



The SARS outbreak: how bad could it get?

SARS could cost Hong Kong nearly 5.5 per cent of GDP in 2003 and China 2.4 per cent of GDP assuming the outbreak is brought fully under control this year. That is enough to tip Hong Kong into recession, but not China. The greater impact on Hong Kong is due to their much larger tourism, travel and retail sales sectors. The high cost arises from changed behavior of people, increased costs of conducting business and an increase in country risk caused by the uncertain outcomes. Costs are accentuated in China and Hong Kong because of the maintenance of a peg of both currencies to the US dollar which causes a tightening of monetary conditions rather than a loosening. Should SARS persist over the next decade, or another similar outbreak occur, real GDP in both Hong Kong and China could fall by 7 per cent and 6 per cent respectively in 2003 alone. That means China could also be in recession as well as Hong Kong.

SARS has had a dramatic effect on parts of economic activity in Asia. The virus outbreak has infected nearly eight thousand people worldwide and the World Health Organization has issued global warnings on travel to some countries. Because the disease is believed to be mainly spread by person-to-person contact, the effects on the travel and tourism industry in Asia have been dramatic. Five-star hotels in Beijing are registering occupancy rates of just 20 per cent. Falls in passenger traffic of 30 per cent or more are commonly reported. People are fearful of congregating in public places and so restaurants, entertainment and retail trade have also been hard hit.

Business more generally has been affected. Trade fairs and other business travel has been curtailed. Since a lot of business in Asia occurs on a face-to-face basis, other business activity and investment has suffered. Prior to the SARS outbreak, one enterprising Hong Kong real estate developer held weekend parties with free beer and music to entice buyers to purchase apartments in an otherwise ailing property market. After the outbreak, the weekend parties came to a halt. So did sales.

Personal fears of contracting the disease have dampened confidence. Uncertainty about how bad the disease might be, the economic future and repercussions has increased perceptions of risk. Hardest hit has been China where the outbreak started, but also Hong Kong and Singapore where it quickly spread. Other countries such as Canada (centered on Toronto), Taiwan and Vietnam all became casualties from the outbreak.

Key points

- Hong Kong and China most adversely affected by SARS
- Real GDP in Hong Kong could be 5.5 per cent lower in 2003, and for China, 2.4 per cent lower
- A longer term outbreak could have major repercussions for both China and Hong Kong, sending both into recession in 2003
- Equity prices in China and Hong Kong could fall by up to 30 to 40 percentage points if the outbreak persists
- Singapore, Malaysia, Taiwan and Philippines significantly affected
- For other major economies, the effect is manageable with little implication for equity prices

ECONOMIC SCENARIOS

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Using these scenarios

Nobody can foretell the future. If they could, they wouldn't tell you about it. These scenarios are not predictions or forecasts. To make profitable investments from this information you also need to decide how likely the events portrayed here are, and what is already priced in the markets. The value of this material is in the insights it offers into the economic effects of various possible events.

2 SARS: not the last

In May 1997, a three-year old boy died in Hong Kong from a flu-like infection. The virus was of type H5N1 — a bird flu strain that should have never infected a human being. Prior to his death, the boy had been healthy and normal. Like the 'Asian' flu of 1957 and the 'Hong Kong' flu of 1968, both virus strains that had originated indirectly from birds, it was posited that the virus that killed the boy had come from the same source. New strains of flu appear when a virus makes the jump between species. If, say, a pig is simultaneously infected with a bird and a human flu virus, they can exchange genetic material and so a new virulent virus appears. Southern China is the influenza epicenter of the world because that is where the concentration of ducks, pigs and people is the greatest. Ducks are kept to keep insects and weeds down in rice paddies and to utilize fallen grain after harvest and provide a valuable food source. Pigs are kept alongside ducks. The rice-duck-pig system is efficient, traditional and not about to change.

Since the boy's death in May until November that year no more cases were recorded. Authorities believed things were under control. But then new cases appeared. From November until the end of December, eighteen people were hospitalized in Hong Kong, eight ended up on respirators and six died. Pandemic plans were put in place. For example, arrivals to Heathrow airport with respiratory problems were quarantined, just in case. By the end of December, all of Hong Kong's chickens, ducks, pigeons and quail were killed, disinfected and disposed of. The H5N1 scare had been stopped in its tracks. The scare was described, prophetically as it turns out, as a 'dress rehearsal'. The SARS outbreak will not be the last contagious new disease outbreak of the modern era.

Source: Taken from Kolata, G. 2001, *Flu, The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus that Caused it*, Pan Books, London.

Singapore and Vietnam are believed to be clear of the disease and the focus of the outbreak remains in China where it started.

As of the date of this report, estimates by forecasters of the significance of SARS for the world economy varies in the range of 0.4 per cent to 1 per cent of GDP. But the effects of the outbreak are several. First, is the drop in demand, particularly for services. Next is the increased cost of conducting business, and third is the increased perception of risk as a result of the outbreak. Because one country's plight affects trade and investment and has flow-on repercussions for the rest of the world, adding up all of these effects requires a global framework. That is the task undertaken here.

Two scenarios

It is still not known if the disease can be brought under control quickly. If it can, the impact may be transitory. But there is a possibility that the outbreak may become entrenched in rural China where health care is more rudimentary and the virus could mutate often, making vaccination difficult. There is also some possibility of another flu-like outbreak from Southern China. The SARS outbreak is not the last contagious new disease outbreak of the modern era (see box 1). Therefore in this issue we analyse two scenarios — a temporary shock where the outbreak is brought under control in the course of this year, and a more persistent shock where the effects fade out equi-proportionally over a decade. This longer more persistent scenario could be thought of as either a failure to bring the current outbreak under control or an expected repeat of a SARS type outbreak or some combination.

The economic shocks

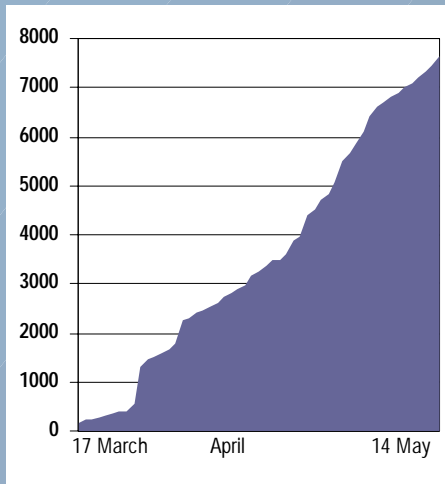
For both the temporary and the persistent shock there are three components contributing to the economic outcomes:

- a drop in the demand for services;
- an increase in costs in the service sector; and
- an increase in the country risk premium.

Since the SARS outbreak has occurred differentially across countries, a disproportional shock for each of these three components is chosen. Also, the SARS outbreak has had a disproportional effect across sectors within the economy. As noted, hardest hit have been airlines, hotels, restaurants, retail trade and entertainment. To capture the two disproportional impacts of the SARS outbreak so far, two indices are constructed. The first is an 'index of country exposure to SARS'. The transmission of the SARS outbreak to other countries depends on several things such as tourist flows, the geographical distance to China, sanitary conditions, public health, infrastructure and so on. Using this information and the number of cumulative cases (see chart 1) for SARS for each country provides an 'index of country exposure to SARS' (see Lee and McKibbin (2003) 'Globalization and Disease: The Case of SARS' forthcoming).

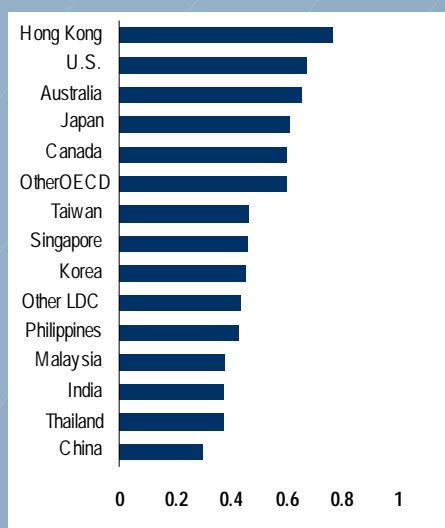
The second index is an 'index of sectoral exposure to SARS'. Those countries with a very large services sector and within services, those with

2 Cumulative number of SARS cases worldwide



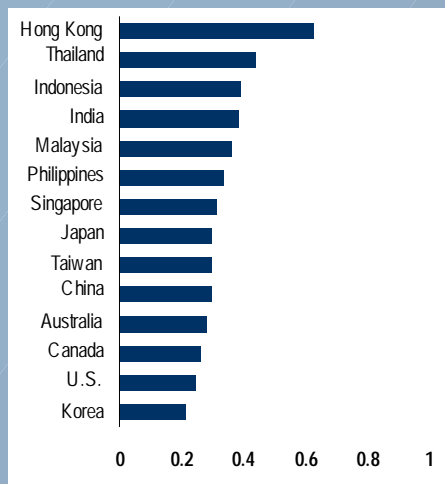
Source: World Health Organization.

3 Share of service sector in total output



Source: GTAP database.

3 Share of retail sales and travel industry in service sector



Source: GTAP database.

large retail sales, travel and tourism industries, will be hardest hit. Charts 2 and 3 show the variation in size of service sectors and the importance of travel and tourism across countries. This index is assumed to be proportional to the share of retail sales and travel in the services sector. The exposure of any country to the SARS outbreak will therefore also depend on the size or share of the service sector in gross output as well as the share of retail sales and travel within the service industry.

To derive a shock for the other countries, a shock is first specified for China and Hong Kong for each of the three components described above and then scaled back according to the two indices.

1. Drop in demand for services

A fall of 15 per cent in the demand for affected services sectors for China and Hong Kong is used. For the temporary scenario, this lasts one year. For the persistent scenario the drop fades equi-proportionally over the ensuing decade. For other countries the shock for China is scaled down by the indices of ‘country exposure to SARS’ and ‘sectoral exposure to SARS’.

2. Increase in the costs in the services sector

The SARS outbreak has made business more costly in providing services. Extra health care costs, extra costs of paying of redundancies and employee absenteeism as people shun public transport all combine to give an assumed increase in costs in exposed service industries of 5 per cent. The effect is for one year for the temporary scenario and phased out over ten years for the persistent case. Again, the effect is scaled by the indices of exposure to SARS.

3. Increase in country risk premium

SARS has had an obvious deleterious effect on the economies of affected countries. The uncertainty of the real extent of the outbreak, whether it can be brought under control and what the economic fall-out might be has increased economic risk. The increase in the country risk premium is assumed to be 300 basis points for China and Hong Kong — in line with commentary from the financial markets. Other countries are scaled off this change according to the index of country exposure to SARS.

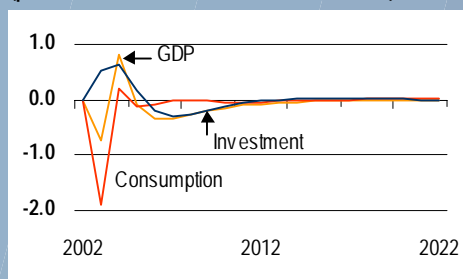
The three components for the temporary shock are shown in table 1. The persistent scenario is the same as for the temporary scenario in 2003, but fades out equi-proportionally over a decade.

2 Model used

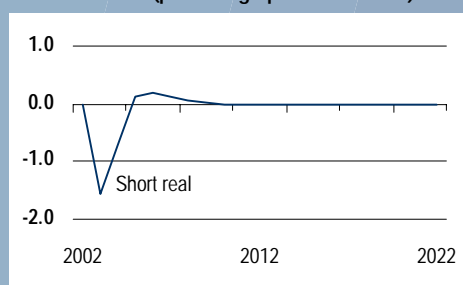
The different nature of the components of the SARS outbreak combined with the repercussion internationally mean the best way to capture the effect of SARS of each of the world’s major economies is by using a good equilibrium model. Since the effects are centered on Asia, the G-Cubed (Asia Pacific) model is used. The version used is 50n and is described fully by either following the links on this web site or directly accessing www.msgpl.com.au. Ten East and South East Asian economies are distinguished along with the United States, Australia, New Zealand, other OECD economies, Russia and East Europe and OPEC. Six sectors, of which services is one, are distinguished.

CHART 4: TEMPORARY SCENARIO: DROP IN DEMAND — CHINA

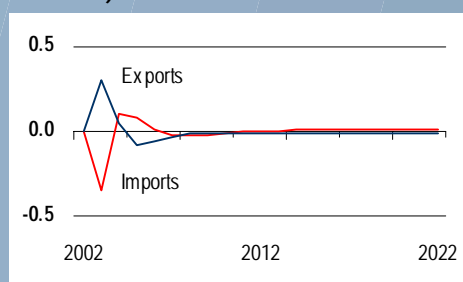
Real GDP, consumption and investment (per cent of GDP deviation from baseline)



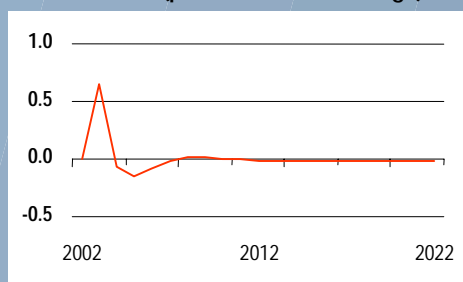
Interest rates (percentage point deviation)



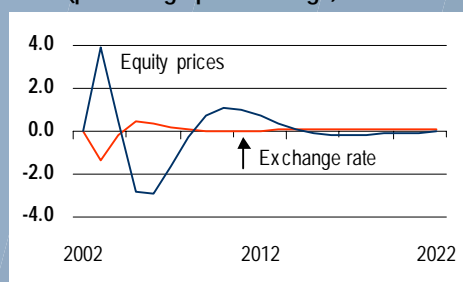
Exports and imports (per cent of GDP deviation)



Trade balance (per cent of GDP change)



Equity prices and real effective exchange rates (percentage point change)



Effects of a temporary outbreak

As usual we present the components separately before giving the total effect so investors can appreciate the drivers behind the results and hence better appraise the economic risks.

1. Economic shocks in 2003 to represent the temporary scenario of the SARS outbreak^a

Country/region	Drop in demand	Increase in service costs	Changed country risk premium
	Percentage points	Per cent	Percentage points
United States	-0.1	-0.1	0.3
Japan	-0.2	-0.2	0.3
Australia	-0.1	-0.1	0.3
New Zealand	-0.2	-0.2	0.3
Indonesia	-0.4	-0.4	0.6
Malaysia	-0.7	-0.5	0.9
Philippines	-0.8	-0.5	0.9
Singapore	-1.0	-0.8	1.5
Thailand	-0.7	-0.7	0.9
China	-2.7	-1.5	3.0
India	-0.2	-0.2	0.3
Taiwan	-0.4	-0.3	0.6
Korea	-0.4	-0.2	0.6
Hong Kong	-1.0	-3.2	3.0
Other OECD	-0.2	-0.1	0.3
Non-oil LDCs	-0.2	-0.2	0.3
USSR & Eastern Europe	-0.2	-0.2	0.3
Oil exporting countries	-0.2	-0.2	0.3

^a The persistent shocks can be computed by taking the above as the start point and making equi-proportional reductions over a decade.

1. Drop in demand

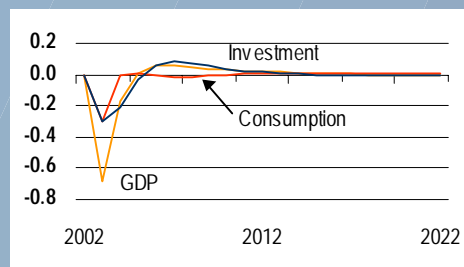
To trace the mechanisms at work, we follow the effects on China. The drop in demand for services causes consumption to fall — as simulated. This drop in consumption (first panel of chart set 4) leads to a drop in GDP in China in 2003 of 0.75 per cent below what it would otherwise be. That drop in GDP might be thought to lead to a drop in investment. But the income not spent has to go somewhere. It is saved, which leads to a fall in short term real interest rates (the second panel of chart set 4) and stimulates investment. This stimulus outweighs any negative effect as a result of the drop in output and the net effect is a small rise of real investment (as a per cent of GDP) of 0.5 per cent above base in 2003.

Less domestic consumption means there is a drop in imports and a surplus to exports (third panel). Alternately, there is an excess of savings over investment and therefore there is a capital outflow (or less capital inflow). This depreciates the real exchange rate by nearly 1.5 per cent below baseline (but the Chinese currency is pegged to the US dollar, thus prices in China fall). Consequently the Chinese trade balance moves more into surplus. Who benefits from this capital outflow is an interesting point and is discussed later, but it demonstrates again the need for a comprehensive consistent framework that traces all real and financial variables.

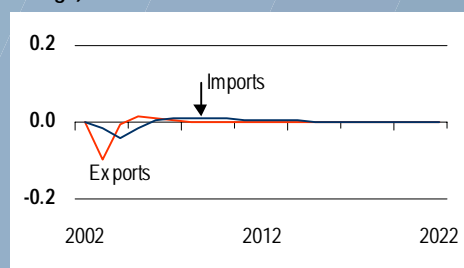
The drop in real interest rates affects asset values and equity prices (represented by Tobin's q for capital goods) by 4 percentage points above

CHART 5: TEMPORARY SCENARIO: INCREASED SERVICE COSTS — CHINA

Real GDP, consumption and investment (per cent of GDP deviation from baseline)



Exports and imports (percentage point change)



Equity prices and real effective exchange rate (percentage point change)

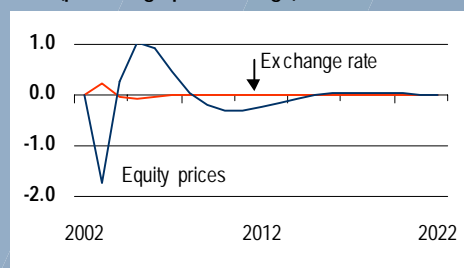
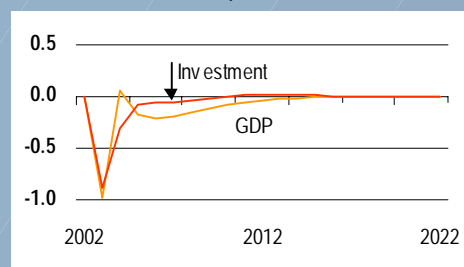
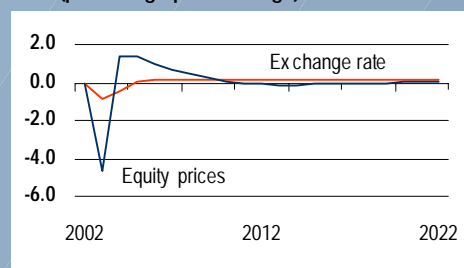


CHART 6: TEMPORARY SCENARIO RISE IN COUNTRY RISK — CHINA

Real GDP and investment (per cent of GDP deviation from baseline)



Equity prices and real effective exchange rate (percentage point change)



baseline in 2003 with a subsequent drop as real interest returns to baseline — shown in the last panel of chart 4.

2. Increased cost of services

The extra cost of business, means production falls and GDP for China falls by 0.7 per cent below baseline in 2003 (panel 1 of chart set 5). But now, this fall is accompanied by a lower return on capital, hence real investment falls. Less production and higher costs means prices rise, the real money supply falls and short term real interest rates rise. Less goods to export and less consumption means less imports causing both variables to decline, the net effect being a small drop in the trade balance. Consistent with this small drop in the trade balance (more capital inflow), the rise in real interest rates and rise in producer prices, there is a small appreciation of the real effective exchange rate — the opposite to what happened when there was a demand drop for services. Equity prices now fall.

3. Increased country risk

The higher uncertainty and increased risk now mean the required rate of return on capital is higher. Current low rates of return relative to high-required rates of return implies the capital stock is too high. Investment temporarily declines until the capital stock runs down sufficiently. Investment falls by 0.9 per cent below baseline in China in 2003, dragging down real GDP with it causing a 1 per cent decline (see chart set 6). The reappraisal of risk means capital flows out to less risky countries. To provide this outflow (or less inflow) the trade balance has to improve — in this case exports rise and imports fall. The real effective exchange rate must depreciate as well. The higher-required rate of return on capital means equity prices must fall — which they do by 5 percentage points in 2003.

Temporary versus persistent scenario

The above results show that some effects of SARS compound each other, while some are offsetting. The combined effects for key variables for the temporary outbreak is shown in chart set 7. Hong Kong is worst affected due to the large size of its service sector, the large size of its travel and tourism sectors and the relatively high incidence of the SARS outbreak. Real GDP could be nearly 5.5 per cent below baseline in Hong Kong in 2003, even if the outbreak proves a short term affair.

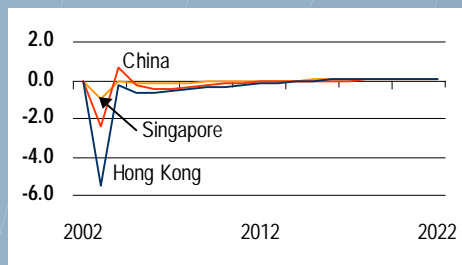
Besides China, Singapore is the next most affected country. Investment in all three declines despite the boost to savings from the drop in consumption.

For real effective exchange rates, the depreciating forces in China and Singapore outweigh the tendency to appreciate from the extra cost of service delivery as a result of SARS. The opposite is true in Hong Kong.

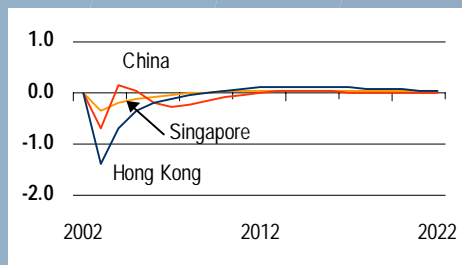
The persistent SARS scenario (chart set 8) shows the effects are far more pronounced and more protracted. The shock is more serious for Hong Kong than China as the negative effect is more protracted. Hong Kong's

**CHART 7: TEMPORARY SCENARIO
COMBINED EFFECTS— CHINA, HONG KONG
& SINGAPORE**

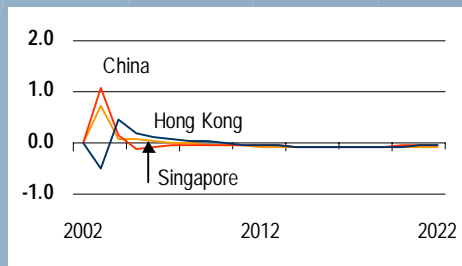
Real GDP (per cent of GDP deviation from baseline)



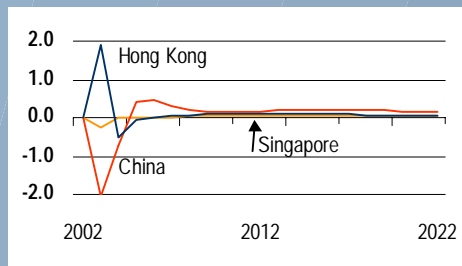
Investment (per cent of GDP deviation from baseline)



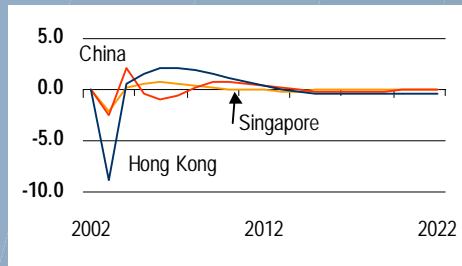
Trade balance (per cent of GDP change)



Real Exchange rates (percentage point change)



Equity prices (percentage point change)



economy, with its high level of services and travel and tourism, is more vulnerable.

Under the persistent scenario, the relative effect of the country risk component of the SARS shock is more important in its effect on the economy. The persistent country risk premium (albeit a fading one over ten years) causes large capital outflows from China and Hong Kong. The net capital outflow rises to a peak of 3.5 per cent of GDP for Hong Kong in 2004 and 2.5 per cent of GDP for China.

To match this large capital outflow, there has to be surplus in the trade balance shown on the third panel of chart set 8. The real effective exchange rates of China, Hong Kong and Singapore depreciate, the fall being 8 per cent below baseline for China in 2004 before recovery.

Effects on other countries

There are negative effects for real GDP for all other countries, but the effects are not nearly as great in percentage terms as the impact on China and Hong Kong (see table 2). Besides Hong Kong, China and Singapore, the next most affected countries are Malaysia, Thailand, Taiwan, the Philippines and Korea.

The United States, Japan, Australia, New Zealand and Europe (comprising mostly 'other OECD') experience losses in the range of 0.11 to 0.15 per cent of GDP below baseline in 2003. An interesting feature is that, on the pattern of the SARS outbreak simulated, under the persistent scenario the annual losses in 2003 for these countries is slightly less. The reason is that those Asian economies more adversely affected by the persistent outbreak of SARS experience greater capital outflow (or less inflow) and this has a slightly beneficial effect on other countries — they get more access to capital on slightly more beneficial terms and is a small positive for these economies. Again, that highlights the need for a comprehensive, consistent global framework when analysing these questions.

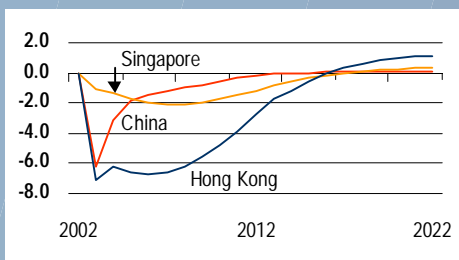
2. Percentage change in GDP in 2003 due to SARS

	<i>Temporary shock</i>	<i>Persistent shock</i>
	Total effects	Total effects
United States	-0.14	-0.13
Japan	-0.15	-0.11
Australia	-0.13	-0.11
New Zealand	-0.16	-0.16
Indonesia	-0.16	-0.14
Malaysia	-0.32	-0.36
Philippines	-0.21	-0.25
Singapore	-0.95	-1.08
Thailand	-0.31	-0.30
China	-2.42	-6.16
India	-0.09	-0.07
Taiwan	-0.26	-0.27
Korea	-0.20	-0.17
Hong Kong	-5.46	-7.13
Other OECD	-0.11	-0.10
Non-oil LDCs	-0.10	-0.10
Eastern Europe and Russia	-0.13	-0.11
OPEC	-0.14	-0.18

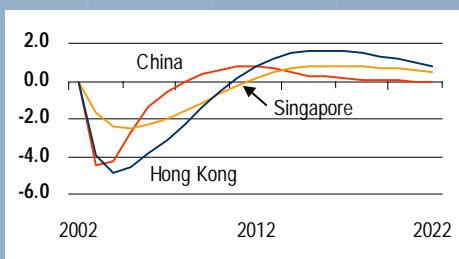
Source: G-Cubed (Asia Pacific), Model version 50n.

CHART 8: PERSISTENT SCENARIO: COMBINED EFFECTS —CHINA, HONG KONG, & SINGAPORE

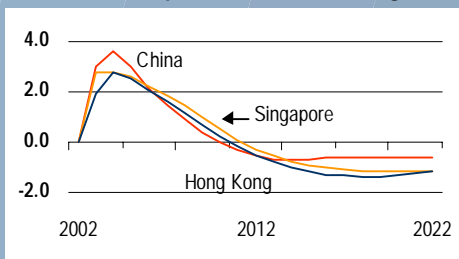
Real GDP (per cent of GDP deviation from baseline)



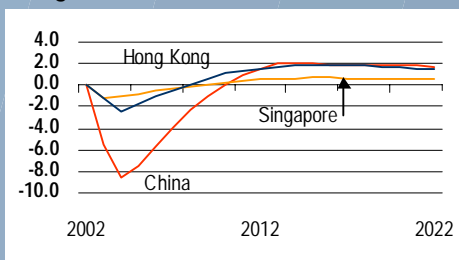
Investment (per cent of GDP deviation from baseline)



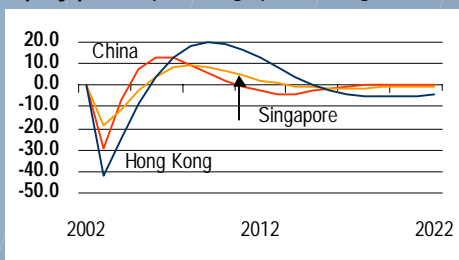
Trade balance (per cent of GDP change)



Real Exchange rates (percentage point change)



Equity prices (percentage point change)



Implications for investors

Asian economies, centered around China, Hong Kong and Singapore are most adversely affected by the SARS outbreak. The key variables to watch in the short term are consumer spending, especially retail sales, travel and tourism as well as the disruptive effects on business and the extra costs that entails. Country risk effects are less important if the short term scenario proves correct.

Country risk becomes a much larger problem for Asian economies, especially Hong Kong, China and to some extent Singapore and less so Malaysia and Taiwan, if the persistent scenario, wherein either SARS proves difficult to get under control or a new similar virus appears, proves the case. But under this scenario, investors need not stay out of the market for the duration of the outbreak — there is a rebound in equity prices by 2005 for China and 2006 for Hong Kong as real interest rates return to baseline and expectations of a recovery in GDP take hold.

Another feature of the persistent scenario is that, provided the outbreak is confined to its current distribution, the effects on other major economies of the United States, Japan and Europe is not large (in percentage terms). Equity markets are not severely affected by SARS and any negative reaction priced in the market now — everything else being equal — may be overdone. Most surely there will be new viruses that appear from Southern China, so a key variable to watch is the speed with which authorities act and how successful they are in curtailing the spread of the disease in an era of mass travel. Over time, the development of an effective public health system in China and other developing countries in Asia will be required to reduce the risk of these types of diseases from impacting in future years.

The final point to stress is that in weighing up a temporary versus persistent scenario for risk evaluations, the balance of forces at work are different. Risk becomes more important under the persistent scenario. That is sufficient to change the sign on variables. For example, exports from Hong Kong fall sharply under the temporary scenario. But, in the persistent case, exports from Hong Kong rise in 2003. The explanation is that under the persistent scenario there is a much larger capital outflow which has to be reflected in a current account and trade balance surplus. Exports rise and imports fall to make this possible.

While it appears the rate of new reported cases is falling, there have been cases of repeated flare-ups of similar outbreaks in the past. And new viruses could appear since Southern China, where the concentration of ducks, pigs and people is greatest, is the global epicenter of new viruses.

Either way, the economic fall-out for western countries is manageable, based on the current pattern and rate of outbreak. The effects on Hong Kong and China, however, could be serious.

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