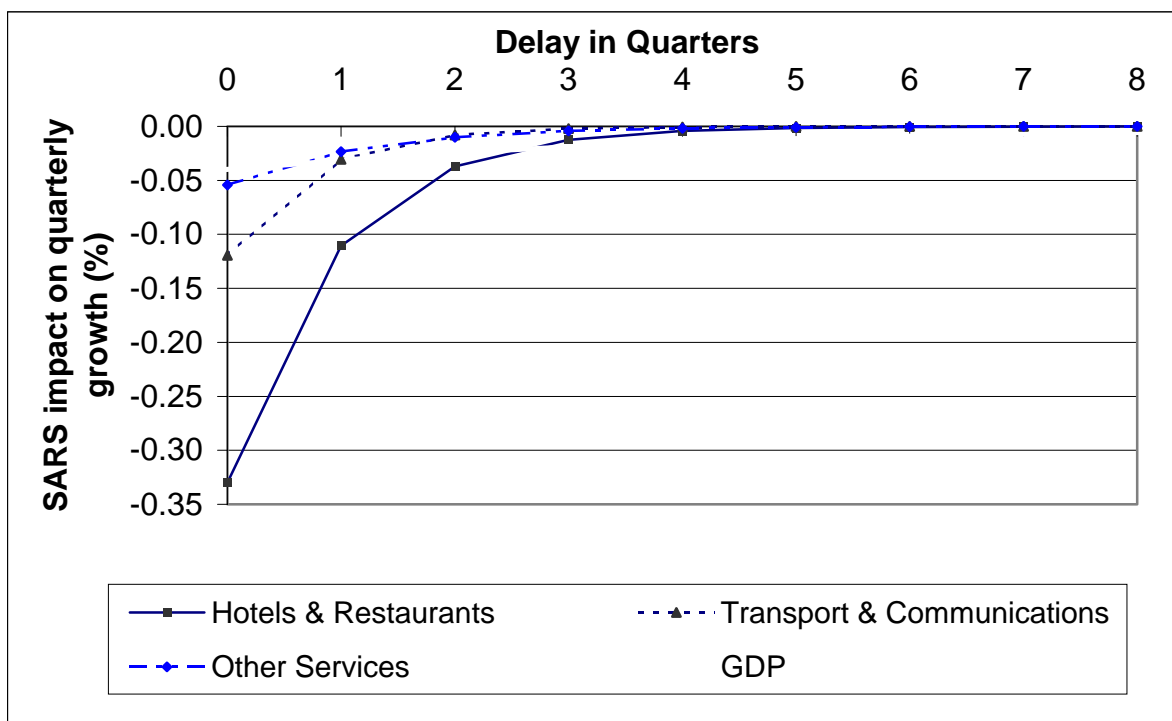
The economic variables in the model are the ones commonly used to forecast GDP growth in Singapore — composite weighted foreign GDP (a gauge of external demand) and global chip sales (a proxy for world electronics demand). The inclusion of these variables is crucial if we want to disentangle the effects of SARS from other factors at work during the first half of 2003. For example, slower growth in both foreign GDP and semiconductor sales in the second quarter resulting from the uncertainties associated with the Iraq war led to a drastic fall of 7.1% in Singapore's manufacturing output which, if not taken into account, would exaggerate the impact of SARS.

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<sup>1</sup> The forecasts of real GDP and commerce sector growth for Q4, tagged at 4.5% and 5.5% respectively in year-on-year terms, are the median projections in the *MAS Survey of Professional Forecasters, Dec 2003*, which polled twenty two economists in late November. Forecasts of other variables were generated from the ESU's suite of models.

<sup>2</sup> The results we obtained through this approach are very similar to what we get if data up to only 2003Q3 were used with visitor arrivals representing the SARS impact. Total visitor arrivals, however, does not capture the drop in domestic demand due to SARS.

## Immediate and Delayed Impact of SARS on Growth



Note: The numbers in the figure represent the impact of a 1% drop in demand due to SARS.

As we anticipated, the intervention analysis revealed that SARS had created a significant and persistent impact on the Singapore economy. The evidence suggests that although the SARS impact was greatest during the three months in the second quarter of 2003, its effects may not necessarily be short-lived. The figure above depicts the estimated dynamic effects of the SARS epidemic on the overall economy and badly hit sectors. Although SARS created a dent in the output of some other sectors as well, the estimated delayed effects on these sectors is not that significant. Each line in the graph traces the immediate — at quarter zero — as well as the spillover or delayed impact on the quarter-on-quarter growth of the relevant sector.

Not surprisingly, the immediate SARS impact on hotels and restaurants is the largest, followed by transport and communications and other services industries. The delayed effects on these sectors are consistent with the relatively slow recovery in visitor numbers and the gradual restoration of cancelled flights and business events. Except in the case of real GDP, the SARS impact peters out three quarters after the shock. Thus, we can expect the affected sectors to more or less recover completely from the outbreak by the end of 2004Q1, provided that both internal demand and visitor arrivals and expenditure recover fully.

The drop in real GDP in Q2 alone due to SARS is estimated at 17% on an annualized basis, compared to the actual decline of 9.8%. Translating this into year-on-year changes means that the entire contraction of 3.8% in Singapore's GDP from April to June can be accounted for by the SARS outbreak. Moreover, the delayed spillover effects are masked by the economy's rebound in the third quarter, which brought total output to slightly above its pre-SARS level by the end of September. In the absence of the epidemic, however, the level of GDP in the second half of 2003 would have been higher. For the year as a whole, economic growth could have been 2.5% stronger than the median forecast of 1% reported in the latest *MAS Survey of Professional Forecasters, December 2003*, which is also the ESU's best estimate at the moment.

Our econometric estimate of the impact of SARS is substantially larger than that obtained by simply adding up the negative percentage point contributions to GDP growth of services industries that were affected by the outbreak, which would imply that only two-thirds of the decline in second quarter GDP could be attributed to SARS. Our figure is also of the same order of magnitude as the comparable estimate from the Asian Development Bank. Based on counterfactual simulations from a global macroeconomic model, the ADB concluded that 3% of Singapore's GDP in 2003 will be lost to SARS (*Asian Development Outlook, 2003 Update*). Although it is difficult to be precise about the true economic impact of SARS in view of the complex effects involved, both our finding and that of the ADB imply that the ESU's forecast of 3.5–4.5% GDP growth made in January 2003 might have been quite reasonable had it not been for SARS.<sup>3</sup>

## **Economic Outlook for 2004: What If SARS Revisits?**

There are grounds to believe that the Singapore economy will perform better in early 2004. Leading indicators of the global electronics cycle have risen more convincingly than at any time since the IT bubble burst in 2000. The US and Japanese economies have exhibited surprising strength in the second and third quarters of 2003, and this should spur growth in the other key trading partners of Singapore. The swift end to the large scale fighting in Iraq has also resolved a major source of uncertainty in the world economy and encouraged companies to start investing again in machinery and computers.

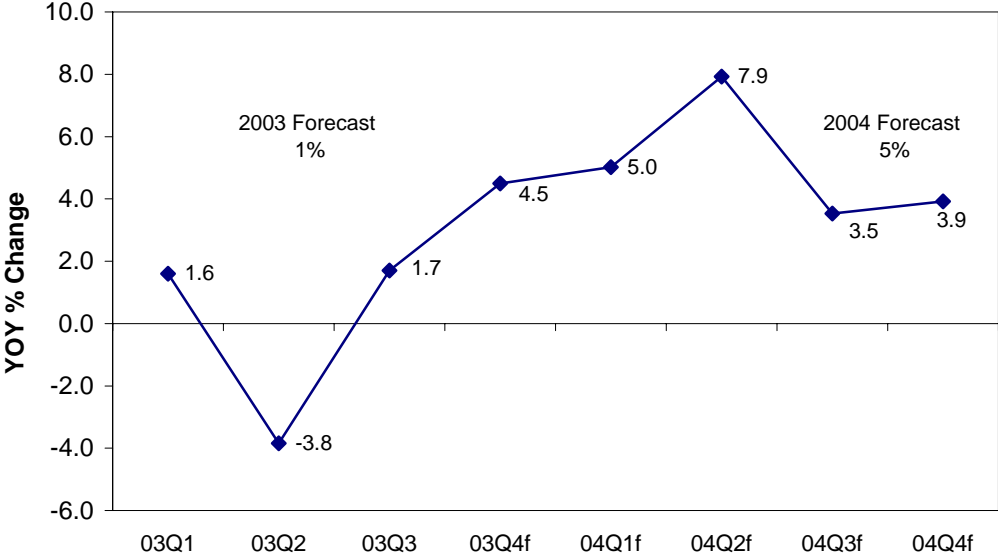
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<sup>3</sup> *Forecasts for the Singapore Economy*, ISEAS Regional Outlook Forum, 7 January 2003 (available at <http://www.fas.nus.edu.sg/ecs/center/esu/>).

Singapore's economic performance during the later part of 2004 will be conditional on the sustainability of buoyant external conditions and the absence of further adverse shocks. Most analysts are sanguine about the economic future, with professional forecasters predicting that the US economy will expand by 4–4.5% in 2004 and the Semiconductor Industry Association (SIA) forecasting that global chip sales will grow by 19.4% next year. Confirming this rosy outlook, large chipmakers have announced plans to raise production capacity while semiconductor equipment manufacturers are anticipating an increase in sales of nearly 40% in 2004.

If these optimistic prognostications come to pass, Singapore's real GDP growth in 2004 may reach or even surpass the upper end of the government's preliminary forecast range of 3–5%. Given the current economic momentum and partly because of low base effects, growth is expected to be faster in the first half of 2004 compared to the second half (see the chart). The good news is that the improvement in the economy should feed through to the labour market after the usual lag of about half a year, so that the unemployment rate can be expected to come down gradually to 4.5–5% by the end of next year. In spite of this pickup in economic activity, the deflationary pressures generated by SARS in 2003 and excess capacity in the economy should cap CPI inflation at about 1% in 2004.

**Forecasts of Singapore's GDP Growth**



But what if there is a renewed outbreak of SARS? To answer this question, we work with the following assumptions: (i) SARS resurfaces in 2004Q1 and comes under control within the same quarter; (ii) its impact on the Singapore economy mimics that of the first wave of infection. Using our earlier estimates, we found that real GDP growth in the first quarter of 2004 would be cut sharply to 1.6% (from 5% if there were no SARS relapse). And in accordance with the delayed effects in the 2003 episode, growth in subsequent quarters would also be adversely affected, albeit to a progressively lesser extent. To sum up, if SARS revisits, the Singapore economy would grow by only 3% in 2004.

There are, however, two reasons why a second wave of SARS is unlikely to inflict as much damage on the economy as our estimates might suggest. First, governments around the world are now much better equipped than previously to deal with the disease after going through the harrowing experience of 2003. This means that any incipient outbreak is likely to be contained faster. Second, many of the preventive measures taken earlier this year remain in place; indeed, health monitoring systems have greatly improved in the wake of the first infection. Hence, our projection of GDP growth in 2004 under the SARS scenario is best thought of as the worst outcome in the event of another outbreak.