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Contents

LIST OF ABBREVIATIONS

bpd	barrels per day
bps	basis points
COE	Certificate of Entitlement
CPF	Central Provident Fund
CPI	consumer price index
CSCE	Coffee, Sugar and Cocoa Exchange
DLI	Domestic Liquidity Indicator
DOS	Department of Statistics
DSPI	Domestic Supply Price Index
EDB	Economic Development Board
EPD	Economic Policy Department
FA	factor analysis
FDI	financial development index
FI	fiscal impulse
FX	foreign exchange
FY	financial year
GDP	Gross Domestic Product
GST	goods and services tax
HDB	Housing and Development Board
HDD	hard disk drive
HSFO	high sulphur fuel oil
IC	integrated circuits
IEA	International Energy Agency
IMF	International Monetary Fund
IPI	import price index
LPG	liquid petroleum gas
LTA	Land Transport Authority
MCB	minimum cash balance
MMOs	money market operations
MOM	Ministry of Manpower
MRT	Mass Rapid Transit
MSD	Macroeconomic Surveillance Department
NEER	nominal effective exchange rate
NORX	non-oil re-exports
OPEC	Organisation of the Petroleum Exporting Countries
PCA	principal components analysis
PMETs	Professionals, Managers, Executives and Technicians
PPI	Producer Price Index
q-o-q	quarter-on-quarter
REER	real effective exchange rate
REIT	real estate investment trusts
SAAR	seasonally adjusted annualised rate
SERS	selective en-bloc redevelopment scheme
SGS	Singapore Government Securities
TWIBOR	trade-weighted interest rate
UIP	uncovered interest parity
ULC	unit labour cost
URA	Urban Redevelopment Authority
VAT	value added tax
WTI	West Texas Intermediate
y-o-y	year-on-year

Preface

The *Macroeconomic Review* is published twice a year in conjunction with the release of the MAS Monetary Policy Statement. The *Review* documents the Economic Policy Department's (EPD) analysis and assessment of macroeconomic developments in the Singapore economy, and shares with market participants, analysts, and the wider public, the basis for the policy decisions conveyed in the Monetary Policy Statement.

The production of the *Review* is coordinated by EPD under the general direction of Dr Khor Hoe Ee, Assistant Managing Director (Economics), and Edward Robinson, Executive Director (Economic Policy & Macroeconomic Surveillance). EPD is supported by the Macroeconomic Surveillance Department (MSD) in this project. The primary contributors to the *Review* were Celine Sia, Ng Bok Eng, Liew Yin Sze, Soo Cheng Ghee, Priscilla Ng, Tu Suh Ping, Supaat Saktiandi, Jason Lee, Ng Yi Ping, Koh Ngiap Weu, Cyrene Chew, Ng Tze Wei, Ang Eng Siong, Dennis Tan, Guo Shanyi, Koh Tsin Zhen, Tan Yin Ying and Edwin Heng. Peter Wilson, Associate Professor, Department of Economics, National University of Singapore edited the publication and provided comments and guidance. The data used in the *Review* were drawn from the following government agencies: CPF Board, DOS, EDB, IE Singapore, MOF, MOM, MTI, STB and URA.

The *Review* may be accessed in PDF format on the MAS website: http://www.mas.gov.sg/masmcm/bin/pt1Macroeconomic_Review.htm.

The *Review* may also be purchased at major bookstores, online (http://asp.marketasia.com.sg/Spore/sporeindex.asp), or on an annual subscription basis (details on the last page).

Highlights

The domestic economy has exhibited remarkable resilience this year, against the headwinds of high oil prices, hikes in interest rates, and geopolitical tensions. For the first three quarters of this year, the Singapore economy chalked up impressive growth of 8.5%, reflecting broad-based expansion across the manufacturing and services sectors. Concomitantly, the labour market saw a record high number of jobs created in the first six months of the year. Barring any shocks, Singapore's GDP growth is on track to reach the upper half of the 6.5% to 7.5% official forecast range.

Looking ahead, the global economy is clouded somewhat by several risk factors, including the uncertainties over oil prices, the severity of a slowdown in the US economy, and the extent of a downturn in the global IT market. Nevertheless, these downside risks to growth appear limited at this stage, and the external environment is likely to continue to be broadly supportive. Against this backdrop, Singapore's GDP growth is expected to ease back to its medium-term potential rate next year.

Chapter 1 of the Review describes in detail the recent performance of the domestic economy in Q2 and Q3. Notably, we highlight how some of the services industries have provided the support to growth when the mainstay trade-oriented sectors suffered from a temporary retraction in Q2. We take the opportunity to also review some of the longer-term factors that underpin the economy's resilience. This includes a short section on the factors contributing to the robust performance of Singapore' re-export sector. There is a box on "Spillover Effects from Financial Services on the Business Services Sector" that highlights the outsourcing trends from financial to business services in recent years.

Chapter 2 examines the wage-price dynamics in the Singapore economy. External factors, notably the sharp rise in oil prices, continued to underpin domestic CPI inflation. In comparison, domestic sources of inflation have remained muted, reflecting the effects of globalisation, increased domestic competition and subdued wage growth. Specifically, our econometric estimates suggest that China has been a key source of disinflation for domestic consumer prices. We have included a box on "Consumer Price Adjustments in Singapore" at the end of the chapter that characterises the process of price adjustments across various consumer product and services categories. On the labour market front, the data shows that locals have benefited from the recent robust employment performance, with almost 6 out of every 10 jobs created going to Singaporeans. In addition, the increased demand for skilled workers is evident across many sectors in the economy.

Chapter 3 contains our assessment of the growth, labour market and inflation outlook for the Singapore economy, taking into account developments in the global economy, oil markets, and the IT industry. In particular, we have taken a closer look at how the current correction in the US housing market could have an impact on US consumer spending. The chapter also contains a detailed discussion of the global IT market, in which we assess the current state of play against a longer-term perspective of the IT cycle.

Finally, the *Review* contains two Special Features which draw on the ongoing work of the Department. The studies involve the application of econometric techniques. In the first study, we review the evidence on the uncovered interest rate (UIP) parity condition. The tests confirm that the UIP condition holds in Singapore before and after the Asian Financial Crisis both for domestic interest rates against the US$ SIBOR (Singapore Interbank Offered Rate), and domestic interest rates against trade weighted interest rates or TWIBOR (Trade-Weighted Interbank Offered Rate). The second study makes use of factor analysis to develop an index to capture the broad range of financial sector activity in Singapore. The Financial Development Index shows that growth of financial services has picked up sharply since the late 1990s which reflects in part the effect of the liberalisation and promotion measures. The chapter also provides evidence on the importance of financial sector development in Singapore's long-term economic growth.

The next issue of the *Review* will be released in April 2007.

Economic Policy Department
Monetary Authority of Singapore
25 October 2006

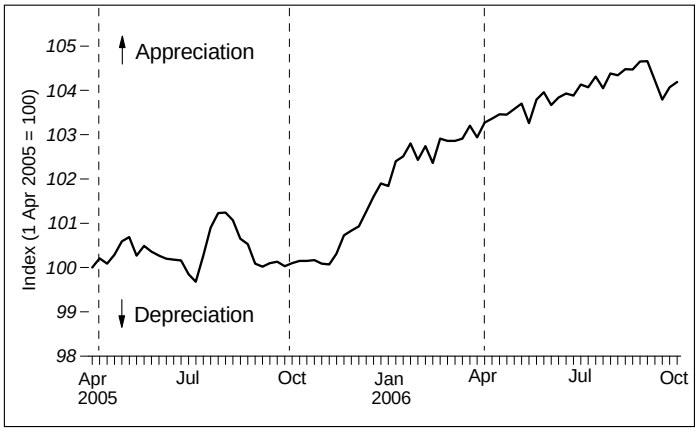
10 October 2006

Monetary Policy Statement

INTRODUCTION

1. In April 2006, MAS reaffirmed the policy of a modest and gradual appreciation of the S$NEER policy band. This policy stance, which has been in place since April 2004, has contributed to the low inflation environment amidst the robust economic conditions of the past few years.

Chart 1
Nominal Effective Exchange Rate (S$NEER)



- - - - indicates release of statement on monetary policy

2. The S$NEER has stayed in the upper half of the policy band since the last policy review. (Chart 1) This reflected a number of factors, including the weak US$ sentiment, strong investment inflows into emerging Asian markets, as well as a relatively buoyant Singapore economy. In particular, both short-term and long-term capital inflows had increased significantly in the first half of this year. More recently, the S$NEER eased in mid-September, due in part to a strengthening of the US$ following the G7 meeting last month.

3. After a strong rebound last year, the three-month domestic interbank rate rose further to 3.56% in June 2006, before declining to 3.44% as at end-September. Notwithstanding the general rise in interest rates, the demand for credit has picked up, particularly in industries such as construction and transport & communications.

OUTLOOK FOR 2006 AND 2007

4. The *Advance Estimates* released by the Ministry of Trade and Industry indicated that the Singapore economy grew at a faster pace in Q3 2006, following some slowdown in the second quarter. On a quarter-on-quarter seasonally adjusted annualised (q-o-q SAAR) basis, GDP expanded by 6.0% in Q3, up from 3.4% in Q2 2006. The manufacturing and transport-hub services sectors grew more strongly in Q3, after a pull-back in the preceding quarter, while growth of the domestic-oriented, tourism, and financial services sectors continued to hold firm. GDP growth this year should come in at the upper half of the official forecast range of 6.5-7.5%.

5. Going forward, the global outlook next year is clouded by signs of slower growth in the US economy, reflecting in part the ongoing correction in the housing sector. Nevertheless, the moderation in US growth has thus far been confined to specific sectors and the economy on the whole is expected to avoid a sharp downturn. China and India are likely to continue growing apace, lending support to the regional economies. Further, following the recent decline in oil prices, fears of an oil price shock crippling the world economy have receded. While signs of moderation have emerged in the global IT markets, the likelihood of a severe downturn is low.

6. Despite the continuing risks to external demand conditions, the outlook for the Singapore economy remains generally positive at this stage. GDP growth is expected to be sustained in 2007, although at a slower rate compared to 2006. The manufacturing sector will be driven by the semiconductor and marine engineering industries, while the services sector will be led by trade-related activities. Following the strong performance of the economy in 2006, GDP growth is likely to approach its medium-term potential rate next year, barring any unexpected shocks.

7. Inflationary pressures remain well-contained under the present policy stance. Headline CPI inflation rose to an average of 1.2% in the first eight months of this year, from 0.5% for the whole of 2005, reflecting stronger pass-through effects from higher oil prices. Going into 2007, tighter labour market conditions and the lagged effects of commodity price increases would continue to underpin domestic price pressures. However, the fall in oil prices, if sustained, would take some pressure off headline CPI inflation. Importantly, structural changes to the economy including a more competitive environment and diversified sources of imports have helped to cap price increases. Headline CPI inflation for 2007 is forecast to be in the 0.5-1.5% range, similar to that in 2006. The underlying inflation measure, which averaged 1.8% in the first eight months of this year, is expected to remain within 1-2% in 2007.

MONETARY POLICY

8. The Singapore economy has expanded strongly this year. While the growth momentum is expected to moderate, the economy should grow at close to its potential in 2007. At the same time, CPI inflation will be contained in 2006 and 2007 under the current policy stance.

9. MAS will maintain the policy of a modest and gradual appreciation of the S$NEER policy band. There will be no re-centring of the policy band, or any change to its slope or width.

CHAPTER 1

MACROECONOMIC DEVELOPMENTS

1.1 External Developments

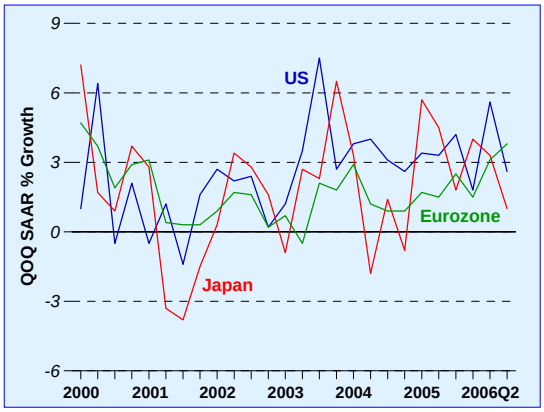
Growth Slowed in the Second Quarter

Following strong performance in the first three months of the year, the global economy eased during the Apr-Jun 2006 quarter. Amongst the developed economies, significant slowdown was seen in the US and Japan, which offset the firmer growth in the Eurozone. Likewise, Asian economies generally moderated in Q2 2006 due largely to weaker domestic demand.

US growth moderated in Q2 2006 after rebounding strongly post-Hurricane Katrina.

After expanding by a strong 5.6% q-o-q SAAR in Q1 2006 due to post-Hurricane Katrina effects, the US economy pulled back sharply in the second quarter. Real GDP growth eased to 2.6% q-o-q SAAR in Q2 2006, as growth in personal consumption and business investment moderated. (Chart 1.1) The ongoing correction of the housing market was also a significant drag on the economy, with residential investment alone subtracting 0.7% point from GDP growth. Accordingly, and with no significant inflationary pressure, the US Federal Reserve kept monetary policy on hold, leaving the overnight target Fed funds rate at 5.25% at the August and September meetings.

Chart 1.1
G3 GDP Growth



Source: Datastream

Corporate investment supported growth in the Eurozone while growth momentum slowed in Japan.

The Eurozone economy expanded at a robust rate of 3.8% q-o-q SAAR in Q2 2006, a pace not seen since 2000. Growth was driven by the two largest economies, Germany and France. Amidst improved corporate profitability and business confidence, corporate investment picked up strongly, providing the main pillar of support for the Eurozone. In Japan, real GDP growth slowed to 1.0% q-o-q SAAR in Q2 2006, from 3.3% a quarter earlier. (Chart 1.1) Although consumer spending and business investment both expanded at a faster pace, these were partially offset by the sharp contraction in private residential and public sector investment. Weaker export growth also dampened overall GDP growth during the quarter.

Asian growth broadly slowed as domestic demand weakened.

Growth in the Asian economies generally softened, though there were exceptions. (Table 1.1) China was one of the outliers, with real GDP growth accelerating to 11.3% y-o-y in Q2 2006, the strongest growth rate in a decade. This was fuelled by robust investment growth, despite several interest rate hikes this year and administrative measures to restrain capital spending. In Indonesia and Malaysia, exports and private consumption remained firm, respectively. Both countries also witnessed increased government consumption and some build-up in inventories.

Elsewhere in the region, economic growth decelerated in tandem with weaker domestic demand. In particular, investment growth slowed sharply in Thailand, Hong Kong and South Korea, and turned negative in Indonesia, Taiwan and the Philippines. This was likely due to a combination of factors, including political uncertainty, the rise in interest rates and higher oil prices. These same factors also weighed on personal consumption growth, which generally moderated during the Apr-Jun 2006 period compared to the previous quarter.

Pause or reversal in monetary policy in Asia due to easing of inflationary pressures.

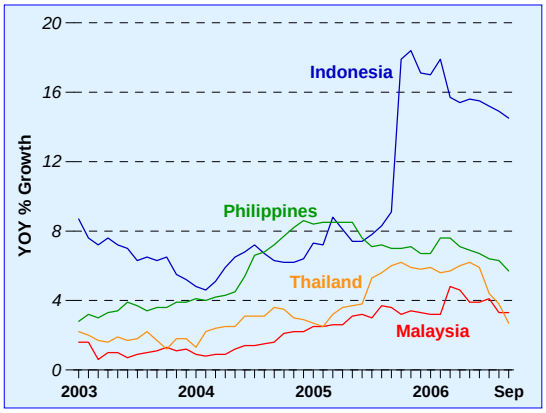
Except for Hong Kong and China, CPI inflation in the rest of the Asian economies has generally been flat or trending down in recent months. (Chart 1.2) This was, to some extent, a consequence of the diminishing base effects of fuel price hikes that were implemented last year, particularly in Indonesia, Malaysia and Thailand. The more moderate CPI inflation rate also reflected weaker domestic demand conditions due to earlier rounds of interest rate hikes. Korea, Thailand and Indonesia (until May 2006) were amongst those that tightened monetary policy most aggressively. However, as inflationary pressure has started to subside in recent months, central banks in the region have begun to pause, or even ease monetary policy. (Chart 1.3)

Table 1.1
East Asian GDP Growth

y-o-y (%)	2004	2005	2006	
			Q1	Q2
China	10.1	10.2	10.3	11.3
Hong Kong	8.6	7.3	8.0	5.2
Indonesia	5.1	5.6	4.7	5.2
Korea	4.7	4.0	6.1	5.3
Malaysia	7.2	5.2	5.5	5.9
Philippines	6.2	5.0	5.7	5.5
Singapore	8.7	6.4	10.6	8.0
Taiwan	6.1	4.0	4.9	4.6
Thailand	6.2	4.5	6.1	4.9

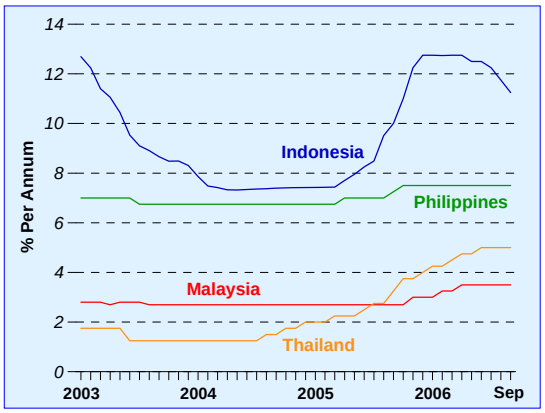
Source: CEIC

Chart 1.2
CPI Inflation



Source: CEIC

Chart 1.3
ASEAN-4 Interest Rates*



Source: CEIC

* 30-day SBI rate for Indonesia, overnight policy rate for Malaysia, overnight reverse repo rate for the Philippines and 14-day repo rate for Thailand.

1.2 Domestic Economy

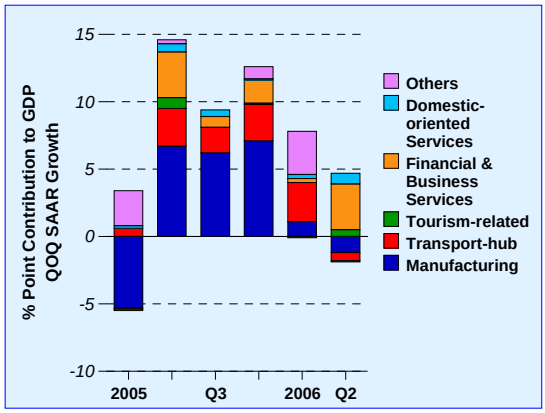
Taking a Breather

Growth momentum moderated further in Q2 ...

With the softening in external demand, economic activity in Singapore decelerated in Q2. On a q-o-q SAAR basis, GDP growth eased to 3.4% in Q2, down from 7.6% in the preceding quarter. Indeed, the growth momentum has come down from a cyclical high at the end of last year, with sequential GDP growth averaging 5.5% in the first two quarters of 2006, half the double-digit pace recorded in H2 2005.

Notwithstanding the slowdown in the overall economy, there were some differences in the performances of the individual sectors, which revealed alternative sources of growth support to the mainstays in Q2. While the trade-oriented sectors (such as manufacturing and transport-hub services) weakened, the domestic-oriented, tourism-related, financial and business services sectors – which had lagged in the earlier expansion – appeared to have caught up somewhat. (Chart 1.4) These sectors provided an offset to the weaker performance of electronics, which had been triggered by a softening in the global IT cycle and some industry-specific consolidation.

Chart 1.4
Contribution to GDP Growth



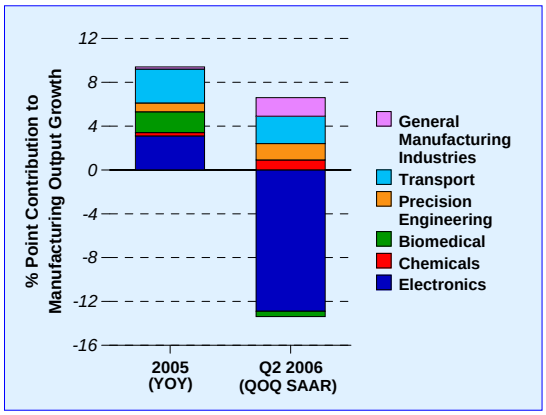
Source: EPD, MAS internal estimates

... due largely to the contraction in the manufacturing sector.

The manufacturing sector saw the most pronounced moderation. Following four quarters of strong sequential expansion averaging 21%, industrial production contracted by 6.7% in Q2. (Chart 1.5)

The electronics industry shrank by 9.6% q-o-q SAAR in Q2 2006, alongside emerging signs of moderation in the global IT industry. In particular, products in the downstream segment were the hardest hit, with domestic production of computer peripherals and infocomms & consumer electronics registering contractions during the quarter. In part, this resulted from a levelling off in downstream demand in the end markets – as proxied by US private consumption and investment of IT products – after a sustained period of strong increases. (Chart 1.6)

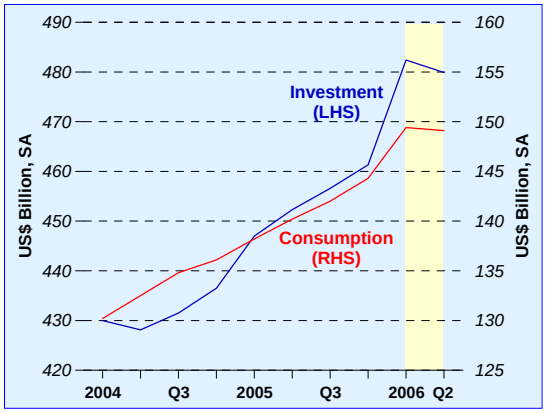
Chart 1.5
Contribution to Manufacturing Output Growth



However, the weakness was confined to the downstream segment. Midstream conditions remained sanguine, with global chip sales expanding by 8.7% in H1 compared to the same period last year. Furthermore, chip prices, as estimated by US Producer Price Index (PPI) of integrated circuits (ICs), strengthened in Q2 and held firm. (Chart 1.7) Against this backdrop, Singapore's semiconductor industry recorded further gains of 28% q-o-q SAAR in Q2.

Apart from a cyclical pullback in global IT markets, the softness in the domestic electronics cluster was also due to consolidation in the hard disk drive (HDD) industry. The winding down of Maxtor's operations arising from its acquisition by Seagate caused Singapore's disk drive production to fall sharply after H2 2005, with output levels in Q2 2006 some 30% lower than the peak in Q3 last year.

Chart 1.6
US Private Consumption and Investment of IT Products

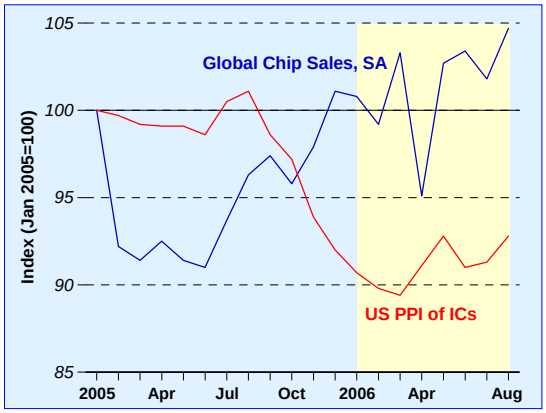


Source: CEIC

Growth of non-electronics manufacturing output was also muted.

Output in certain non-electronics manufacturing industries also experienced sharp corrections in Q2, due to various transient factors. Industry-specific volatility caused pharmaceutical output to contract by a further 10%, after falling by 31% in Q1. Meanwhile, the marine & offshore engineering segment saw a 10% contraction after nine quarters of robust growth. Temporary capacity constraints in the shipyards may have put a cap on expansion, after a particularly strong performance in 2005. Indeed, Singapore's two largest shipyards won an estimated $10.7 billion of new orders in 2005 alone, more than the total from the three preceding years combined.

Chart 1.7
Global Chip Sales and US PPI of ICs



Source: Semiconductor Industry Association for global chip sales, US Bureau of Labour Statistics for US PPI of ICs; EPD, MAS internal estimates for Global Chips Sales

Transport-hub services turned in negative growth in tandem with the fall in manufacturing output.

As for the transport-hub services, non-oil re-exports (NORX) dipped into negative territory in Q2 following the slowdown in the global IT industry and, by extension, its impact on the regional electronics production network. Likewise, the volume of air cargo handled through Singapore fell in Q2, after peaking in Q1.

However, domestic-oriented services recorded a strong performance in Q2, providing a fillip to overall growth.

While the transport-hub services faltered in Q2, the domestic-oriented services strengthened significantly. The retail sector grew by 5.0% q-o-q SA following several quarters of flat or slow growth. The current expansion was partly supported by the strong rise in visitor arrivals, reaching a record high during the quarter. In addition, the buoyant labour market, together with the release of the Progress Package announced in the FY2006 Budget, prompted a strong turnaround in residents' spending. Based on EPD's estimates, the fiscal stimulus from the Progress Package in Q2 accounted for 15% of residents' contribution to retail sales (excluding motor vehicles). (Chart 1.8)

Residents' expenditure abroad increased as well.

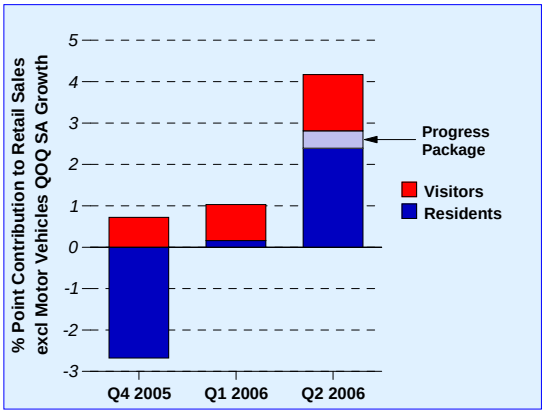
Singapore residents have been spending more abroad as well, with such expenditure nearly tripling between 1998 and 2005. The latest *General Household Survey 2005* shows that one out of two Singaporeans aged 15 years and above (or 1.4 million people) made at least one overseas trip in 2005.[1] (Chart 1.9)

Based on EPD's estimates, holiday expenses as a proportion of average household monthly expenditure increased from 4.4% in 1998 to 5.3% last year. (Chart 1.10) On average, the typical household spends about $2,400 a year on holidays. For the highest income group, the figure is closer to $6,000 and a breakdown of household income by quintiles shows that Singapore residents in higher-income households have a stronger tendency to spend abroad. In 2003 (latest available data), travel expenses accounted for 6.5% of monthly expenditure of the highest quintile group, compared to 2.2% of the lowest group.

Financial services saw rapid growth ...

The financial and business services sectors outperformed the broader economy both in terms of GDP and employment growth in Q2.

Chart 1.8
Contribution to Retail Sales Growth (excluding Motor Vehicles)



Source: EPD, MAS internal estimates

Chart 1.9
Residents' Expenditure Abroad

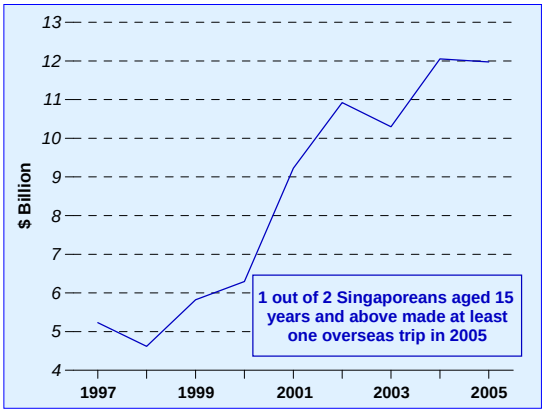
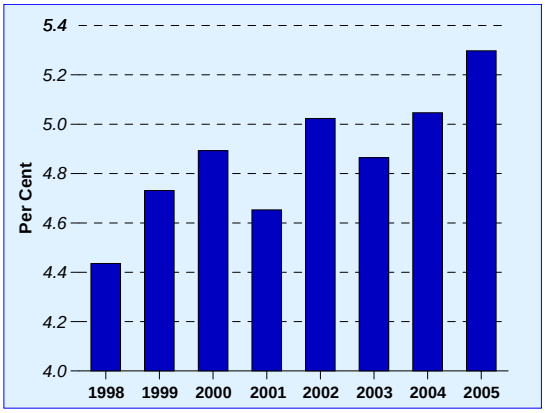


Chart 1.10
Proportion of Holiday Expenses in Household Monthly Expenditure



Source: EPD, MAS internal estimates

[1] Overseas trips in the *General Household Survey 2005* refer to trips that were longer than 24 hours and were made during the last 12 months prior to enumeration.

This is illustrated in Chart 1.11, which plots GDP growth q-o-q SAAR on the horizontal axis and quarterly employment growth on the vertical axis for the various sectors of the economy in Q2. The financial services sector posted the highest growth in activity and the second highest expansion in employment. 5,400 jobs were created in the financial sector in H1 this year, the bulk of which were in the banking industry.

Although the expansion was broad-based across financial services (Chart 1.12), a major impetus was the turnaround in the financial intermediation cluster. The domestic banking segment, in particular, was spurred by a marked rebound in non-bank lending as credit extended to the industrial sector began to pick up following a protracted period of sluggish growth. The strongest expansions were in loans to the transport & communications and building & construction industries.

Credit in the Asian Dollar Market also continued along the uptrend that began at the start of last year. Offshore lending to the non-bank sector rose by 11% in Q2, with loans to East Asia contributing most to the increase.

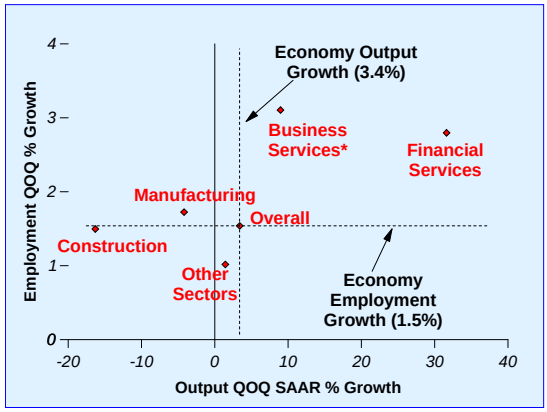
Another source of support for the financial sector in Q2 was the forex market as turnover value surged to new highs. (Chart 1.13) Global macroeconomic and political developments had led to increased volatility in international exchange rates. These include the recent halting of the Federal Reserve's interest rate tightening cycle, and renewed upward pressures on energy prices.

... which resulted in positive spillovers to the business services sector.

Alongside the robust growth momentum in financial services, business services expanded strongly in Q2 2006. (Chart 1.14) In particular, the real estate segment saw a marked improvement as private residential property prices trended up for the ninth consecutive quarter.

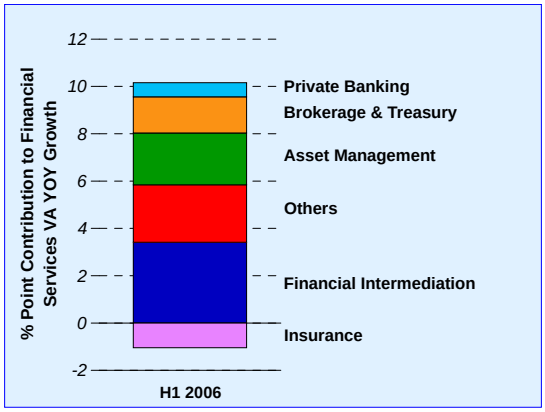
Other segments within business services, such as IT, accounting and legal services also benefited from growth in the domestic economy, particularly in the

Chart 1.11
Output and Employment Growth, Q2 2006



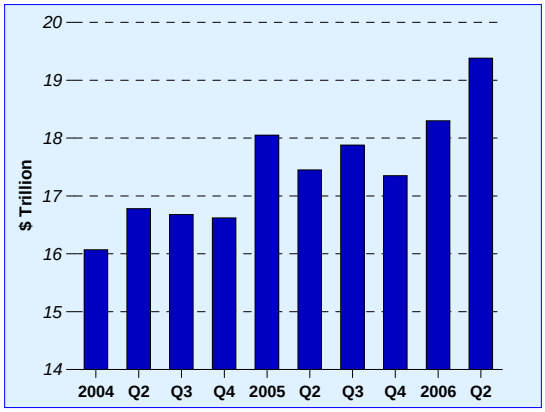
* Employment in Business Services consists of real estate & leasing services, professional services & administrative and support services under MOM's classification.

Chart 1.12
Breakdown of Financial Services Value Added Growth



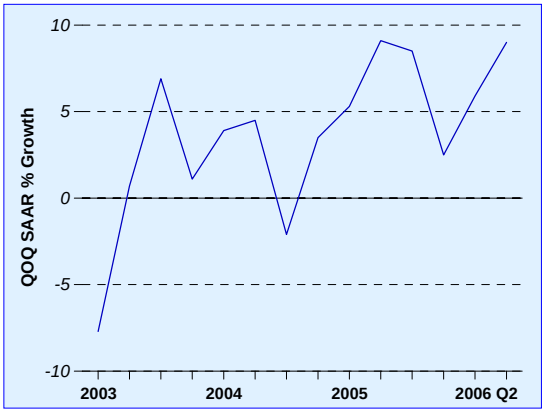
Source: EPD, MAS internal estimates

Chart 1.13
Forex Market Turnover



financial services sector. In fact, these professional services received the largest spillovers from financial services. Box A explores this relationship between the financial and business services sectors in greater detail.

Chart 1.14
Business Services Value Added

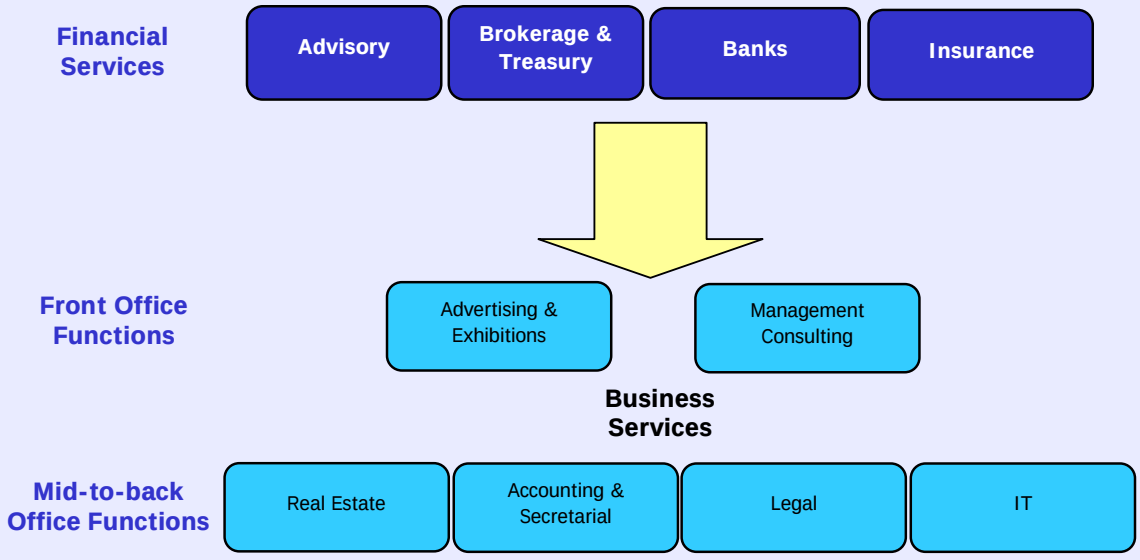


Box A
Spillover Effects from Financial Services on the Business Services Sector

This box examines the financial services' positive spillovers on the business services sector.

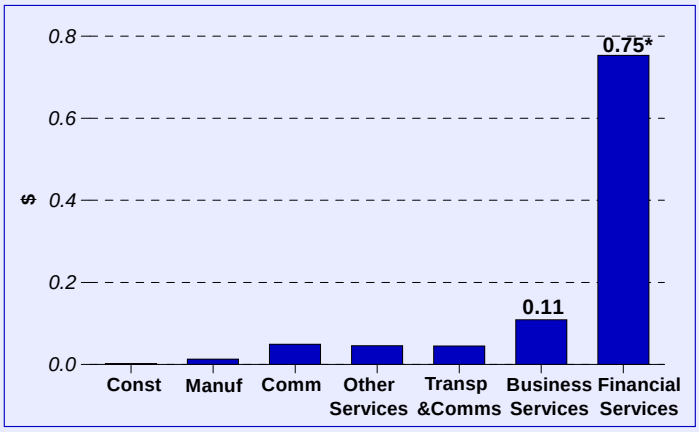
Financial services activities have close linkages with business services in the Singapore economy. For instance, the front offices of financial institutions often engage advertising companies for their promotional activities, while their mid-to-back offices frequently outsource their accounting, legal and IT functions to firms specialising in these supporting services. (Figure A1) Indeed, such outsourcing of non-core activities has gained momentum among financial institutions in recent years, as stronger competition has induced greater efforts to streamline operations and reduce costs.

Figure A1
Stylised Relationship between Financial and Business Services



Based on data from the *Singapore Input-Output Tables 2000*, a dollar increase in financial sector final demand generates 27 cents worth of spillovers to the rest of the economy. The business services sector was the largest beneficiary, receiving 11 cents (or 40% of the total spillovers on the rest of the economy). (Chart A1)

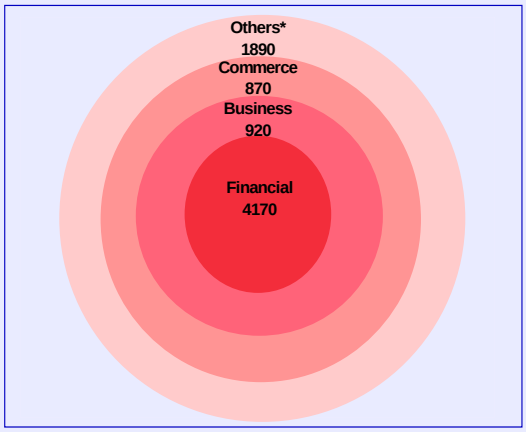
Chart A1
Spillovers Arising from a Dollar Increase in Financial Sector Final Demand



* The financial sector's spillovers are largest to itself amounting to 75 cents per dollar increase in final demand

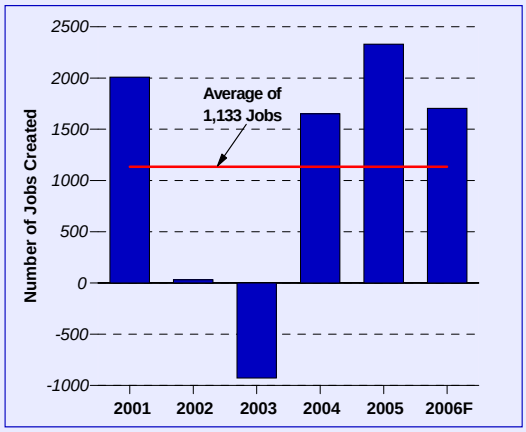
The boost from financial services has helped generate a substantial number of jobs in the business services sector. Based on EPD's estimates, every $1 billion increase in final demand in financial services generates 920 jobs in business services. (Chart A2) Applying this employment multiplier, employment spillovers from the financial sector amount to an annual average of around 1,100 jobs – or around 8% of total jobs created – in the business services sector over the period 2001-06. (Chart A3)

Chart A2
Jobs Created Per $Billion Increase in Financial Sector Final Demand



* Include manufacturing, transport & communications, construction and other services

Chart A3
Employment Spillovers from Financial Services on Business Services Sector

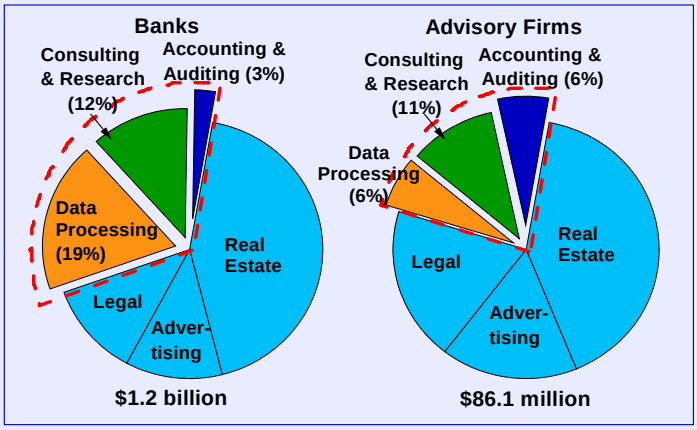


Source: EPD, MAS internal estimates

A significant portion of the spillovers described above is accounted for by financial institutions' outsourcing of non-core activities to companies in the business services sector. These are examined here using the income and expenditure data from the annual *Survey of Services*, which MAS administers for the DOS.

Between 2001 and 2005, banks and advisory firms spent an average of $1.2 billion and $86 million each year on business services-related activities, respectively. Chart A4 shows a breakdown of the expenditure patterns of banks and advisory firms – the two segments of financial services with the largest spillovers on business-related services. The information from the expenditure survey data also reveals that financial institutions have been outsourcing some non-core activities, in particular, consulting & research, data processing and accounting & auditing services. These comprise about a third of banks' business-related expenditure, and a smaller proportion (about a quarter) of advisory firms' expenditure.

Chart A4
Expenditure on Business-related Services (average 2001-2005)



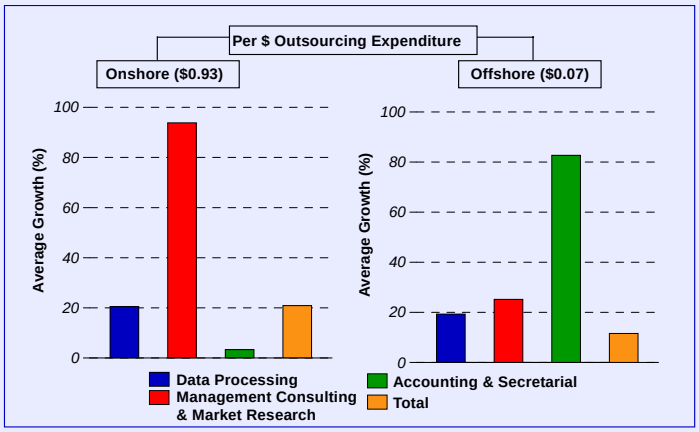
Activities outsourced

* Data for 2005 are preliminary estimates

However, while business-related functions are outsourced to firms both in and out of Singapore, the survey data suggests that the bulk of such outsourcing activities have been contracted to locally-based firms, rather than offshore service providers.

For the banks, 93 cents per dollar of outsourcing expenditure accrue to Singapore-based firms, with only 7 cents flowing overseas. (Chart A5) In addition, the growth of the onshore component has outpaced that of offshore activities in recent years, boosted by a sharp increase in management consulting activity. This reflects in part the engagement of consultants for new regulatory initiatives such as Basel II, and for market research amidst the increased competition in the industry. Meanwhile, the growth in offshore activities was boosted by accounting and secretarial services.

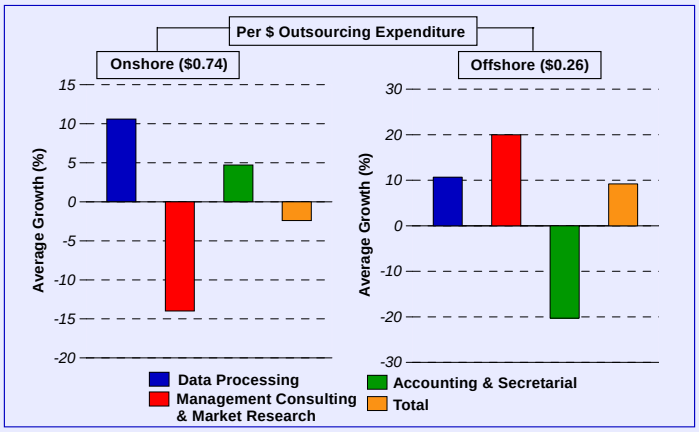
Chart A5
Banks' Outsourcing Expenditure (2001-2005)



* Data for 2005 are preliminary estimates

Similarly, outsourcing in the wealth advisory industry is dominated by the onshore component, with 74 cents per dollar being outsourced to local business services firms. Management consulting and market research appear to be increasingly outsourced offshore, while accounting and secretarial are still predominantly outsourced locally. (Chart A6)

Chart A6
Advisory Firms' Outsourcing Expenditure (2001-2005)



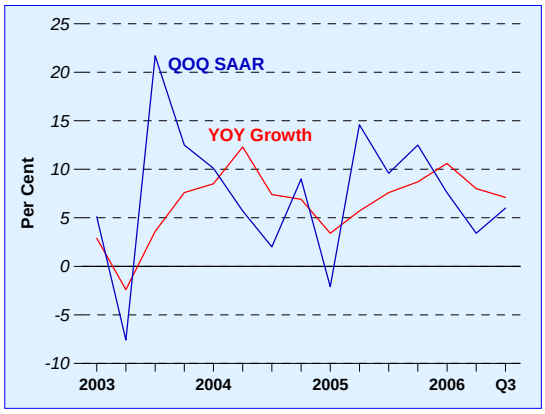
* Data for 2005 are preliminary estimates

In conclusion, the financial services sector has strong spillovers on business services in terms of both income and employment. A significant portion of these spillovers is accounted for by financial institutions' outsourcing of non-core activities but the bulk has been contracted to locally based firms.

Holding Firm in the Third Quarter

The domestic economy regained some traction in Q3. According to the *Advance Estimates*, the domestic economy grew by 6.0% on a q-o-q SAAR basis. (Chart 1.15) The improvement came as the drag from the trade-oriented sectors dissipated, while the other services sectors – namely, the domestic-oriented, tourism-related, financial and business services – remained resilient at this stage of the cycle.

Chart 1.15
GDP Growth

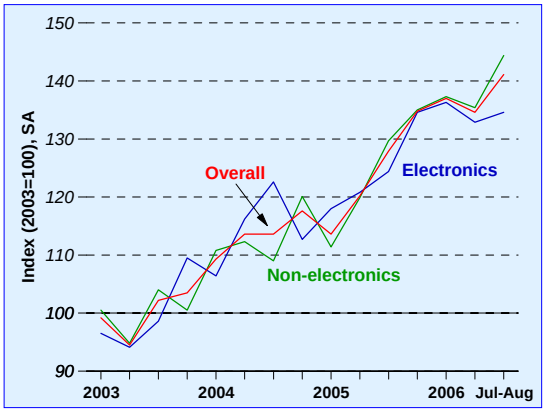


Manufacturing saw signs of a rebound in Q3 ...

Activity in the manufacturing sector showed signs of recovery in Q3, with industrial output in Jul-Aug some 4.8% higher than in Q2. (Chart 1.16) The electronics sector expanded steadily, supported by strong growth in semiconductor output. Furthermore, conditions in the data storage industry also appeared to have improved with robust sequential growth in early Q3.

Similarly, non-electronics manufacturing output recorded a sharp rebound in Jul-Aug, buoyed by the strong performances of the transport and biomedical clusters. The marine & offshore engineering segment provided the strongest boost, as a significant backlog of new orders was filled. Meanwhile, pharmaceutical

Chart 1.16
Manufacturing IIP



output rose modestly in early Q3 amidst some variation in product composition.

... and entrepôt trade bounced back strongly.

The dip in NORX in Q2 proved to be short-lived as well. NORX grew by 4.5% q-o-q SA in Q3, following an improvement in electronics re-exports. (Chart 1.17) Excluding the temporary dip in Q2 2006, NORX has enjoyed strong quarterly sequential growth since the beginning of 2005.

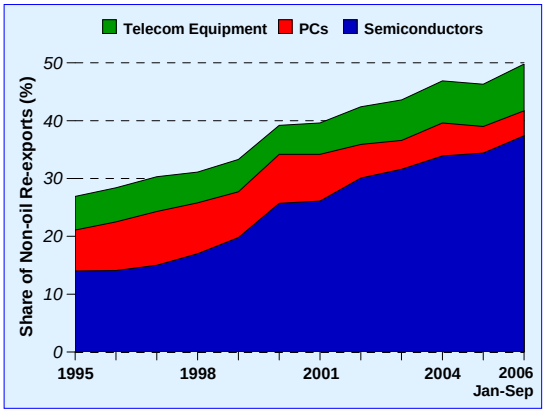
In fact, entrepôt trade has gained in importance in recent years, with its share in total exports rising from around 41% in 1990 to 53% in Jan-Sep 2006.[2] This has mainly been driven by growth in re-exports of semiconductors, which accounted for more than a third of Singapore's total NORX. (Chart 1.18) Semiconductor re-exports are more than double its domestic exports. A further breakdown shows that a large proportion of these semiconductor re-exports are bound for China and Malaysia, which have a strong comparative advantage in final electronics products and require semiconductors as inputs into their production processes. (Chart 1.19) China has now surpassed Malaysia as the top destination for Singapore's semiconductor re-exports.

Two critical factors underpin Singapore's role as a re-export centre for semiconductors. First, there is the advantage of connectivity. Semiconductors are typically air-flown in response to just-in-time logistic management, and Changi Airport's strong connectivity and efficiency fulfils this transport role well. Changi Airport has one of the most direct city links and largest number of flights per week among the region's airports. Singapore's connectivity and efficiency is further augmented by good supporting logistics facilities. This has resulted in lower logistic costs for exporters.

Second, while Singapore is still a major electronics manufacturing hub in the region, it is also fast becoming the distribution and testing centre for electronics components. This further strengthens its role as re-export hub. Semiconductor firms such as AMD and Infineon have their regional testing centres in Singapore, even though they have production facilities elsewhere in the region. These testing centres provide value added services such as device analyses and reliability testing, and cater to manufacturers based both in Singapore and overseas.

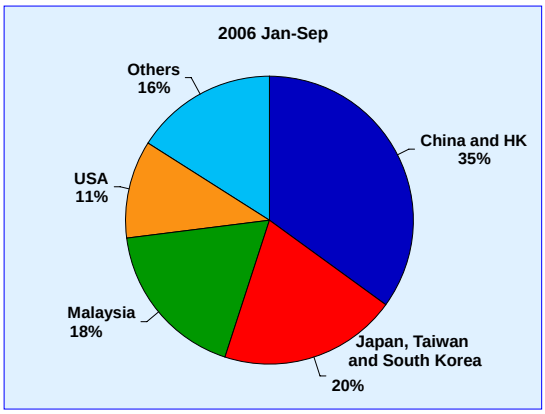
Chart 1.17
Non-oil Re-exports

Chart 1.18
Re-exports of Electronics by Products



Note: Data excludes trade with Indonesia.

Chart 1.19
Semiconductors Re-exports by Destination



Note: Data excludes trade with Indonesia.

[2] Excludes trade with Indonesia.

Growth in the other services sectors also held firm.

Apart from transport-hub services, other service sectors such as tourism-related, domestic-oriented, and the financial services also continued to post healthy growth in Q3.

The steady stream of visitor arrivals provided support to the tourism-related services, such as the hotel and airline industries in early Q3. For the first eight months of the year, visitor arrivals hit 6.5 million, a 10% increase over the same period last year. This raised the hotel occupancy rate to a 12-year high of 91% in July. (Chart 1.20) Although there was some retraction in retail sales, the decline was due largely to a dip in sales of motor vehicles.

Activity in the financial services sector remained at high levels, following the surge in Q2.

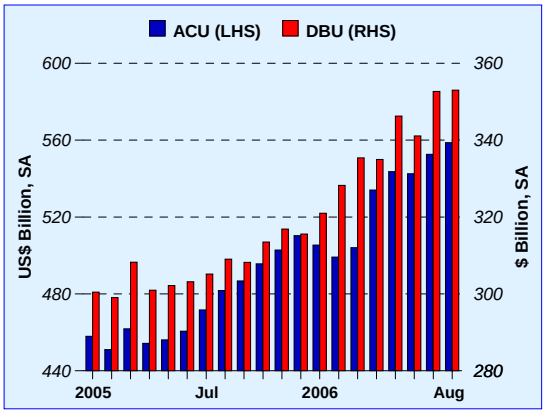
Meanwhile, financial services continued to record positive growth despite some moderation in momentum, in part attributable to an easing in domestic non-bank credit growth following the marked upturn in the previous quarter. (Chart 1.21) The offshore banking segment also saw more moderate growth in Jul-Aug.

In the sentiment-sensitive segments, the Q2 decline in stock market trading arising from the sell-off in the global equity market did not persist into Q3. Despite some lingering caution on the part of investors, trading activity generally held up. (Chart 1.22) Market confidence was bolstered by the still-healthy corporate earnings of Singapore firms, as well as robust incoming economic data, which confirmed that growth fundamentals for the domestic economy remained intact.

Private wealth management services also continued to strengthen in Q3, as a result of resilient macroeconomic conditions in the region and the rapid growth of high net worth individuals in the region. In addition, the trend of new private banks entering Singapore or upgrading existing services has not abated. Recently, Swiss fund manager Bank Julius Baer and AIG joined Citigroup and UBS as the latest players to ramp up their private banking operations here.

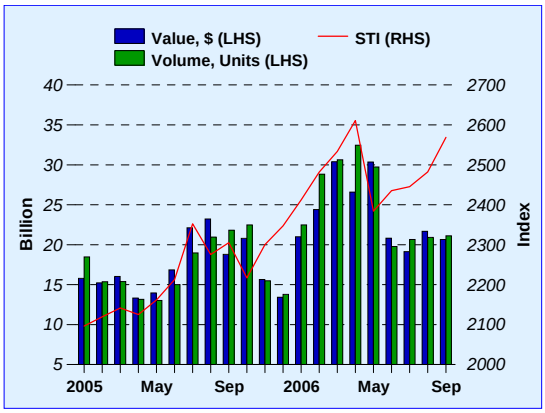
Chart 1.20
Visitor Arrivals and Hotel Occupancy Rate

Chart 1.21
Total Bank Lending



Source: EPD, MAS internal estimates

Chart 1.22
Stock Market Total Turnover and Straits Times Index (STI)



The domestic economy is on a steady and relatively broad-based growth path.

The domestic economy has transited to slower, but steadier growth this year, following the exceptionally strong expansion averaging 12% q-o-q SAAR between Q2-Q4 2005. Viewed in perspective, the relatively broad-based and sustained growth in the last few years has brought real GDP levels to some 30% above the trough in Q2 2003. Moreover, a comparison of the current expansionary phase with the high growth of the early 1990s suggests that sequential growth rates in recent quarters have been comparable. In recent quarters, the q-o-q growth rate has averaged around 2.1% q-o-q SA, compared with 1.9% between Q2 1989 and Q2 1992. (Chart 1.23)

The slowdown in growth this year was largely a consequence of a cyclical moderation in the trade-oriented sectors, in tandem with the softening global economy. With domestic-oriented services sectors recovering more strongly, overall growth has in fact held up relatively well compared to previous periods of strong growth and, on balance, has been fairly broad-based. (Chart 1.24) Chapter 3 assesses some of the risk factors ahead and how they might affect the outlook for the Singapore economy.

Chart 1.23
Real GDP Growth

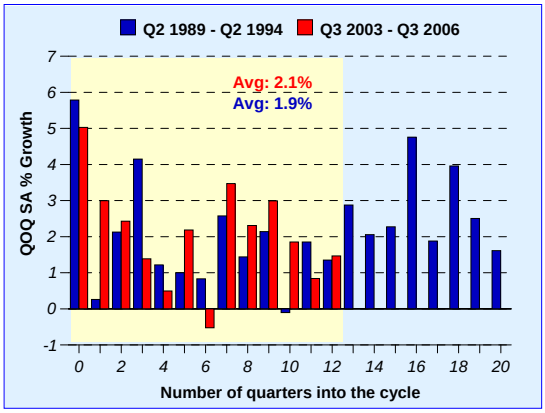
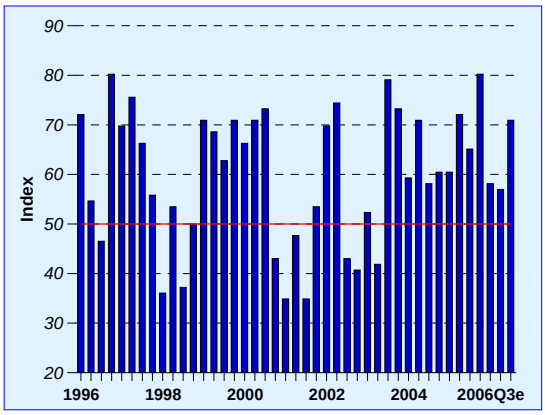


Chart 1.24
EPD Sectoral Diffusion Index

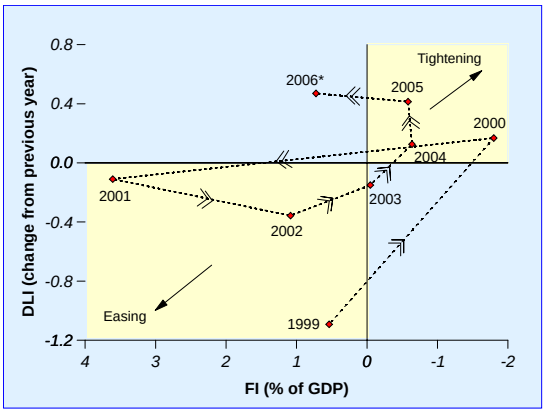


Notes:
- Historical average = 60
- A value of 50 indicates an equal number of expanding and contracting industries, while a value of 100 indicates that all the industries are expanding. The methodology used is similar to that of other diffusion indices. Some 45 industries across both manufacturing and services sectors are captured.

1.3 Macroeconomic Policy

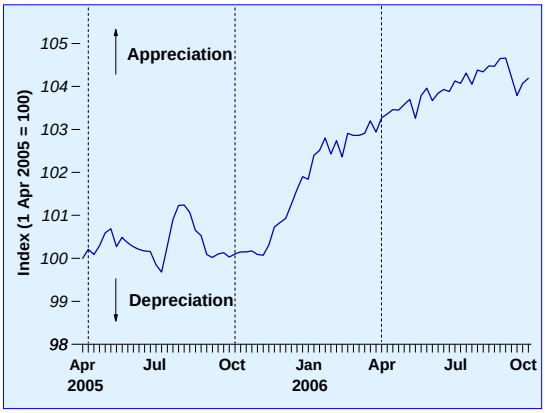
Singapore's macroeconomic policy stance has evolved in line with the economy's cyclical developments. In 2004-2005, there was a general tightening of policy amidst a strengthening economy. This can be seen in Chart 1.25, which is a scatter plot of the Domestic Liquidity Indicator (DLI)[3] on the vertical axis and the FI[4] measure on the horizontal over the period 1999-2006. A point in the southwest and northeast quadrants (shaded in yellow) indicates a general easing and tightening of the macroeconomic stance, respectively. The estimated plot point for 2006 falls out of the yellow shaded areas due to the more expansionary fiscal budget this year, which was targeted at helping the lower income groups. At the same time, monetary conditions gradually tightened in tandem with sustained economic growth. Recent developments in monetary and fiscal policy are reviewed in this section.

Chart 1.25
Scatter Plot of DLI against FI



* Preliminary estimate for 2006

Chart 1.26
S$NEER



Note: --- indicates release of Monetary Policy Statement

MONETARY POLICY

MAS reaffirmed its policy of a modest and gradual appreciation of the S$NEER in October 2006.

In the Monetary Policy Statement of 11 April 2006, MAS reaffirmed the policy of a modest and gradual appreciation of the S$ nominal effective exchange rate (S$NEER) policy band, with no change to its slope and width. This policy stance, which has been in place since April 2004, has contributed to the low inflation environment despite the buoyant economic conditions of the past few years.

The Singapore economy has continued to grow strongly this year, and is expected to expand at close to its potential in 2007, even though growth momentum is likely to moderate. At the same time, CPI inflation will be contained in 2006 and 2007 under the current policy stance. Against this backdrop, MAS announced in its latest Monetary Policy Statement that the policy of a modest and gradual appreciation of the S$NEER policy band would be maintained, with no re-centring of the policy band, or any change to its slope or width. Section 3.5 provides a more detailed discussion of the monetary policy stance.

[3] The DLI is a measure of overall monetary conditions, reflecting changes in the S$NEER and S$ SIBOR.

[4] The FI measure is calculated using the IMF methodology. Please refer to the January 2002 issue of the *Review* for more information.

Since the last policy review in April 2006, the S$NEER has stayed in the upper half of the policy band, although it eased in mid-September due, in part, to the strengthening of the US$ following the G7 meeting. (Chart 1.26)

The earlier strength seen in the S$NEER reflected a number of factors, including the weak US$ sentiment, strong investment flows into emerging Asian markets and a relatively buoyant Singapore economy. In particular, both short-term and long-term capital inflows increased significantly in the first half of this year. (Chart 1.27)

The S$REER has remained low.

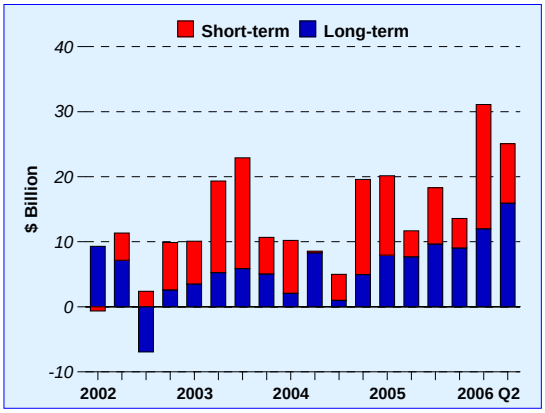
With the appreciation of the S$NEER, the S$ real effective exchange rate (S$REER) – which adjusts the S$NEER for relative price and cost movements in Singapore vis-à-vis those of its competitors – edged up slightly in H1 this year compared to the latter half of 2005. (Chart 1.28) However, it has remained low, at around the level of 1989-90 due to the downward adjustment in prices and costs in Singapore relative to its trading partners, particularly after the cost-cutting measures taken during the Asian Financial Crisis. The level of Singapore's real exchange rate at this point of the business cycle suggests that our competitiveness has not been undermined by the appreciation of the trade-weighted S$.

Domestic monetary conditions continued to tighten.

Liquidity conditions in the domestic money market continued to tighten over the past six months, albeit to a lesser extent than late last year and early 2006. A disaggregation of the DLI indicates that the tightening of monetary conditions was largely driven by the exchange rate, i.e. the appreciation of the S$NEER over this period. (Chart 1.29)

The three-month S$ interbank rate (S$ SIBOR) hovered at around 3.44% over the period March to May 2006, after rising strongly late last year. (Chart 1.30) It rose to 3.56% by the end of June and into July, spurred on by the 17th consecutive increase in the US Fed funds rate to 5.25% on 29 June. As at end-Q3, the interbank rate had eased back to 3.44%. Its differential with the three-month US$ SIBOR widened to 193 basis points

Chart 1.27
Gross Financial Inflows



Note: Short-term inflows comprise portfolio investment, short-term inflows of other sectors in "other investments" and errors & omissions; while long-term inflows comprise direct investment and long-term inflows of other sectors in "other investment" in the balance of payments.

Chart 1.28
S$REER

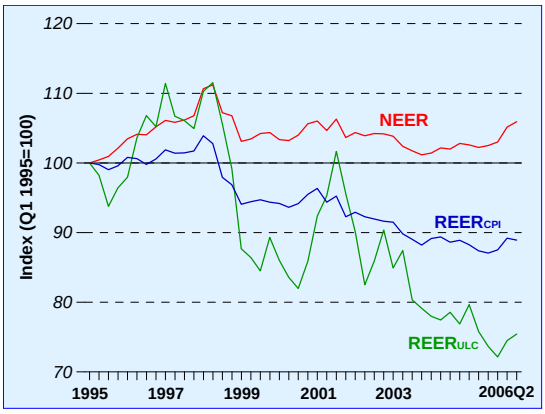
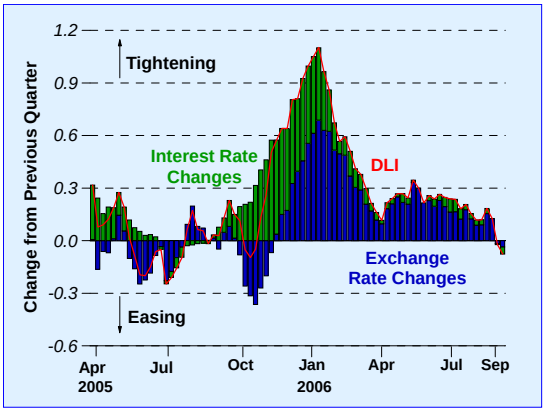


Chart 1.29
Domestic Liquidity Indicator



(bps), compared to 157 bps at the end of Q1. The S$ SIBOR is expected to stabilise at around current levels for the rest of 2006, against the backdrop of a pause in US Fed funds rate hikes in August and September.

In terms of deposit rates, banks have continued to look to fixed deposits as a cheaper source of funds compared to the interbank market. The competition for individual savings has expanded to include CPF funds, with local banks offering CPF members the option of earning higher returns on their funds by placing them in fixed deposits. Nevertheless, compared to late last year, the competition for deposits has eased somewhat as the interbank rate stabilised. On the whole, the savings deposit rate and 12-month fixed deposit rate have remained largely unchanged over the period April to September 2006. (Chart 1.31)

The headline prime lending rate posted by banks inched upwards to 5.33% in August 2006, from 5.30% maintained since March 2003. Notwithstanding the general rise in interest rates, domestic credit activities appeared to be finally turning around after a long period of sluggishness. The banking sector is seeing a firm pickup in Domestic Banking Unit loans, supported by lending to the corporate sector, particularly the construction and transport & communications industries. Meanwhile, there appears to be some incipient recovery in mortgage loans as the strong buying sentiment in the high-end private residential market filters down to the mass market segment.

Over the course of the year, MAS' money market operations (MMOs) ensured that there was sufficient liquidity in the banking system to meet banks' demand for reserve and settlement balances. The amount of liquidity in the banking system was estimated by taking into consideration the banking sector's demand for funds and the net liquidity impact of autonomous money market factors. Box B at the end of the chapter provides a review of MAS' MMOs in FY2005/06.

Chart 1.30
S$ SIBOR and US$ SIBOR

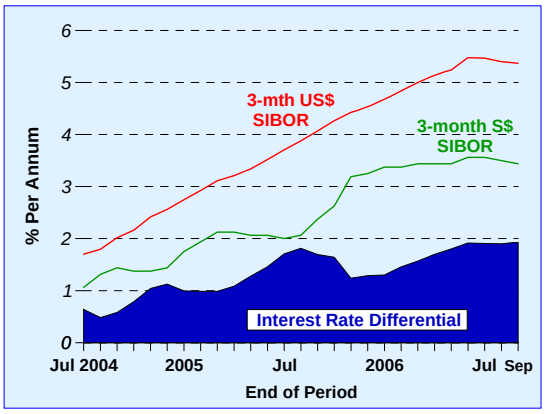
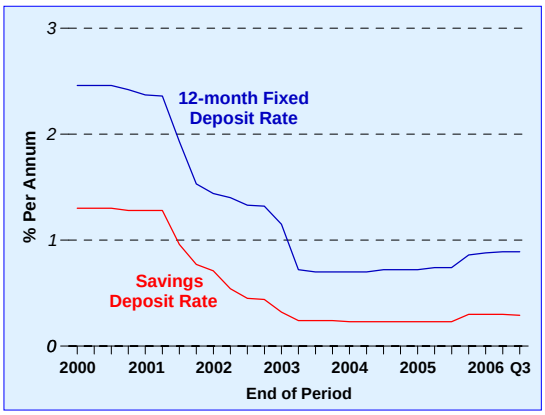


Chart 1.31
Deposit Rates*



* These rates are simple averages of the top 10 banks' interest rate for the particular type of deposit. The deposit sizes are usually within the range of S$5000 to S$50000 (retail banking). The list of 10 banks used is not made public and the rates are compiled from submissions by banks required under MAS Notice 756.

FISCAL POLICY[5]

Government operating revenue increased in H1 2006 on the back of healthy income tax and GST collections.

Against the backdrop of strong economic growth, the government's operating revenue rose in the first half of 2006 to $15.2 billion (15.2% of GDP), from $14.6 billion in the same period last year. This was largely supported by the $653 million increase in corporate and personal income tax collection – which is the largest source (accounting for 40%) of total operating revenue. (Chart 1.32) The healthy collections this year reflected the growth of personal and corporate earnings arising from sustained economic growth since 2005 and into 2006. This was despite the reduction in the top personal income tax rate from 22% to 21%, and with comparable reductions in all other tax brackets, with effect from Year of Assessment 2006.

Indirect tax collection in the form of GST – the second largest component of operating revenue – rose in H1 2006, alongside modest growth in private consumption. (Chart 1.33) There were also increases in revenue from stamp duties and to a lesser extent, asset taxes (which comprise property tax and estate duty) and motor vehicle taxes.

However, revenue from fees and charges declined as a result of larger COE rebates.

In comparison, revenue from fees and charges declined by $486 million to $994 million in the first half of 2006. This was the first time that it dipped below $1 billion in the first six months of a year since 1992. One explanation was the fall in revenue generated by the vehicle quota or Certificate of Entitlement (COE) premiums – which is equivalent to gross COE premium collections from new vehicle registrations minus rebates granted for vehicles deregistered before the expiry of their COEs. In recent years, the trend decline in COE premiums (Chart 1.34) has prompted car owners who purchased cars at a higher COE premium to scrap their cars early and use these high COE rebates to offset the lower COE premiums payable on their new cars. COE rebates can also be offset against Additional Registration Fees payable, but these rebates are still charged against

Chart 1.32
Changes in Operating Revenue, H1 2006 over H1 2005

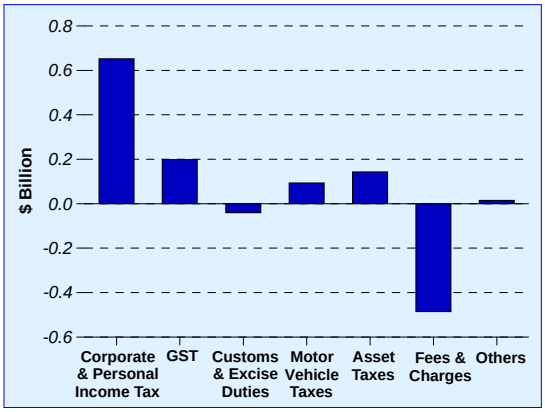


Chart 1.33
Real Private Consumption and GST Collection

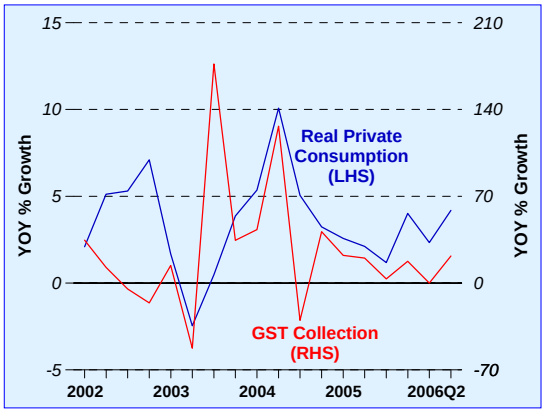
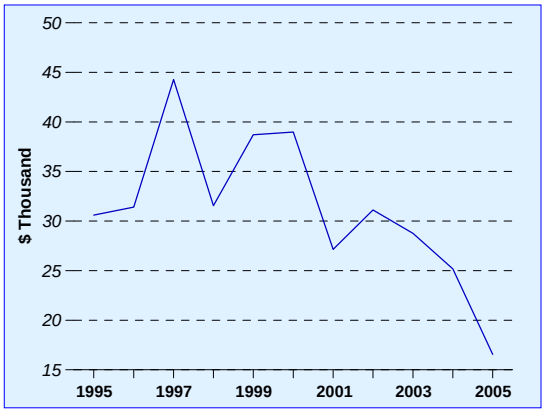


Chart 1.34
COE Premium (Category A)



[5] This section reviews the government's budget outcome on a y-o-y basis. This makes for a more meaningful assessment, given the significant seasonality in the quarterly budget data.

the COE revenue account, thus reducing collections further.

Indeed, annual data on the age distribution of cars from the Land Transport Authority (LTA) suggested that almost two-thirds of the cars deregistered in 2005 were less than six years old, compared to 5.1% in 2000. (Chart 1.35) To obtain a rough estimate of the amount of COE rebates granted by the government for cars alone, EPD mapped the age profile of the cars deregistered in a year with the COE premiums (averaged across the various car categories) paid at the time when they were bought, and calculated the rebates using a straight line depreciation of the COE premiums. Meanwhile, the amount of gross COE collections is estimated by multiplying the number of new car registrations in a year by the average COE premium across the various car categories. As shown in Chart 1.36, total COE rebates have been increasing in recent years, while gross COE collections dipped in 2005, resulting in a smaller net revenue collection from COE premiums.

Chart 1.35
Age Distribution of Cars

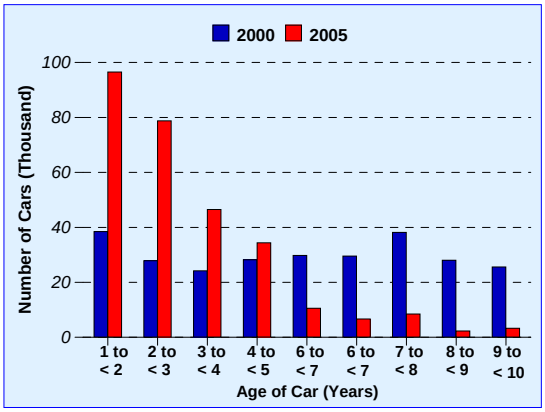
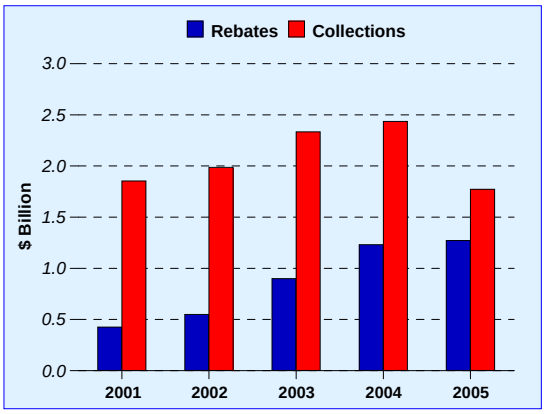


Chart 1.36
COE Rebates and Collections

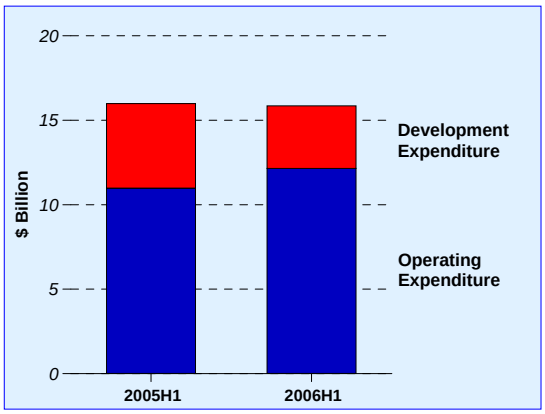


Source: EPD, MAS internal estimates

The increase in government's operating expenditure was accompanied by a fall in development expenditure in H1 2006.

Government expenditure declined slightly by $129 million on a y-o-y basis, to $15.9 billion (15.8% of GDP) in H1 2006. However, there was a shift in the composition of total expenditure, as the $1.2 billion increase in operating expenditure was offset by a fall in development expenditure of a similar magnitude. (Chart 1.37)

Chart 1.37
Government Operating and Development Expenditure



This shift was mainly due to changes in the spending composition for national development and education. (Chart 1.38) In particular, capital grants to the Housing Development Board (HDB) have been reclassified from development to operating expenditure, as they are used to fund housing grants to individuals, which are more akin to recurrent expenditure that generates no corresponding assets for the government. In addition, Phase 2 programmes under the Selective En-bloc Redevelopment Scheme (SERS)[6] have wound down, further reducing HDB's development expenditure. In the area of education, most of the development projects

[6] The SERS was launched in August 1995 as part of the government's estate renewal strategy for HDB estates and towns. Under SERS, selected old sold flats are redeveloped to optimise land use, and residents are provided the opportunity to upgrade to new and better flats nearby with fresh 99-year leases.

under the early phases of the Programme for Rebuilding and Improving Existing Schools and those undertaken by Institutes of Higher Learning[7] are near completion. Going forward, requirements for such building projects will also be reduced as the Ministry of Education shifts its emphasis from hardware to software improvements in the education system by, for example, improving the pupil-teacher ratio.

Fiscal policy is expected to be expansionary this year due to special transfers.

Overall, the government recorded a smaller primary deficit[8] of $635 million (0.6% of GDP) in the first half of 2006, compared to $1.3 billion (1.4% of GDP) in the same period last year. For year 2006 as a whole, the government's primary deficit is estimated to increase slightly to $0.9 billion[9] (0.4% of GDP), from $0.7 billion (0.3% of GDP) in 2005. (Chart 1.39)

To better estimate the stimulus to aggregate demand arising from fiscal policy, the FI measure is used. A positive (negative) FI implies a more expansionary (contractionary) fiscal stance compared to the previous year. In 2006, the FI measure is expected to be 0.7% of GDP, suggesting a more expansionary fiscal stance. (Chart 1.40) However, this should be viewed in the context of the generous special transfers announced in the FY2006 Budget,[10] targeted to help the lower-income households who had weathered economic restructuring over the past few years (please see earlier discussion on the impact of government transfers on retail sales in Section 1.2). Abstracting from these special transfers, the FI is estimated to be contractionary at -0.2% of GDP in 2006, compared to 2005; an appropriate shift in fiscal stance given the sustained robust growth in domestic economic activity.

Chart 1.38
Changes in Expenditure on National Development and Education, H1 2006 over H1 2005

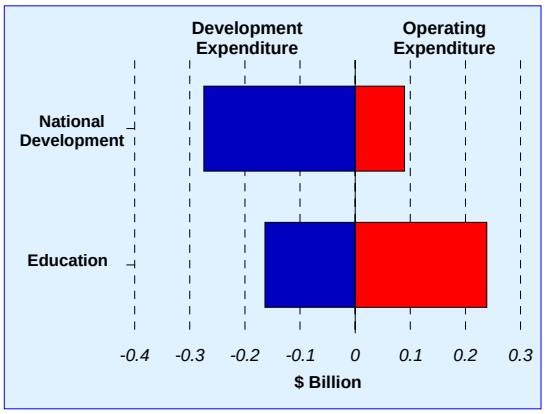


Chart 1.39
Primary Fiscal Surplus/Deficit

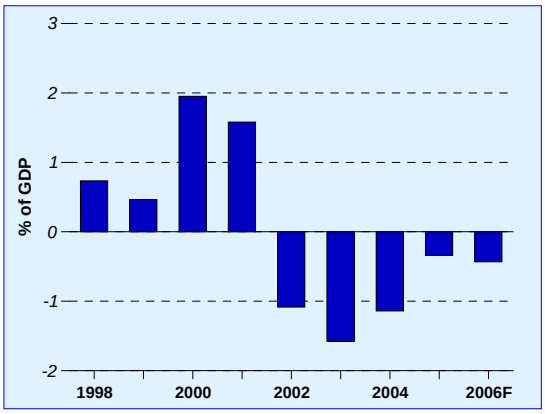
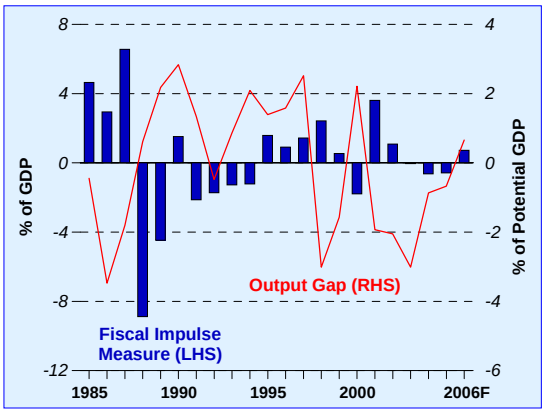


Chart 1.40
FI Measure and Output Gap



Source: EPD, MAS internal estimates

7 Examples include Republic Polytechnic's permanent campus and the Nanyang Technological University's expansion of campus facilities Phase 3C.

8 This is defined as operating revenue (excluding net investment income contributions) less operating and development expenditure.

9 Based on previous years' H2 trends and taking into consideration the primary deficit budgeted for FY2006.

10 Please refer to the April 2006 issue of the *Review* for more information on the special transfers.

Box B
Review of MAS' Money Market Operations in FY2005/06

This box reviews the conduct of MAS' Money Market Operations (MMOs) in FY2005/06. As explained in the monograph on "*Monetary Policy Operations in Sing*apore" published in January 2003, MAS' MMOs are undertaken to manage the liquidity within the banking system, and are distinct from the implementation of its exchange rate policy.

This box first provides a brief description of how MMOs are conducted. It then reviews banks' demand for cash balances with MAS, and the behaviour of autonomous money market factors in FY2005/06. It also examines the MMOs conducted during the period.

Conduct of MMOs

As a result of Singapore's open capital account and its exchange rate centred monetary policy, domestic interest rates and the money supply are endogenous. This is the principle underlying the open-economy trilemma, which states that a country cannot simultaneously manage its exchange rate and domestic interest rates, while maintaining an open capital account. MAS' MMOs are therefore not targeted at any level of interest rate or money supply. Instead, they are aimed at ensuring that there is sufficient liquidity in the banking system to meet banks' demand for reserve and settlement balances.

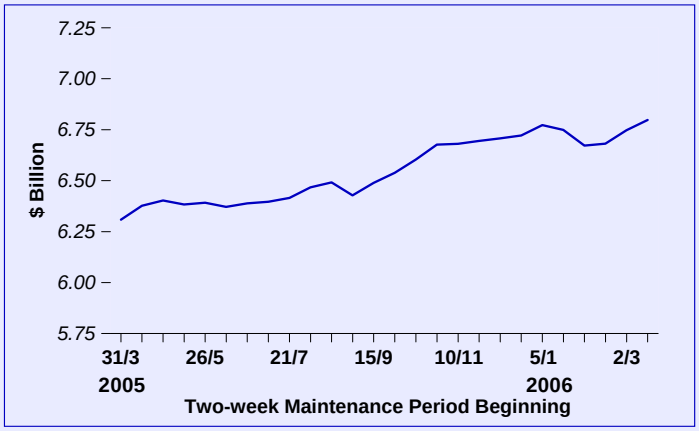
MMOs are conducted daily by the Monetary Management Division in MAS. The amount of liquidity in the banking system is estimated by taking into consideration the banking sector's demand for funds and the net liquidity impact of autonomous money market factors. Money market transactions are then carried out, after which market and liquidity conditions are monitored throughout the day.

Banks' Demand for Cash Balances

Banks hold cash balances with MAS to meet reserve requirements and for settlement purposes. In particular, banks in Singapore are required to maintain a Minimum Cash Balance (MCB) equivalent to 3% of their liabilities base with MAS on a two-week average basis.

In FY2005/06, banks' demand for balances to meet reserve requirements rose strongly as a result of a growing liabilities base. (Chart B1) This in turn reflected rising income on account of economic growth.

Chart B1
Average Reserve Requirements over a Two-week Maintenance Period



Demand for Settlement Balances

Besides meeting banks' demand for reserve balances, MAS also takes into account banks' demand for settlement balances when planning its MMOs. Based on historical experience, a liquidity buffer of about

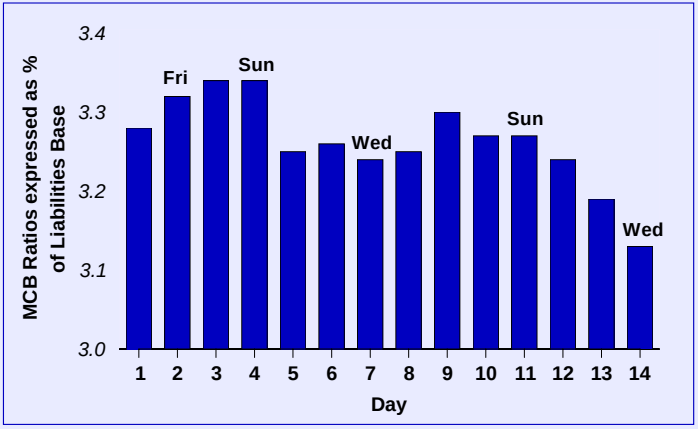
0.1-0.3% in excess of reserve requirements, or around 3.1-3.3% of liabilities base, has been generally adequate in meeting banks' demand for settlement balances.

Patterns in Bank's Daily Demand for Cash Balances with MAS

Although banks are required to keep an average MCB ratio of 3% over the two-week maintenance period, their daily MCB ratios can fluctuate between 2% and 4% of their liabilities base, giving them more flexibility in their liquidity management. Hence, within each maintenance period, day-to-day variations in banks' demand for cash balances with MAS may be observed.

Chart B2 illustrates how the daily MCB ratios varied within a typical maintenance period in FY2005/06. Two observations are noteworthy. First, banks tended to keep higher MCB ratios on most Fridays (day two and day nine of the maintenance period) to cover their positions over the weekends. Second, banks kept slightly higher MCB ratios during the earlier part of the maintenance period so as not to be caught short of cash towards the end of the period. As a result, the daily MCB ratios required by the banking system during the last few days of a typical maintenance period were generally lower.

Chart B2
Daily MCB Ratio over a Typical Two-week Maintenance Period in FY2005/06

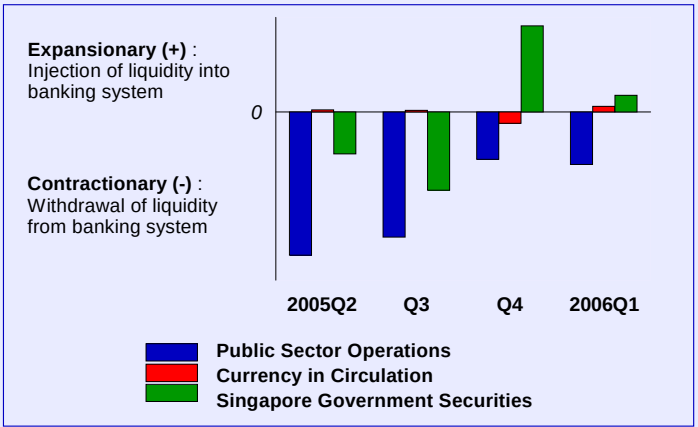


Note: The bars represent the average MCB ratio for the banking system across all maintenance periods during FY2005/06.

Liquidity Impact of Autonomous Money Market Factors

Chart B3 shows the liquidity impact of each of the autonomous money market factors, which includes (i) public sector operations, (ii) currency in circulation, and (iii) Singapore Government Securities (SGS) issuance and redemption, over FY2005/06. Public sector operations include the government and CPF Board's net transfers of funds between their accounts with MAS and their deposits with commercial banks.

Chart B3
Liquidity Impact of Autonomous Money Market Factors



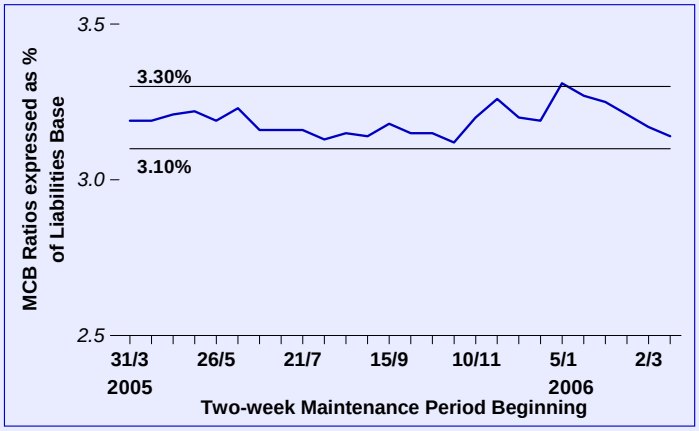
In FY2005/06, the liquidity impact of the autonomous money market factors was largely dictated by public sector operations, which had a contractionary impact on the banking system. SGS issuance and redemption was expansionary in Q4 2005, because maturing SGS bonds exceeded new issuances. The liquidity impact of currency in circulation was negligible.

Money Market Factors

Net Liquidity Impact of MAS' MMOs

Over FY2005/06, MAS' MMOs took into consideration the impact on the liquidity of autonomous money market factors and MAS' foreign exchange (FX) intervention operations. MAS generally kept the effective average MCB ratio at about 3.1-3.3% of the banking system's liabilities base for the two-week maintenance periods. (Chart B4)

Chart B4
Effective Average Two-week MCB Ratios

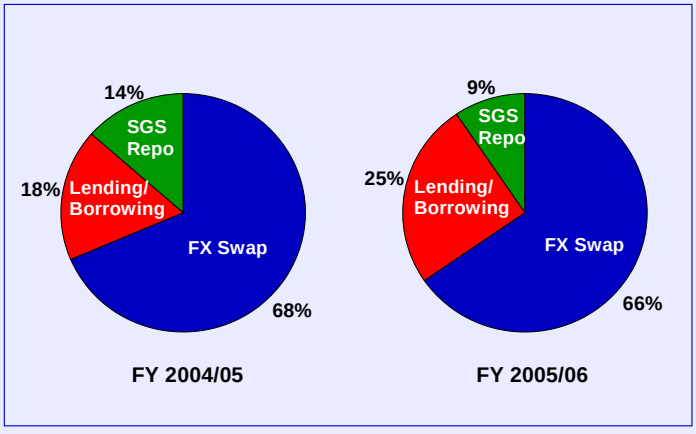


Instruments for MMOs

For its MMOs, MAS uses three key instruments to inject liquidity into the banking system and to withdraw liquidity from it, namely, (i) FX swaps; (ii) SGS repos or reverse repos; and (iii) clean lending or borrowing. Chart B5 illustrates the distribution of MMOs amongst the three key instruments.

FX swaps and clean borrowing are generally preferred for longer-term transactions, while clean lending and SGS repos are generally used for short-dated transactions (typically under one month in tenure). In the case of clean lending, this reflects the higher credit risks associated with uncollateralised lending. The reliance on SGS repos for shorter horizons is to avoid "locking-up" MAS' SGS for extended periods of time.

Chart B5
Distribution of MMOs by Instrument



This box is contributed by the Monetary Management Division of the Reserve & Monetary Management Department.

CHAPTER 2

WAGE-PRICE DYNAMICS

2.1 Consumer Price Developments

External price pressures pushed CPI inflation higher in 2006 ...

Amidst rising external inflation, headline domestic CPI inflation rose to 1.2% over the period Jan-Aug 2006, up from a mild 0.5% in 2005. (Chart 2.1) Prices rose in all categories of the CPI basket, except transport & communications which was dragged down by declining car prices. (Chart 2.2) Meanwhile, the MAS underlying inflation measure, which excludes accommodation and private road transport costs, came in at 1.8% in the first eight months of 2006, up from 1.3% in 2005. Both headline and MAS underlying inflation remained within their forecast ranges of 1.0-2.0% and 1.5-2.0%, respectively, as announced during the April 2006 policy review.

... though inflation remained low on a historical basis due to globalisation and benign wage growth.

External factors continued to underpin domestic CPI inflation. (Chart 2.3) This largely reflected the sharp rise in oil prices, which fed directly and indirectly into local business costs, as well as higher imported food prices. In comparison, domestic sources of inflation remained particularly muted at this stage of the business cycle, contributing just 0.1% point to overall CPI inflation in H1 2006. Overall, CPI remained relatively low on a historical basis due to the ongoing disinflationary effects of globalisation, a more competitive business environment, and relatively subdued wage growth.

Global oil prices touched new highs on supply disruption fears.

Since the last policy review in April 2006, global oil prices have risen further, with the benchmark WTI oil price surging from an average of US$63.33 per barrel in Q1 2006 to US$70.41 per barrel in Q3. The rise was precipitated by geopolitical developments that further exacerbated supply-side uncertainties in an already jittery oil market. For instance, oil prices surged in July on fears that the armed conflict between Israel and Hizbollah guerrillas in Lebanon could spread to more countries in the Middle East and lead to major oil supply disruptions.

Chart 2.1
CPI Inflation and MAS Underlying Inflation

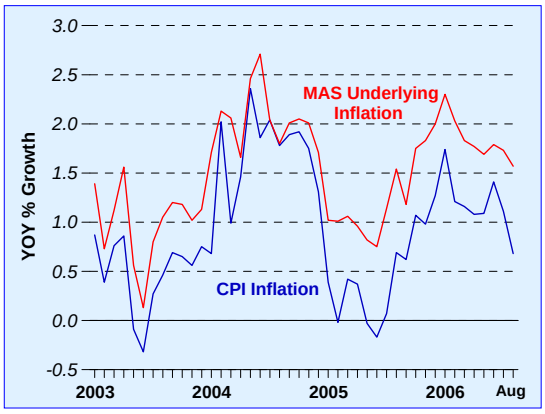


Chart 2.2
Contribution to CPI Inflation, 2005 vs Jan-Aug 2006

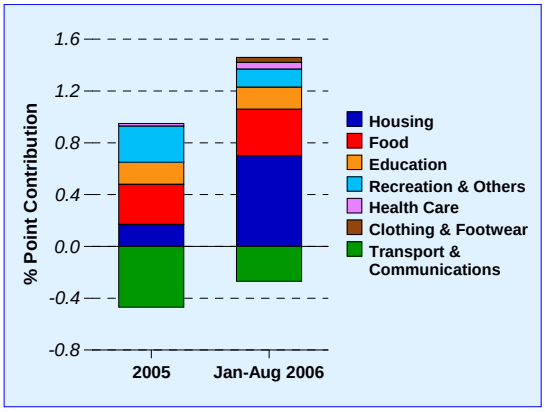
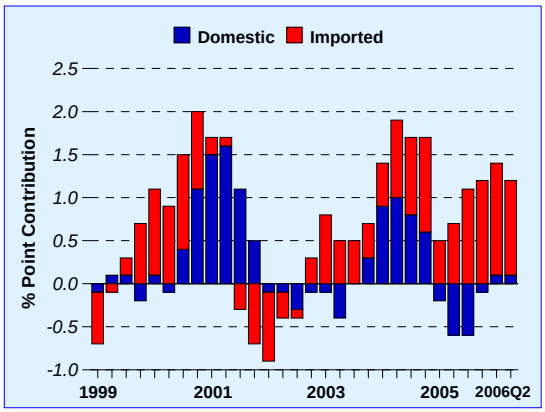


Chart 2.3
Contribution to CPI Inflation, Domestic vs Imported Sources



Direct pass-through effects have intensified despite a more moderate increase in oil prices.

As global oil prices rose, the pass-through to local prices of energy-related items in the CPI basket intensified. Over the period Jan-Aug 2006, direct energy-related items (electricity, gas, LPG and petrol) contributed 0.9% point to overall headline CPI inflation, compared to 0.4% point for the whole of 2005.

As depicted by Chart 2.4, the direct pass-through effects have become more apparent since Q3 2005. This is largely due to higher electricity tariffs, which have jumped by more than 31%. Electricity tariffs were mainly affected by the increase in the cost of high sulphur fuel oil (HSFO)[1] which has surpassed the increase in crude oil prices. (Chart 2.5)

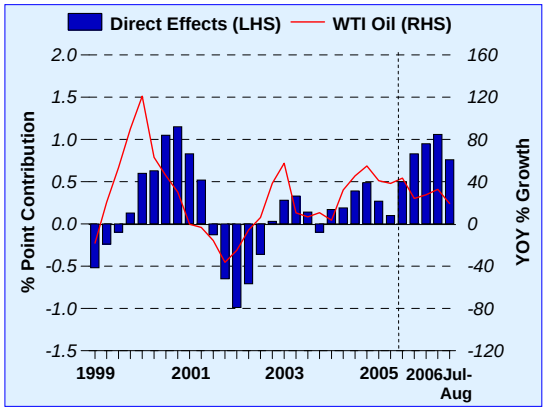
Service providers which were willing to absorb the cost increases earlier have become more inclined to pass on the higher input cost burden to consumers. For instance, petrol companies have allowed retail petrol prices (petrol CPI) to stay high in 2006 despite the recent moderation in upstream crude and wholesale prices (Chart 2.6), as gross margins (pump prices less tax and product costs) have gradually been eroded since the start of the oil price run-up in 2002.

Apart from electricity tariffs, residential gas tariffs and prices of retail LPG have undergone further adjustments in 2006. Town gas producer, City Gas Pte Ltd, raised its residential gas tariffs by 4.1% in July 2006 following the 7.7% hike in 2005. Retailers of LPG also increased prices in February and July 2006 by a total of 8.0%, after having raised prices by 4.8% in 2005.

The indirect pass-through effects of higher oil prices have become more apparent in 2006.

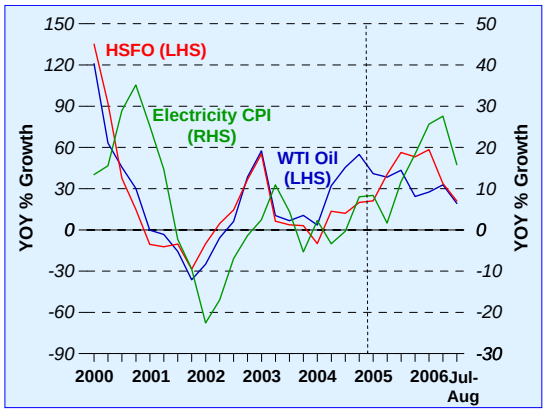
Similarly, the indirect pass-through effects of higher oil prices have become more pronounced in 2006. First, public road transport costs rose sharply in July after taxi operators raised fares amidst sustained higher diesel prices. The pump price of diesel currently stands at a record high of $1.37 per litre, more than double the price at the beginning of 2002.

Chart 2.4
Contribution to CPI Inflation from Direct Oil-related Items



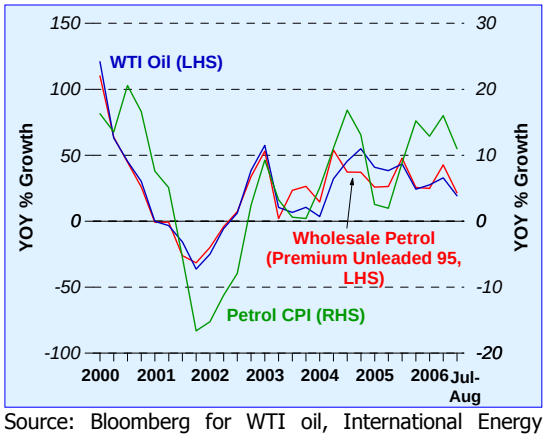
Source: Bloomberg for WTI oil; EPD, MAS internal estimates for direct pass-through effects.

Chart 2.5
Prices of WTI Oil, HSFO and Electricity Tariffs



Source: Bloomberg for WTI oil and HSFO

Chart 2.6
WTI Oil Prices, Wholesale Petrol Prices and Petrol CPI



Source: Bloomberg for WTI oil, International Energy Agency for premium unleaded 95 petrol

[1] HSFO is a refined by-product used to generate electricity in Singapore. Prices of piped natural gas used to generate electricity in Singapore are also pegged to HSFO prices.

Second, higher utilities costs arising from the spike in oil prices have lifted the operating costs of food operators. As shown in Chart 2.7, prices of cooked food items, which tend to respond to changes in the cost of fuel and utilities with a lag, rose sharply in recent months. This suggests that food operators are now more inclined to pass on the cumulative cost pressures from rising energy prices.

Third, prices of sugar and confectionery items have risen in tandem with oil prices in 2006. High oil prices have led to greater demand for alternative forms of bio fuel, such as ethanol.[2] In turn, this has pushed up sugar prices, given that sugarcane is a feedstock for the production of ethanol. At its peak, the price of sugar traded on the US Coffee, Sugar and Cocoa Exchange (CSCE) was some 147% higher than that at the beginning of 2002. (Chart 2.8) As a result of the sustained rise in the import price of sugar, local retailers of refined sugar and confectionery increased retail prices by as much as 9.0% y-o-y in the first eight months of 2006. This compared to an annual average rise of 0.8% over the period 2002-2005.

Non-cooked food prices continued their uptrend, underpinned by rising import prices.

Apart from sugar, prices of domestic non-cooked food in the CPI basket also went up as strong global demand for seafood, dairy products & eggs, and meat & poultry, among others, pushed up the import prices of these items. In addition, prices of non-alcoholic beverages (e.g. instant coffee and tea, soft drinks, etc.) rose during this period, alongside higher sugar prices. As a result, non-cooked food prices in the CPI basket have risen by 1.2% since the beginning of 2006. (Chart 2.9)

Indeed, retailers of non-cooked food have been more prompt in adjusting prices in response to changes in input prices, compared to other sectors. To further understand the dynamics of consumer price adjustments in Singapore, we have included a box at the end of the chapter which highlights some stylised facts on price-setting behaviour in the domestic economy.

CPI inflation is well-contained at this stage of the business cycle.

Despite the increase in the CPI in 2006, domestic inflation has remained relatively low on a historical basis.

Chart 2.7
Fuel & Utilities and Cooked Food Prices

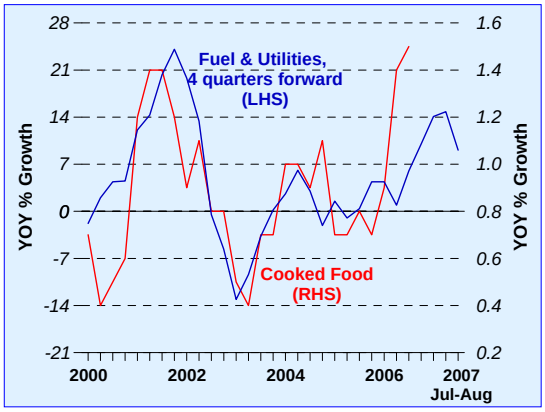
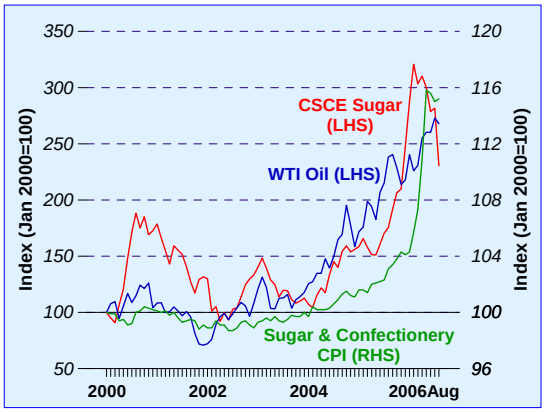
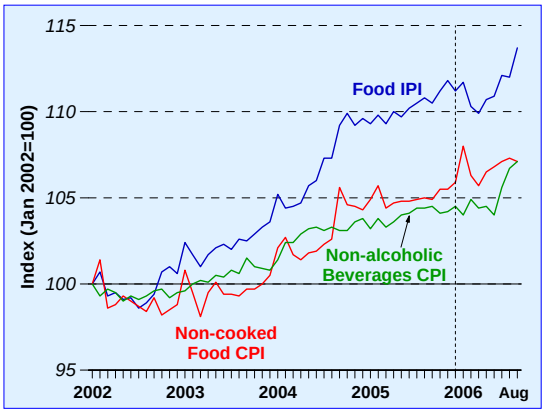


Chart 2.8
CSCE Sugar Prices and Sugar & Confectionery CPI



Source: Bloomberg for CSCE sugar and WTI oil prices

Chart 2.9
Imported Food Prices and Non-cooked Food CPI



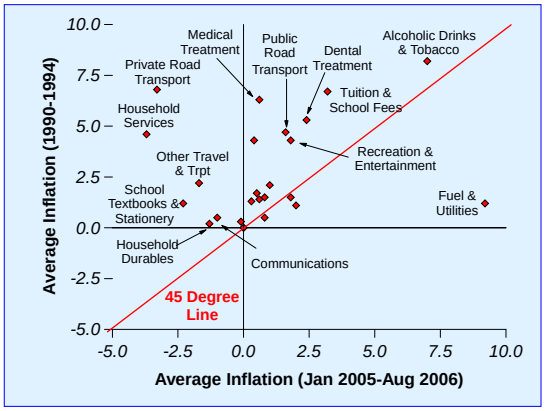
Notes:
- Non-alcoholic beverages are subsumed under non-cooked food.
- IPI stands for Import Price Index.

[2] Ethanol is a fuel produced from renewable crops such as corn and sugarcane and is combined with petrol to form blended fuels.

Headline inflation in the period of sustained economic expansion between January 2005 and August 2006 has averaged 0.8%. This compares with 2.9% in the high-growth period of 1990-1994. A similar picture emerges from the MAS underlying inflation measure.

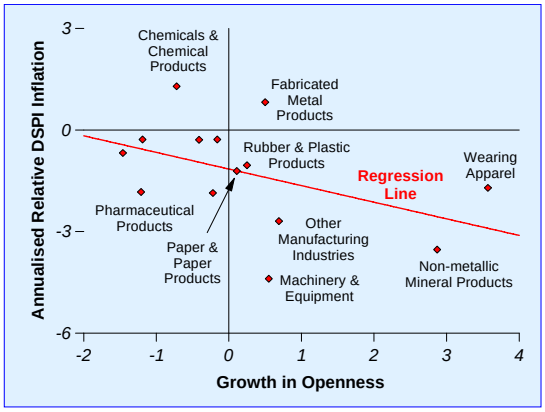
The lower inflation rate in the recent period appears to be broad-based across both goods and services. (Chart 2.10) For example, the costs of private road transport and household services (e.g. maid levies) fell in the last 1-2 years, following changes in government policies. The costs of telecommunications and air travel services[3] have also declined due to increased competition arising from liberalisation. In addition, the prices of consumer goods such as computers,[4] household durables, and telecommunications equipment[5] have been on a downward trend due to the effects of globalisation and technological advancement. Wage-sensitive services such as medical & dental treatment, tuition & school fees, recreation & entertainment and public road transport have also recorded much lower inflation rates in line with more modest wage growth.

Chart 2.10
Average Inflation by CPI Sub-groups, 1990-1994 vs Jan 2005-Aug 2006



Note: The 45 degree line represents the boundary where average inflation for both periods are the same for a particular CPI sub-group. Thus, points above the 45 degree line represent higher inflation in the earlier period while points below the line represent higher inflation in the latter period.

Chart 2.11
DSPI Inflation and Trade Openness, 1995-2005



Notes:
- Manufacturing sectors are classified according to the two-digit Singapore Standard Industrial Classification. The category "textile manufactures" is excluded as an outlier. We also excluded refined petroleum products and basic metals as they have been influenced by the boom in commodity prices.
- Relative DSPI inflation refers to growth in the ratio of sectoral price indices to the overall price index for all sectors.
- Trade openness is calculated as the change in the sector's import-to-production ratio.

Effects of globalisation on inflation are apparent across a range of sectors.

Indeed, globalisation has been a major contributing factor to the decline in inflation over the past 15 years, particularly in the tradable goods sector across many countries. Through the integration of global production and trade, firms are better able to exploit their comparative advantage, increase productivity and lower costs. The effects of globalisation are more pronounced for sectors with a higher degree of trade openness because of the availability of cheaper imports and the competition they pose for domestic manufacturers. This means that changes in the relative import or producer price inflation in these sectors will be negatively correlated to changes in their exposure to globalisation. This appears to apply to Singapore as seen from a simple graphical plot between the changes in openness of manufacturing industries against Domestic Supply Price Index (DSPI)[6] inflation over the period 1995-2005. (Chart 2.11)

[3] These items are subsumed under the "other travel & transport" category.

[4] These items are subsumed under the "school textbooks and stationery" category.

[5] These items are subsumed under the "communications" category.

[6] The DSPI monitors the price changes of locally manufactured goods and imported goods which are retained for use in the domestic economy.

China's exports to Singapore have had a disinflationary impact on IPI and CPI inflation.

China's relatively low labour cost has often been cited as one of the main sources of disinflation in internationally traded products. In principle, if the prices of imports from China are lower than those of other countries, products which are increasingly imported from China should display a lower domestic Import Price Index (IPI) inflation rate.

This negative relationship is confirmed by a scatter plot of the annualised imported inflation by product category against the respective changes in China's share as an import source over the period 1995-2005. (Chart 2.12) The results show that products such as office and data machines, telecommunication apparatus, wood & cork manufactures, leather products and furniture experienced more significant increases in imports from China as well as declines in prices.

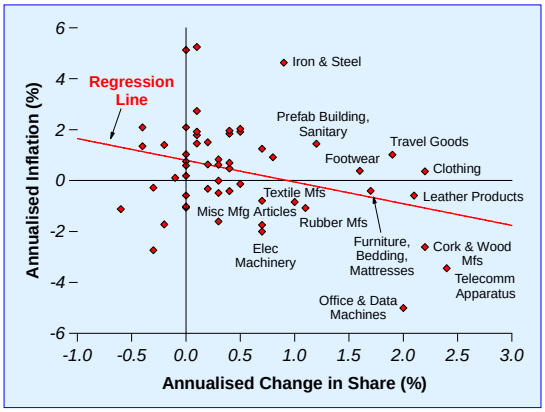
To verify the impact of increased Chinese imports on Singapore's IPI and CPI inflation, the methodology used by Kamin *et al.* (2004) was adopted. In particular, to test the hypothesis of a negative relationship between sectoral inflation rates and changes in the share of imports from China, the following equation was estimated:[7]

$$\pi_i = \beta_0 + \beta_1 \Delta share_i + \beta_2 initialshare_i + \beta_3 lagged\pi_i + \beta_4 dummy_i + \varepsilon_i$$

where

π_i	=	annualised IPI inflation rate for product category i over the period 1995-2005
$\Delta share_i$	=	the change in the share of imports coming from China for product category i over the period 1995-2005
$initial\text{-}share_i$	=	initial share of imports coming from China for product category i in base year 1995
$lagged\pi_i$	=	annualised IPI inflation rate over the period 1985-1994 (full data available from 1985 onwards)
$dummy_i$	=	dummy variable which is unity for product category "refined petroleum products"
ε_i	=	error term

Chart 2.12
IPI Inflation vs Changes in Share of Imports from China, 1995-2005



Notes:
- Products are classified according to the two-digit Standard International Trade Classification (SITC).
- The category "refined petroleum products" is excluded as an outlier.

[7] The data on nominal imports and IPI inflation used in the regression is based on the two-digit SITC classification scheme. A total of 55 product categories were used, representing more than 96% of Singapore's total imports. The $initialshare_i$ controls for any effects of initial import share on imported inflation. The variable $lagged\pi_i$ controls for other factors such as globalisation and market structure that tend to lower inflation for a particular product category.

The coefficients of interest are β_1 and β_3. The disinflationary effects of Chinese imports are verified if β_1 is negative and statistically significant. Indeed, this was confirmed by our estimation results shown in Table 2.1.

The long-run impact multiplier of the increase in China's share of imports was estimated to be -1.3% points.[8] (Table 2.2) To compute the annual disinflationary impact on IPI inflation over the period 1995-2005, this long-run impact was multiplied by the average annual increase in the share of imports from China during this period. Our results show that the 0.7% point average annual increase in the share of imports from China in 1995-2005 depressed Singapore's IPI inflation significantly by 0.9% point each year. Finally, given that the proportion of imports per dollar of final private consumption expenditure is about 33%,[9] the average annual decline in the domestic CPI inflation series itself is estimated at some 0.3% point[10] each year over the period 1995-2005.

These results are somewhat higher than those estimated by Kamin *et al*. (2004) for the US economy. They found that the increase in the share of imports from China had an annual disinflationary effect of 0.8% point and 0.1% point on US IPI and CPI inflation, respectively, over the period 1997-2002.

Table 2.1
Estimated Coefficients

Dependent Variable: Annualised IPI Inflation	
Explanatory Variable	Coefficient
$constant$	0.88** (0.38)
$\Delta share_i$	-1.02*** (0.35)
$initialshare_i$	0.01 (0.04)
$lagged\pi_i$	0.19* (0.10)
$dummy_i$	13.20*** (2.00)
Specification/Fit of the Model	
Adjusted R-squared	0.47
Std. Error	1.79
Durbin-Watson	1.75

Note: Numbers in parentheses denote standard errors. *, ** and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Table 2.2
Estimated Disinflationary Impact

Long-run impact multiplier (= $\beta_1/(1-\beta_3)$)	-1.3% pts
Average annual increase in total import share from China	0.7% pt
Average annual impact on IPI inflation (= Long-run impact multiplier * average annual increase in total import share from China)	-0.9% pt
Share of imports per dollar of private consumption expenditure	33.4%
Average annual impact on CPI inflation (=Average annual impact on IPI inflation * share of imports per dollar of final private consumption expenditure)	-0.3% pt

Domestic cost pressures remained benign.

On the domestic front, wage pressures remained relatively subdued, despite the strong employment gains in recent quarters. Even with GDP expanding by 6.4% in 2005 and 9.3% in H1 2006, nominal wage growth in H1 2006 remained similar to last year's at 3.4% y-o-y. Indeed, nominal wage growth seemed to be less sensitive to real GDP growth in recent years, as shown by the decline in its elasticity from 0.92 in 1992-1998 to 0.63 in 1999-Q2 2006.[11]

Wage pressures have remained contained, with employers more cautious about increasing their wage bill too rapidly amidst rising competition and greater volatility in the economy. At the same time, workers

[8] The long-run impact multiplier is calculated as $\beta_1/(1-\beta_3)$.

[9] This is based on the average share of imports per dollar of final private consumption expenditure from the *Singapore Input-Output Tables, 1995* and *2000*.

[10] The average annual decline in CPI is calculated as 33% * -0.9%.

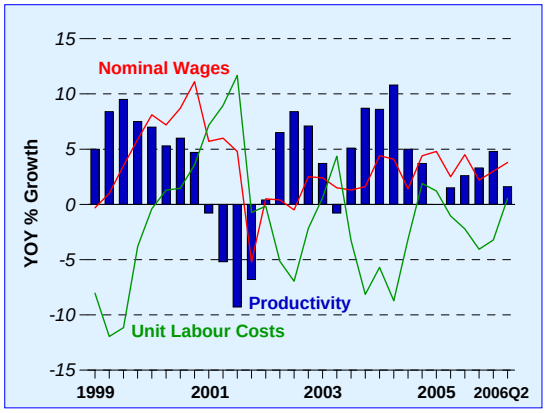
[11] The estimates of the elasticity with respect to output are found by regressing real GDP growth on nominal wage growth.

may have become more realistic in their wage expectations. The inflow of foreign workers to help fill the record number of newly-created jobs could have also alleviated some labour market tightness and in turn overall wage pressures. Notably, the number of new work permit holders increased by 43,000 in 2005, the largest increase since 1997.

As a result of the moderate rise in nominal wages and continued gains in productivity, overall unit labour costs (ULC) declined by 1.5% y-o-y in H1 2006, following a 1.5% fall for the whole of 2005. (Chart 2.13) Overall ULC was also dragged down by the lowering of the salary ceiling for CPF contribution, which has been gradually phased in since 2004.

Given stable wage growth, domestic services with a significant labour content, such as education and health care, continued to see benign price pressures in 2006. Tuition and other school fees rose 3.2% y-o-y over the period Jan-Aug 2006, in line with the 3.0% increase in the same period last year. Costs of medical treatment continued to rise by a modest 0.6% y-o-y, as greater transparency has made the sector more competitive. This is significantly lower than the annual medical cost increase of 3.2% over the period 1995-2005.

Chart 2.13
Wages, Productivity and ULC



2.2 Labour Market

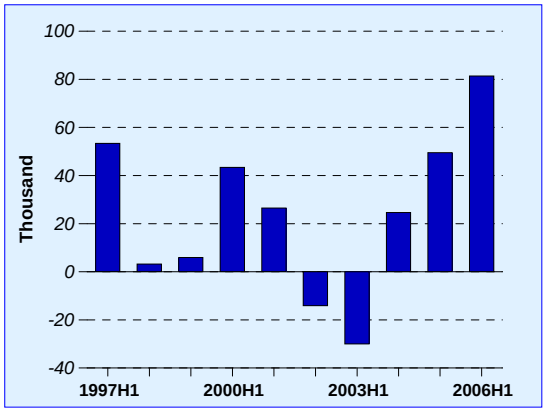
Job creation hit a record high in H1 2006, with healthy gains across all sectors.

Employment growth was robust, with a record number of 81,400 jobs created in H1 2006. In comparison, employment increased by 49,500 over the same period last year. (Chart 2.14)

As in previous quarters, the expansion in employment was broad-based across all sectors. The reading of 93.8 in the Employment Diffusion Index[12] was one of the highest recorded. (Chart 2.15)

The services sector continued to account for the bulk of the job gains (64%) in H1 2006, with employment rising by 52,400, almost 80% higher than in the same period last year. Within services, the financial and

Chart 2.14
Employment Changes



[12] The index is equal to 100 when all the industries are increasing employment and zero when they are decreasing employment. An index of 50 indicates an equal balance between industries with increasing and decreasing employment.

business services sub-sectors contributed 46% to the employment gains (23,900). Most of these were concentrated in the business services segment (18,500), particularly administrative & support services, which benefited from the sustained growth in the economy. The recent turnaround in the property market also significantly increased the demand for workers in the real estate & leasing industry this year.

Apart from services, the manufacturing and construction sectors also added more jobs in H1 2006, with employment increasing by 19,500 and 9,100 respectively. Within manufacturing, the non-electronics industries accounted for 89% of the gains in H1 due to stronger output growth this year, especially in the marine & offshore engineering segment. For the electronics industry, net hirings were dampened somewhat by the retrenchments arising from the takeover of Maxtor by Seagate.

The strong growth in total employment since last year can be viewed from a longer-term perspective in Chart 2.16 which shows that the job losses sustained over Q3 2001 to Q2 2003 were regained by Q4 2004.

Locals benefited more from the robust job creation.

More than half (56%) of total jobs created in 2005 went to locals. (Chart 2.17) Eight out of ten local jobs were created in the services sector as shown in Chart 2.18, notably in the administrative & support services industry.

For foreign employment, the new jobs created last year were more evenly distributed between the manufacturing (39%) and services (46%) sectors. Apart from work permit holders, employment pass holders also saw an increase in employment.

Indeed, MOM will be issuing Personalised Employment Passes next year to attract more foreign talent. Furthermore, the S-pass quota for mid-skilled workers was raised from 5% to 10% of the total workforce in October this year, with the additional 5% coming from the existing work permit holders quota. This will encourage the replacement of low-skilled workers with mid-skilled ones, thereby improving the quality of the foreign workforce.

Chart 2.15
Employment Diffusion Index

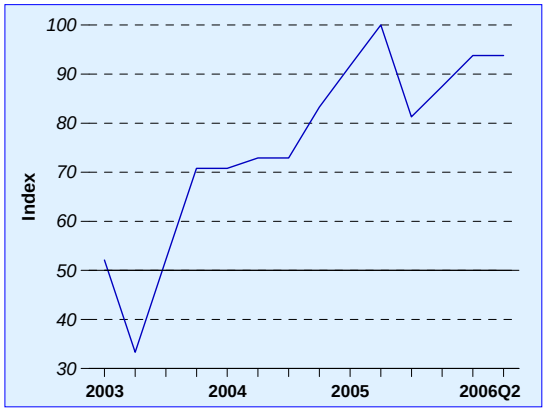
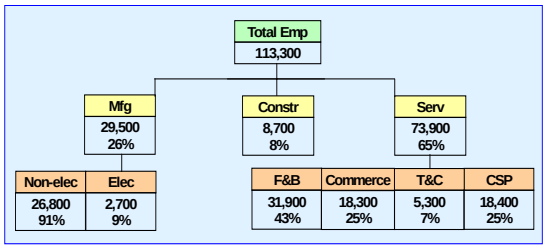
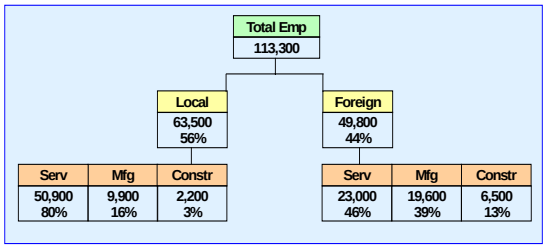


Chart 2.16
Cumulative Change in Total Employment

Chart 2.17
Employment Changes by Sector, 2005



Local and Foreign Employment Changes by Sector, 2005



Note: Figures are based on SSIC 2000.

Similarly, the demand for local high-skilled workers rose last year. Based on the recent release of the *General Household Survey 2005* by DOS, the proportion of Professionals, Managers, Executives and Technicians (PMETs) among local workers edged up from 44% in 2000 to 45% in 2005. In addition, working residents with educational qualifications of diploma and above constituted 39% of local workers last year, up from 31% in 2000.

Upgrading of the workforce was broad-based across all sectors.

Due to the ongoing restructuring of companies, retrenchments have been rising gradually since last year, reaching 6,700 in H1 this year. (Chart 2.19) As revealed in the latest MOM survey, nearly two out of three local workers retrenched last year were aged 40 and above, and almost two-thirds of the retrenched locals had secondary school education or below.

Two-thirds of the retrenched workers came from the manufacturing sector, which continued to upgrade and shift towards higher value added activities. This sector has been upgrading its workforce, with the proportion of PMETs rising from 20% in 1990 to 32% in 2005. (Chart 2.20)

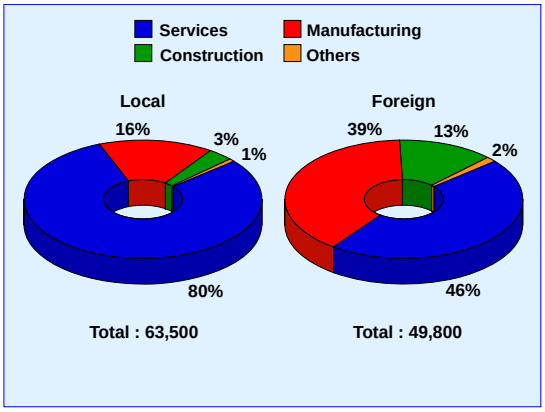
Changes in the composition of the workforce can also be observed in other sectors. For example, there was a substantial increase in the proportion of PMETs in services, from 29% in 1990 to 41% in 2005. Similarly, in the construction sector, the proportion of PMETs increased from 11% to 19% over the same period.

Firms have also invested in training to enhance the skill level of their workers. According to a recently published survey on *Employer Supported Training* by MOM, 72% of the private sector establishments provided structured training for at least some of their employees in 2005, a marked increase from 52% in 2002. From the sectoral perspective, almost 57% of manufacturing employees were sent for structured training in 2005. This was similar to the proportion in services (56%) but higher than in construction (49%).

Lowest unemployment rate since 2001 but still higher than pre-Asian Financial Crisis level.

The headline unemployment rate stood at 2.8% in H1 2006, its lowest level since the economic downturn

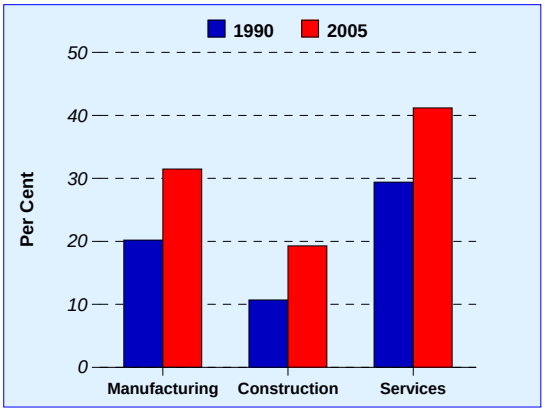
Chart 2.18
Local and Foreign Employment Gains by Sector, 2005



Note: Figures are based on SSIC 2000.

Chart 2.19
Retrenched Workers

Chart 2.20
Share of PMETs by Sector



in 2001. (Chart 2.21) Nonetheless, it remained higher than the average unemployment rate of 1.7% before the Asian Financial Crisis (1992-1997).

Similarly, the resident unemployment rate improved to 3.7% in H1 2006, from 4.1% in 2005, but was still higher than the average of 2.2% in the 1992-1997 period. All age groups in the resident population experienced lower unemployment rates this year but the pace of recovery was slower for the older age groups. The unemployment rate for residents in the age group of 25-54 began to edge down in 2004 when economic growth accelerated sharply to 8.7%. In contrast, the unemployment situation for those over 55 years of age only started to improve this year. (Chart 2.22)

The recent decline in unemployment rates for the older population is an indication that they are also benefiting from the sustained economic growth. It could also reflect the efforts of the Tripartite Committee on Employability of Older Workers set up in 2005 to increase the employability of more mature workers through enhancing their skill levels and changing the perceptions of older workers.

Chart 2.21
Unemployment Rate

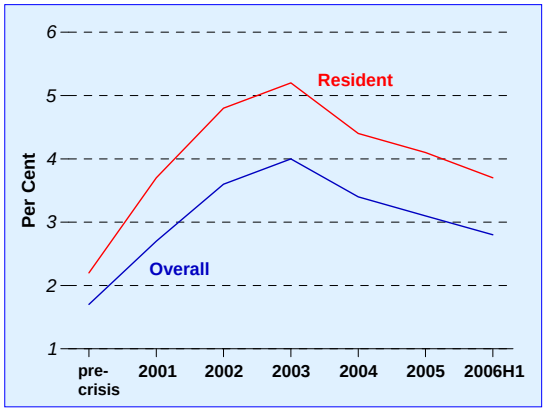
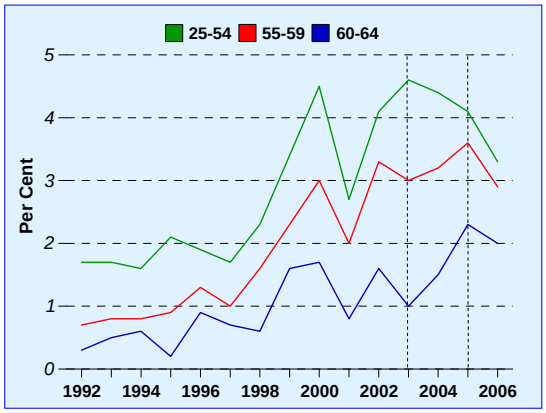


Chart 2.22
Unemployment Rates of Resident Population by Age Group



Box C
Consumer Price Adjustments in Singapore

Introduction

In the modern economy, prices of goods and services do not always adjust to changes in demand and supply conditions instantaneously. Price adjustments can take on distinct characteristics and this, in turn, can have implications for the nature of the equilibrating process in the economy in response to shocks.

The objective of this box is to provide greater insight into the price-setting mechanism and the pattern of price changes in Singapore by drawing on micro-level CPI data. The data set used is the monthly CPI data at the five-digit level provided by DOS. The coverage is from January 1998 to August 2006. Excluding accommodation-related items and new items introduced during the CPI rebasing in 2004, a total of 136 price series or about 86% of the CPI basket are analysed. From this rich data set, five key stylised facts about consumer price adjustments are highlighted.

Fact #1: The frequency of consumer price adjustment in Singapore is fairly high

The first set of results relates to the frequency of consumer price changes in Singapore. The "frequency approach" employed by Aucremanne and Dhyne (2004) was adapted for this exercise.[1/] This methodology

1/ The formulae used in this box were modified from those used by Aucremanne and Dhyne (2004) to cater for differences in the granularity of the price data available. (Please see footnote 2.)

proxies flexibility in prices by the frequency of price changes (F), which is defined as the number of observations of price changes divided by the total number of observations. The formulae to determine the frequency of price changes for product i and the aggregated frequency of price changes for a product group j are as follows:

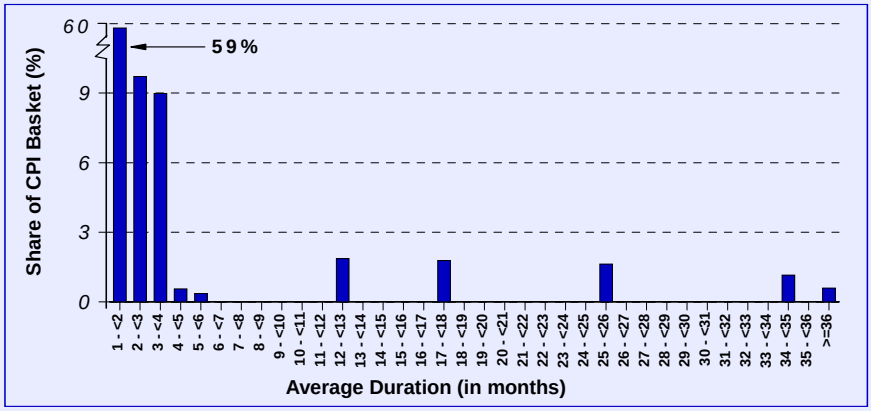
$$F_i = \frac{\sum_{t=2}^{T} DUM_{i,t}}{T-1} \text{ and } F_j = \frac{\sum_{i=1}^{n_j} \sum_{t=2}^{T} DUM_{i,t}}{n_j(T-1)}$$

where: DUM_i is a dummy variable, which takes the value of '1' if the price of product i has changed in time period t and '0' otherwise
T is the time span of the sample
n_j is the number of products observed in product group j

Following Bils and Klenow (2004), the implied average price duration (D) for each product, defined as an uninterrupted period during which the price index remains unchanged, is inversely related to the frequency of price changes, i.e. $D = 1/F$. This assumes that price changes occur at discrete time intervals.

Chart C1 shows the distribution of price duration of the 136 price series in the CPI basket. Evidently, a significant portion of the CPI basket is characterised by fairly frequent price changes with more than 59% of the basket exhibiting short price durations of one to two months and close to 80% experiencing price adjustments at least once in six months.[2/] Overall, the average price duration for all items is 1.7 months while the weighted average price duration is 3.6 months.[3/]

Chart C1
Distribution of Price Duration



Fact #2: The frequency of price changes varies markedly across product categories

Table C1 shows that there are varying frequencies of price changes across different product groups. On a weighted basis, food prices exhibit the highest frequency of price adjustment with the shortest duration. This is unsurprising given that a large proportion of Singapore's food is perishable and imported from countries with unpredictable weather conditions which can lead to high price volatility. Conversely, education & stationary has the highest weighted price duration due to the infrequent price adjustment of newspapers. In fact the prices of newspapers were adjusted only once in the observation period.

2/ Our results on the frequencies of price changes in Singapore are generally higher than those in studies conducted by Bils and Klenow (2004) and Dhyne *et al.* (2006). For instance, Dhyne *et al.* found that 15% and 29% of prices change in a given month in the Eurozone and US respectively. The higher frequency in our study could be due to the much more aggregated price data available to EPD compared to other studies.

3/ The average weighted price duration is obtained by weighting the price duration of the items by their respective shares in the CPI basket so that items with higher shares are given greater importance.

Table C1
Frequency of Price Changes and Price Duration

CPI Groups/Sub-Groups	Weights in CPI basket	Frequency (%)	Duration (months)	Weighted Duration (months)
Non-cooked Food	1029	94.9	1.1	1.1
Cooked Food	1300	81.2	1.2	1.1
Recreation & Others	1659	69.7	1.4	2.3
Clothing & Footwear	357	66.3	1.5	2.3
Health Care	469	61.0	1.6	2.1
Transport	1671	51.0	2.0	6.9
Communications	504	37.9	2.6	2.6
Education & Stationery	819	36.8	2.7	9.0
Housing (excluding-accommodation)	766	22.5	4.4	4.7
All Items	8574	58.0	1.7	3.6
Goods vs Services				
Goods	4833	84.1	1.2	1.3
Services	3741	38.9	2.6	5.7

Note: CPI groups are ranked in descending order of frequency of price changes.

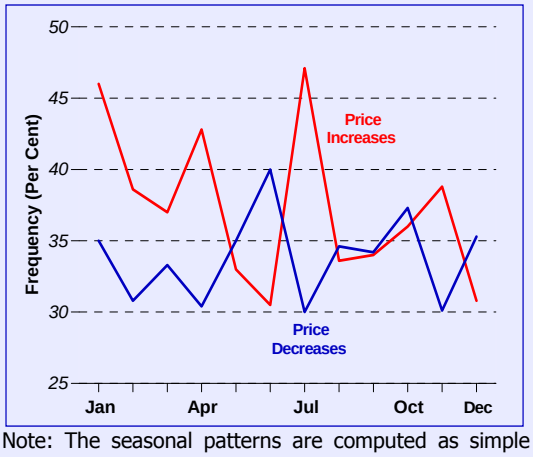
Differences in the frequency of price changes are also evident within product groups. For instance, while prices are highly variable for the private road transport sub-category (weighted duration of one month), the public road transport sub-segment has a much longer price duration of 22 months. The former is due mainly to the volatility of COE prices while the latter is influenced by the less frequent fare adjustments of bus and MRT services. Similar disparities are also observed for categories such as education & stationery, clothing & footwear, and housing (excluding accommodation).

In general, we also find the frequency of price adjustment of consumer goods to be greater than that of services. The weighted price duration for goods is 1.3 months, compared to a weighted duration of 5.7 months for services. This finding is consistent with those in the US (Bils and Klenow, 2004) and the Eurozone (Dhyne, *et al*. 2006). The differences in the frequency of price adjustment for goods and services can be attributed in part to differences in their cost structure (Álvarez, *et al.* 2005). In particular, as wages in the services industry are typically adjusted annually in European countries and account for a larger share of total cost, prices of services tend to remain unchanged for a longer period of time. Bils and Klenow also noted that consumer goods with lower value added in final production, such as uncooked food, often display higher frequency of price changes.

Fact #3: Price adjustments display distinct time-dependent characteristics

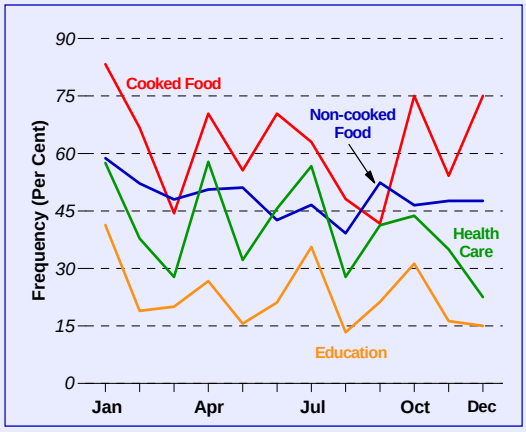
Chart C2 shows the seasonal pattern of price changes in Singapore, suggesting that firms have a tendency to adopt time-dependent pricing strategies. Notably, price increases are common during the first month of each quarter, in particular January and July, while price declines occur more often in June.

Chart C2
Seasonal Pattern of Price Changes



Note: The seasonal patterns are computed as simple averages of the frequency of price changes for each particular month. The frequency here refers to the number of price changes for all items in a particular month.

Chart C3
Seasonal Pattern of Price Increases for Selected CPI Groups

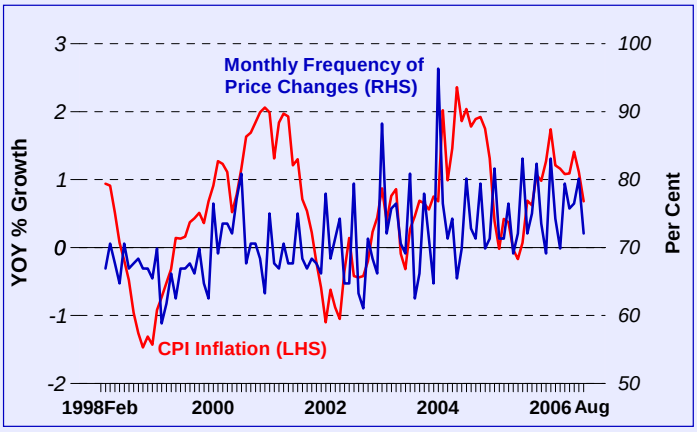


The practice of reviewing prices at the beginning of each year is apparent in almost all categories, thus leading to the highest frequency of price changes in January. For some categories such as cooked and non-cooked food, another reason could be the timing of the Chinese New Year, which often falls in January. During this period, food operators and retailers typically raise prices in anticipation of strong demand. (Chart C3) Meanwhile, the higher frequency of price increases in July can be mainly attributed to the rolling back of discounts on retail sales in July with the end of the annual Great Singapore Sale. In addition, high frequencies of price increases in July can also be observed across various services such as education and health care.

Fact #4: There appears to be some indication of state-dependent price-setting behaviour

Chart C4 shows the time series representation of the frequency of price changes in relation to headline CPI inflation. The monthly frequency of price adjustments appears to be positively correlated with CPI inflation with a correlation coefficient of 0.3. This suggests some form of state-dependent pricing behaviour whereby firms adjust prices more frequently when inflation in the economy is higher. This finding is also observed in European countries such as Austria (Baumgartner, *et al.* 2005), Belgium (Aucremanne and Dhyne, 2004), and Spain (Álvarez and Hernando, 2004).

Chart C4
CPI Inflation and Monthly Frequency of Price Changes



Fact #5: Price increases are just as common as price decreases, and the average magnitude of price increases is only slightly larger than that of price decreases

There appears to be little indication of downward rigidity of prices in Singapore, as the ratio of the frequency of price increases to price decreases is broadly balanced at 1.1. (Table C2) In an inflationary environment, the magnitude of price increases can be expected to exceed price decreases on average. This asymmetry is observed in Singapore, with the average monthly price increases and price decreases at 1.2% and -1.1% respectively.

Table C2
Average and Median Size of Monthly Price Changes

(%)

CPI Group	Median Size of Price Increases	Median Size of Price Decreases	Average Size of Price Increases	Average Size of Price Decreases	Ratio of Magnitude of Price Increases to Decreases	Ratio of Frequency of Price Increases to Decreases
Non-cooked Food	0.5	-0.4	1.1	-1.0	1.1	1.1
Cooked Food	0.1	0.0	0.2	-0.2	1.2	3.2
Clothing & Footwear	1.5	-1.8	2.6	-2.4	1.1	1.0
Housing (excluding accommodation)	0.4	-0.3	1.7	-1.0	1.6	0.9
Transport	0.7	-0.5	1.1	-1.2	0.9	1.0
Communications	1.1	-1.2	2.1	-2.1	1.0	0.5
Education	0.4	-0.6	0.8	-0.9	0.9	1.7
Health Care	0.3	-0.2	0.5	-0.4	1.3	2.0
Recreation & Others	0.4	-0.4	0.9	-0.8	1.2	1.1
All Items	0.5	-0.5	1.2	-1.1	1.1	1.1
Goods vs Services						
Goods	0.8	-0.7	1.3	-1.2	1.1	1.0
Services	0.8	-0.4	1.4	-0.8	1.7	1.7

Across product groups, the degree of asymmetry between the frequency of price changes and the magnitude of price changes differs markedly, as shown in Table C2. Clothing & footwear experienced the largest magnitude of price changes, due to the effects of seasonal sales. In comparison, price changes for cooked food are often minor, despite the higher occurrence of price increases. The ratio of the magnitude of price increases to price decreases is the highest for the housing category due to the recent surge in global oil prices which pushed up prices of oil-related items such as electricity and gas tariffs. As expected, in categories with a larger component of consumer services, such as health care and recreation, prices tend to be biased upwards. Prices in the education category are, however, dragged down by declining prices of computers.

With regard to the ratio of the frequency of price increases to price decreases, it is highest for cooked food at 3.2 and lowest for communications at 0.5. The former probably reflects the stronger influence of wages on total operating costs while the latter reflects the liberalisation of the telecommunications industry and technological progress, which has lowered prices of telecommunications services and equipment over the sample period.

It is also found that consumer services exhibit greater downward price rigidity, with the ratio of the frequency of price increases to price decreases at 1.7, while prices of consumer goods tend to be more flexible, with a ratio of 1.0. (Table C2) Meanwhile, the asymmetry between the average magnitude of price increases and prices decreases is more pronounced in consumer services (1.4% and -0.8%) than in consumer goods (1.3% and -1.2%). (Charts C5 & C6)

Chart C5
Average Magnitude of Price Increases and Price Decreases for Consumer Goods

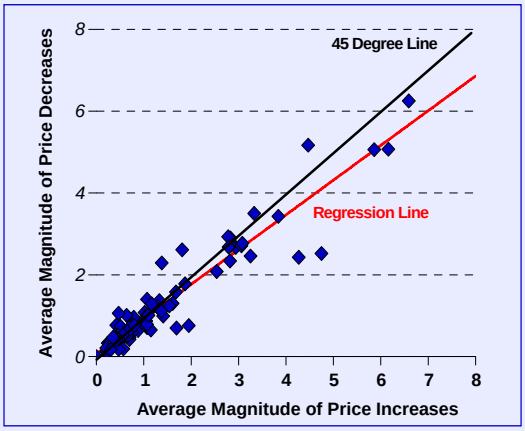
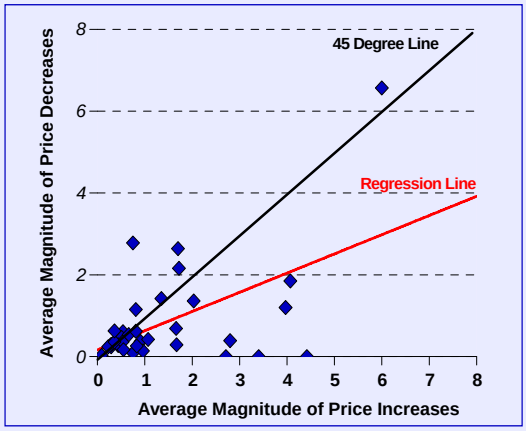


Chart C6
Average Magnitude of Price Increases and Price Decreases for Consumer Services



Note: Services exclude outliers (newspapers & magazines and water tariffs)

Sum-up

This study seeks to provide some insight into the price-setting mechanism and pattern of price changes in Singapore. The results show that domestic consumer prices tend to adjust fairly frequently, especially the prices of food and private road transport as these are affected by unpredictable weather conditions and volatile COE prices respectively. Consumer prices also tend to change more frequently during the first month of each quarter, reflecting amongst other things, the effects of Chinese New Year in January, and the rollback of price discounts on retail sales in July following the end of the annual Great Singapore Sale. Firms also tend to adjust prices up (down) when the overall CPI inflation is up (down), with the average price increases only slightly more than that of price decreases. Finally, price increases are just as common as price decreases, though there are differences across product groups. Notably, the ratio of the frequency of price increases to price decreases is highest for food, reflecting the influence of wage growth, and lowest for communications, reflecting liberalisation and technological progress within the industry. These are some of the interesting stylised facts, which helped contribute to our deeper understanding of pricing practices in Singapore.

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CHAPTER 3

OUTLOOK

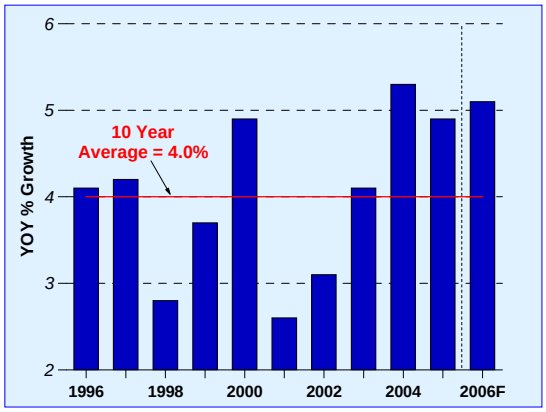
3.1 External Outlook

Some Clouds on the Horizon

The global economy is expected to moderate in 2007 following a period of above-trend growth.

The world economy has shown remarkable resilience in the past year, in the face of accelerating oil prices, hikes in interest rates and geopolitical tensions. (Chart 3.1) Into 2007, global growth is expected to ease, though it should still remain relatively healthy. This moderation is due to a number of factors, including uncertainty about oil prices, the slowdown in the US economy arising from a correction in the housing sector, and softer conditions in the global IT market.

Chart 3.1
World GDP Growth

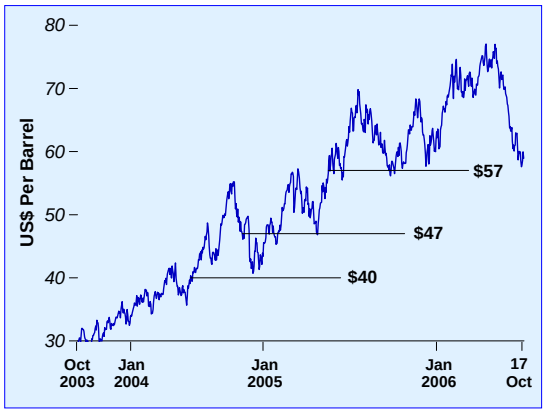


Source: IMF WEO Database

Oil prices are expected to remain high.

From a record high of US$77.03 per barrel in mid-July, the benchmark WTI crude oil price has since fallen sharply to levels closer to US$60 per barrel. This follows the unwinding of risk premiums associated with geopolitical tensions and supply uncertainties. Nevertheless, high oil prices remain a risk to the global economy. In recent years, oil prices have tended to rise in a series of "waves", and then settle at successively higher floors. (Chart 3.2) Each wave was triggered by actual or potential supply disruptions against a backdrop of tight capacity, and was exacerbated by bouts of speculation. Indeed, the average real oil price in Jan-Sep 2006 has nearly reached the peak values seen during the second oil crisis in 1979-1980.

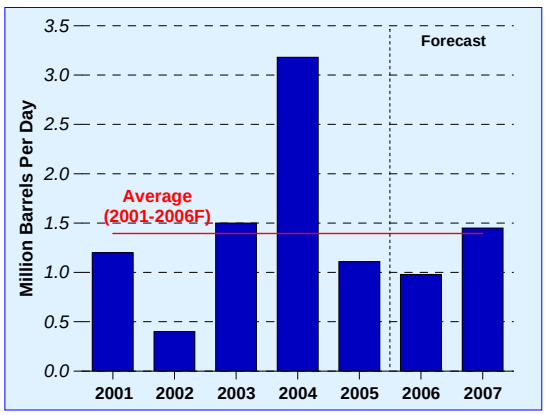
Chart 3.2
WTI Oil Prices



Source: Bloomberg

Looking ahead, demand-supply conditions suggest that global oil prices could stay high, at above US$60 per barrel. Assuming steady growth in the world economy, the International Energy Agency (IEA) is forecasting global demand to rise by 1.5 million barrels per day (bpd) in 2007, compared to 1.0 million bpd this year. (Chart 3.3) In particular, the Chinese economy, which has contributed to the upsurge in oil prices in recent years, will continue to underpin the robust demand for oil, together with firm demand from India, the Middle East and the US.

Chart 3.3
Global Oil Demand Growth



Source: IEA

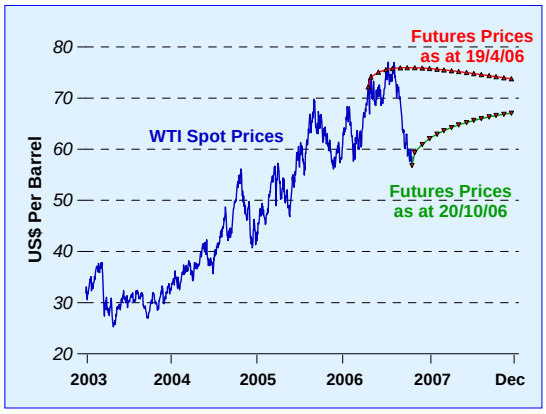
On the supply side, production by non-OPEC countries is expected to rise by some 1.7 million bpd in 2007, according to the IEA. OPEC members decided, however,

to reduce production by about 1.2 million bpd in October 2006. This could therefore result in a situation of excess demand.

In addition, low OPEC spare production capacity will continue to be a market concern. Although the reduction in OPEC production will now increase spare capacity, the latter is estimated to amount to only about 4% of global oil demand. Hence, oil prices are likely to remain vulnerable to threats of supply disruptions.

Against this backdrop, the futures market is forecasting the benchmark WTI oil price to remain high at an average of about US$65 per barrel in 2007, albeit lower than the US$70 level predicted in April this year. (Chart 3.4) In October, the US Department of Energy also lowered its projection of WTI oil price for 2007 to US$66 per barrel from US$70 in the previous month.

Chart 3.4
WTI Spot and Futures Prices

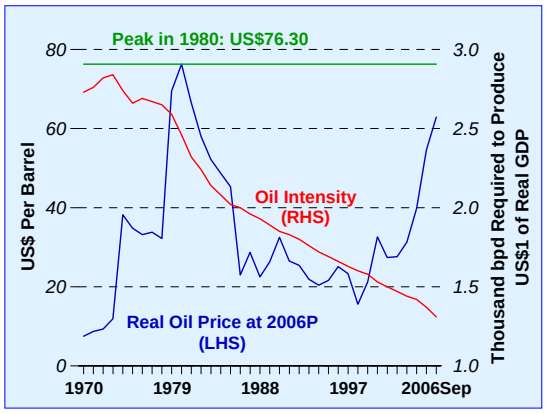


Source: Bloomberg

Decreased oil dependency should cushion the impact of sustained high oil prices.

Thus far, the resilience of the global economy has partly reflected the relatively lower global dependence on oil as a result of the search for alternative fuels and more efficient oil usage after the 1970s oil price shocks. (Chart 3.5) For instance, in transportation there has been a gradual shift in consumption patterns towards the use of more fuel-efficient cars. In addition, businesses have increasingly invested in oil-saving technologies and turned to cheaper fuel substitutes such as coal, natural gas or nuclear energy. Collectively, these cheaper substitutes now constitute a much larger share (about 60%) of the global economy's total energy consumption. These mitigating factors have led to a significantly smaller pass-through of oil prices to CPI inflation in recent years. Given the lower oil dependency, MSD's internal estimates suggest that crude oil prices would have to reach US$135 per barrel in order for spending on oil to account for the same share of global GDP as the last oil shock in 1980.

Chart 3.5
Global Dependence on Oil



Source: Energy Information Administration, IMF and CEIC

The US housing correction has dampened the outlook for the US economy.

Signs of slower growth in the US economy, resulting in part from the ongoing correction in the housing sector, are also clouding global growth prospects. The US housing market had risen sharply in the past five years under easy monetary conditions, with house prices appreciating by more than 50% over this period.

However, the housing market has peaked and the ongoing correction since the second half of last year has gathered pace in recent months. For example, housing starts fell by 19% y-o-y in September and existing single-family home sales dipped by 12% y-o-y in August. (Chart 3.6) At the same time, the median sales price of existing homes fell by 1.7% in August, the first y-o-y decline in 11 years. (Chart 3.7)

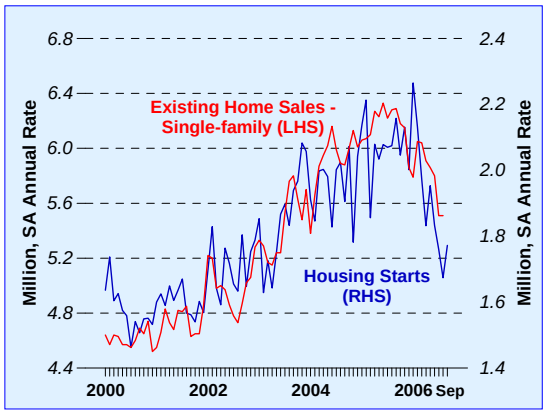
So far, however, the correction in the housing market has had a fairly limited impact on US consumer spending – much of it has been confined to autos and household related items. Barring a sharp collapse in house prices, the impact is likely to remain contained due to a number of mitigating factors, including robust labour market conditions and firm growth in worker compensation. (Please see Box D.)

Elsewhere, the growth momentum in major economies, such as Japan and Europe, is set to ease in tandem with a US slowdown, as export growth slows and specific domestic factors such as the introduction of the value added tax (VAT) in Germany take effect. Broadly, however, domestic demand is likely to remain firm as the Tankan and IFO surveys point to solid investment climates in Japan and Germany respectively. Labour market conditions also continued to improve, following restructuring efforts in both Japan and Europe.

In Asia, growth is forecast to soften. A sharp deceleration is unlikely at this point as prospects for consumption and investment in China and India remain firm and should continue to provide some support for exports from the Northeast Asian and ASEAN economies. Some of the regional economies may also benefit from infrastructure spending and more accommodative monetary policy as inflationary pressures subside.

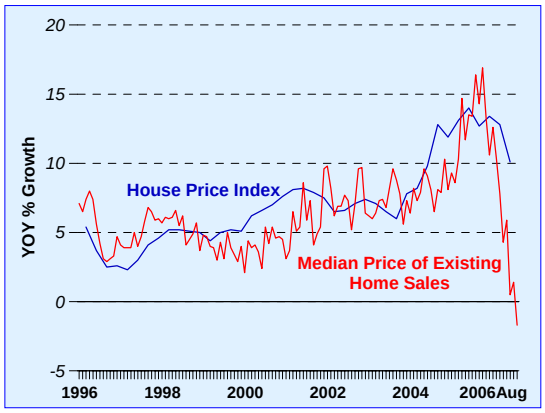
Thus overall, both developed countries and emerging Asian economies are predicted to record slower growth in 2007 compared to this year. Nevertheless, the outlook remains generally sanguine and should support continued healthy economic expansion. (Table 3.1)

Chart 3.6
US Housing Starts and Sales of Existing Homes



Source: National Association of Realtors, US Census

Chart 3.7
US House Prices



Source: Office of Federal Housing Enterprise Oversight, National Association of Realtors

Table 3.1
Forecasts of GDP Growth

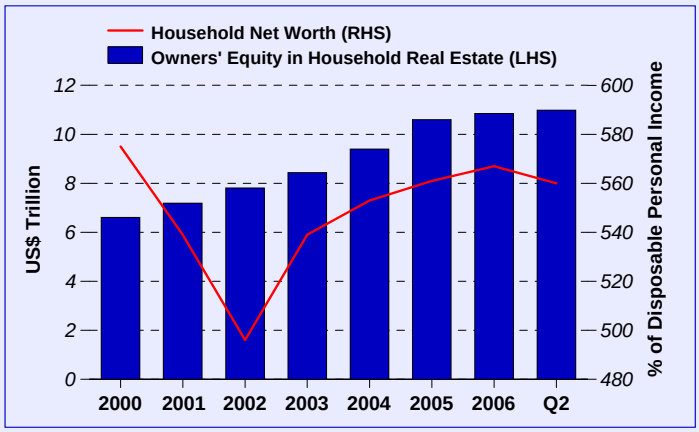
y-o-y (%)	2006F	2007F
US	3.4	2.6
Japan	2.8	2.2
Eurozone	2.6	1.9
China	10.4	9.1
India	8.1	7.4
Hong Kong	5.9	4.9
Indonesia	5.4	5.7
Korea	5.1	4.5
Malaysia	5.5	5.3
Philippines	5.3	5.1
Singapore	7.4	5.0
Taiwan	4.0	4.0
Thailand	4.4	4.4

Source: Consensus Economics Inc., Oct 2006

Box D
US Household Spending

In recent quarters, a number of factors have combined to exert a significant drag on US households' consumption expenditures. First, because of the weakening in the housing sector, homeowners' equity as a share of overall real estate value has been declining since Q3 2005. In the past few years, rising house prices had bolstered households' net worth (Chart D1), against which households have borrowed to fund retail purchases, among other things. If house prices continue to fall, households will become more constrained in their ability to borrow against their homes, thus having the reverse effect and restraining consumer spending. Second, households have become increasingly burdened by debt servicing given the rise in debt and borrowing rates. By Q2 2006, households had incurred US$14.40 in debt service payments for every US$100 of disposable income, up from US$14.07 a year ago. Third, households' tax burdens have risen and are unlikely to ease in the near term. In August 2006, households paid an annualised US$1.4 billion in personal taxes, up from US$1.2 billion in 2005. Moreover, households are unlikely to obtain more tax relief as no further household tax credits are expected from the Bush administration. Fourth, high energy costs act as a tax on households. Year-to-date, residential natural gas and pump prices have risen by 15-17% compared to the same period in 2005, with spending on fuel, gasoline and other energy items accounting for 4.1% of household expenditure in August, a shade below the 11-year peak in July. Finally, consumer spending could be dampened by the need for households to rebuild their savings. The saving rate had declined sharply to -0.4% on average in 2005 and to -0.5% on average between Jan-Aug 2006.

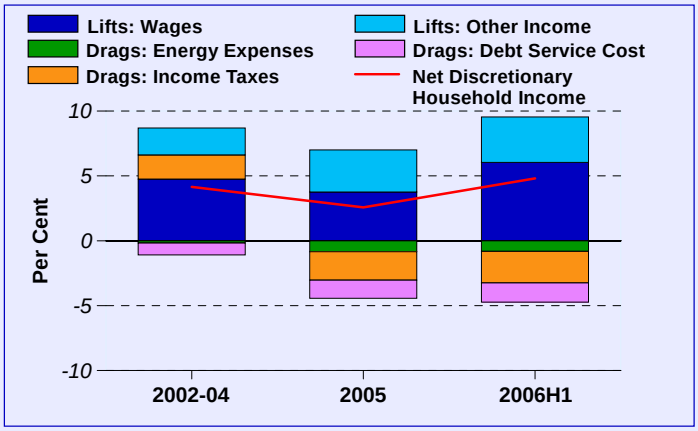
Chart D1
Household Net Worth and
Owners' Equity in Household Real Estate



Source: Federal Reserve

Two important mitigating factors should, however, help to support consumer spending. First, the labour market has remained robust. The unemployment rate fell to 4.6% in September 2006, the third time it reached this level this year and the lowest since July 2001. From Jul-Sep 2006, a monthly average of 134,000 non-farm jobs were created outside the residential construction and manufacturing sectors. This was a rise from a monthly average of 105,000 jobs from Apr-Jun 2006, an evidence of the continued underlying strength of the economy. Second, growth in discretionary income, i.e. income net of taxes, debt service payments and spending on energy items, remained firm. While high fuel prices, greater tax payments and increased debt servicing together was estimated to have shaved 4.6% points from discretionary income growth in H1 2006, this was more than offset by the rapid growth in wages and other income such as dividends. (Chart D2) For example, total workers' compensation rose by 7.9% y-o-y in H1 2006, the fastest pace of expansion since H1 2000, on the back of strong wage growth and gains from employee stock options. According to the Federal Reserve's October Beige Book, wage pressures were greatest in specific sectors requiring specialised skills, such as financial and health services.

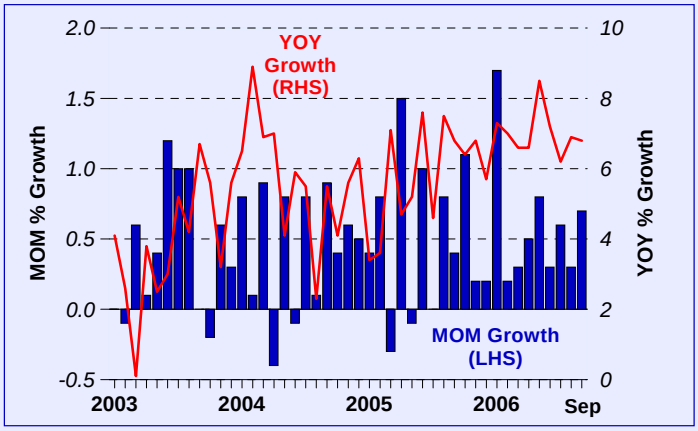
Chart D2
Discretionary Income Growth



Source: CEIC, Federal Reserve, Bureau of Economic Analysis

The sustained job creation and continued expansion in discretionary income have been important factors supporting US household consumption. Weakness in retail sales has been largely confined to a few sectors, such as motor vehicles, gasoline and building materials. Excluding these items, core retail sales[1/] actually rose by 0.5% m-o-m in August and September on average. (Chart D3) Thus, while there are downside risks to consumer spending, a gradual moderation in household expenditure is the more likely outcome. Nonetheless, a sharp contraction cannot be ruled out if the housing market collapses, wage and other income growth falters, and energy prices or borrowing costs rise sharply.

Chart D3
Core Retail Sales



Source: CEIC

1/ This is a widely-used definition of retail sales which excludes sales at gasoline stations, at motor vehicles and parts dealers, and at building materials, garden equipment and supply stores.

Based on the five-stage characterisation of an IT cycle ...

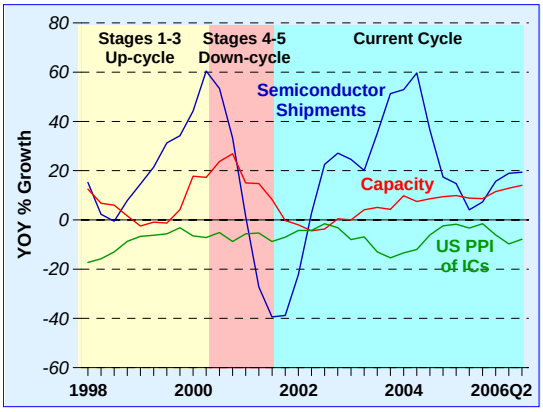
A moderation in US growth will have knock-on effects on the global IT industry. Indeed, as mentioned in Chapter 1, some signs of softening have already emerged in downstream IT demand. Taking a longer-term perspective, the semiconductor cycle[1] can be broadly divided into five stages, based on the historical behaviour of prices, capacity and shipments. (Chart 3.8) The first stage marks the beginning of the up-cycle (shaded yellow) and is characterised by strong semiconductor shipments and output. If demand persists, the second stage kicks in as investment in facilities and equipment increase production capacity. In stage three, inventory levels escalate and prices start to soften. Stage four marks the beginning of the down-cycle (shaded pink in Chart 3.8), as semiconductor prices fall more rapidly alongside weakening demand. Shipments contract, resulting in a dip in revenue. Finally, manufacturers reduce investment and cut capacity in the fifth stage.

... the industry has yet to reach an inflexion point ...

The industry appears to be at the third stage in this current cycle. While semiconductor prices have held firm, inventory levels have increased in recent quarters. According to iSuppli, excess semiconductor inventories reached US$1.3 billion in Q2 2006 after exceeding US$1.0 billion in Q1. (Chart 3.9) Furthermore, US electronics inventories (including semiconductors) have climbed for four consecutive quarters since the beginning of Q3 2005. (Chart 3.10)

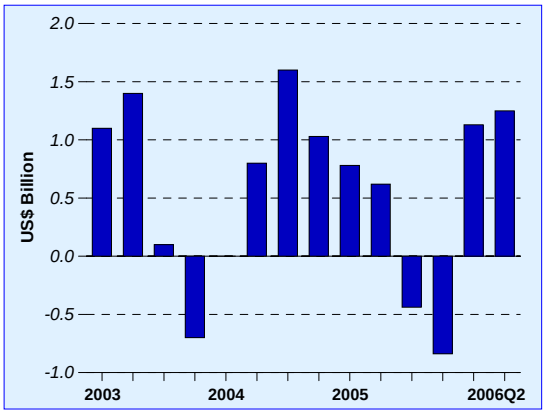
However, the increase in inventories thus far appears benign. In fact, US electronics inventories are still a third below their peak during the downturn in 2001. In addition, manufacturers have been disciplined in this cycle and have not recklessly invested in spare capacity in anticipation of demand. Their capex intensity, or capital expenditure as a percentage of total expenditure, has been very low compared to the highs seen in 1996 and 2000 when the semiconductor cycle was at its peak. (Chart 3.11)

Chart 3.8
Semiconductor Cycle



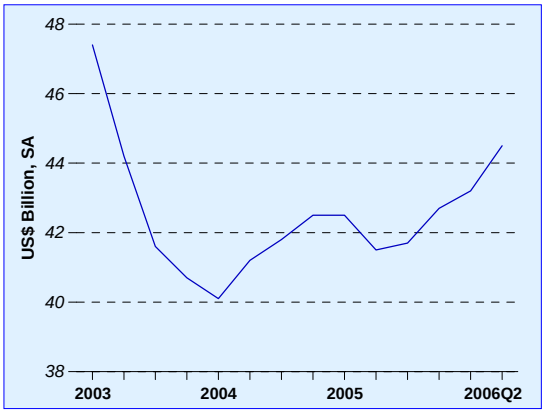
Source: Semiconductor International Capacity Statistics. US Bureau of Labor Statistics and Semiconductor Industry Association; EPD, MAS internal estimates for semiconductor shipments

Chart 3.9
Excess Semiconductor Inventories



Source: iSuppli

Chart 3.10
US Electronics Inventories (including Semiconductors)

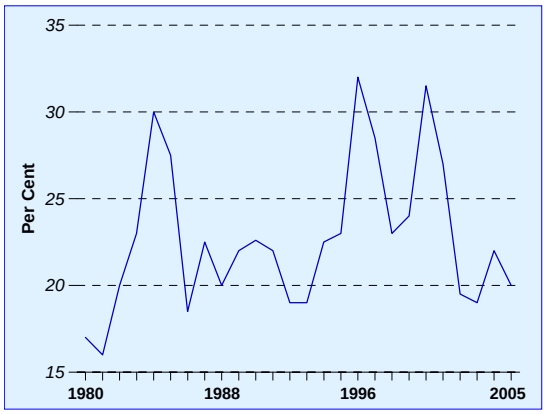


Source: US Census Bureau

[1] Semiconductor cycle is synonymous with IT cycle in this context.

From the demand perspective, growth drivers appear to be firmly in place going into 2007. (Figure 3.1) Demand for handsets is expected to be supported by new mobile phone subscription growth in developing countries (this will be discussed further in Section 3.2), and by new high-end phones which should spur replacement demand. Consumer electronics, which has been the engine of growth in IT markets since 2004, will also benefit from new products, including game consoles. In addition, the launch of Microsoft's new operating system, Vista, next year should not only spur PC demand but also drive up the semiconductor content in PCs, especially for graphics-related chips.

Chart 3.11
Global Semiconductor Capex Intensity

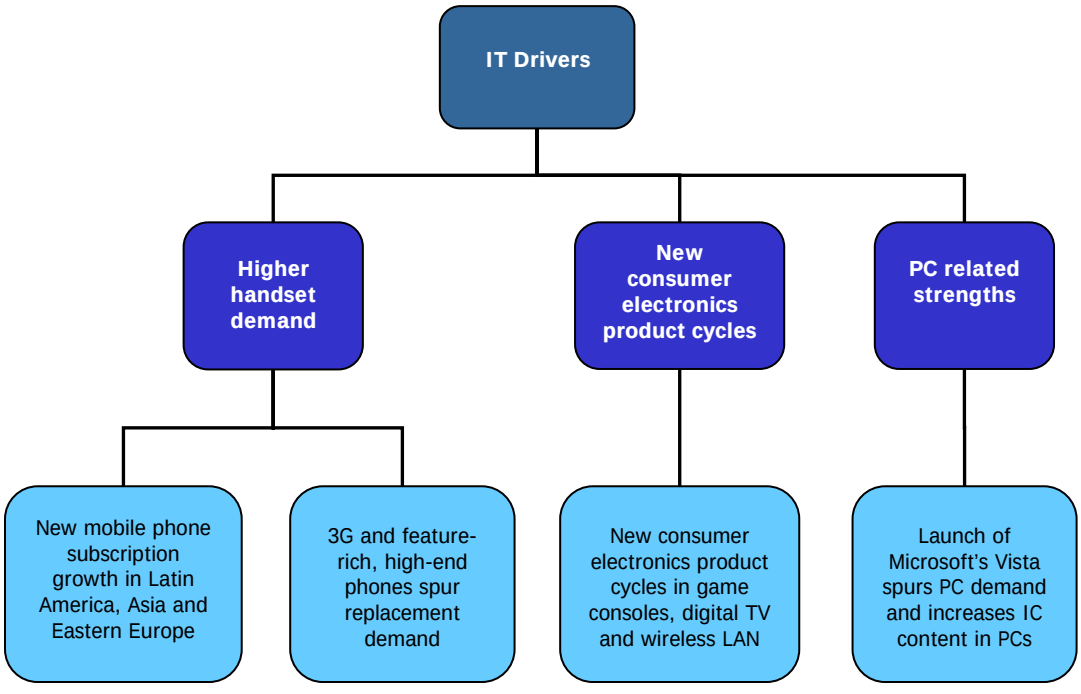


Source: Morgan Stanley Research

... although the global IT cycle is in a mild adjustment phase.

It appears therefore that the global IT industry is in a mid-cycle adjustment phase, rather than a typical downturn. Besides the impending product/software application launches, industry fundamentals, such as profitability and inventories, have generally remained at healthy levels. This situation is reminiscent of the mid-cycle deceleration in 2004 when the industry as a whole avoided a sharp correction despite some elevation in inventories. On balance, barring a sharp adjustment in the US economy, the global IT industry will grow at a slightly slower pace in 2007 compared to this year. Industry analysts are projecting global chip sales to expand by 6-8% next year, compared to an estimated 8-10% in 2006.

Figure 3.1
Underlying Sources of Support for the Electronics Sector in 2007



3.2 Outlook for the Singapore Economy

Keeping Up the Pace

Fears of high oil prices crippling the global economy have abated. Concurrently, the key underpinnings of the global IT industry appear to be largely intact. The moderation in US growth has thus far been confined to specific sectors and the economy as a whole is expected to avoid a sharp downturn.

On balance, the generally favourable global outlook at this stage should provide support for the Singapore economy in 2007. Moreover, there are pockets of strength in some service industries and domestic-oriented activities which could provide an additional buffer next year.

Manufacturing will be driven by growth in the electronics cluster ...

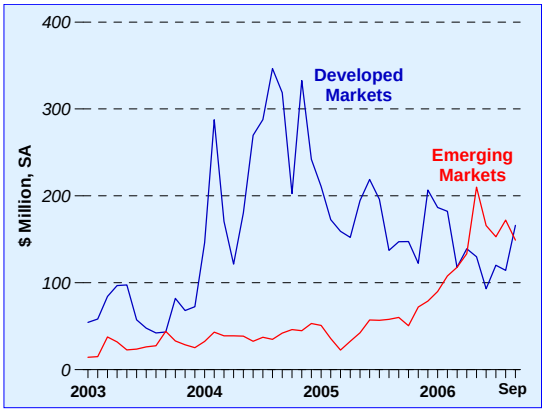
Manufacturing growth will probably moderate next year. However, electronics, in particular, is likely to see continued expansion. In addition, anticipated strong demand for digital consumer electronics products and components should provide the domestic manufacturing sector with an added source of support in 2007.

... supported by strong demand for digital consumer electronics products and components.

Exports of Singapore-manufactured digital consumer electronics products are likely to be buttressed by demand from the emerging markets. Indeed, Singapore's handphone exports to the BRIC economies of Brazil, Russia, India and China more than doubled in Jan-Sep 2006, compared to the same period last year. In contrast, handphone exports to the developed economies contracted by 23%. (Chart 3.12) In fact, the share of handphone exports to emerging markets rose from 13% in 2005 to 30% to date in 2006. Concomitantly, the share to the developed markets fell from 45% to 23%.

According to industry analysts, an estimated 60% of global handset sales volumes are now dominated by emerging markets, up from 40% in 2001. This trend is set to continue as penetration rates in these markets are still low. For instance, the penetration rate is around 30% in China, and less than 10% in India,

Chart 3.12
Domestic Exports of Handphones by Markets



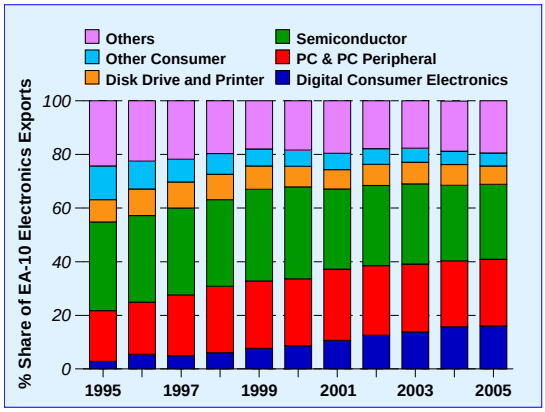
compared to more than 90% in more developed Asian markets. Looking ahead, rapid growth in demand is expected to persist, not just in handsets, but across a wide range of digital consumer electronics goods, due to the growing affluence of the middle-class in emerging markets.

Indeed, Asian electronics producers have been the major beneficiaries of this trend. Asia's exports of five representative digital consumer electronics product categories, namely handphones, digital cameras, DVD and MP3 players, game consoles and flat-panel displays, have expanded significantly in recent years, and their share of total electronics exports doubled from 8.6% in 2000 to an estimated 16% last year. (Chart 3.13)

For Singapore, digital consumer electronics accounted for around 10% of domestic electronics exports in 2005. However, this is much higher if exports of midstream components used in the production of final consumer electronics products are included. Based on available data on global trends, an estimated 20% of global semiconductor production is used in consumer electronics products, while HDDs, which used to be predominantly used in PCs, have found increasing applications in consumer products such as MP3 players and DVD-HDD recorders.

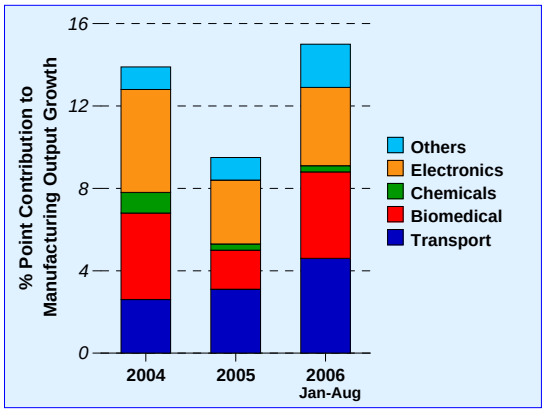
At the same time, MNCs are tapping Singapore, both as a production centre for digital consumer electronics products and its components, and as a centre for R&D. Seagate, Motorola, Dell and Philips have all located design centres here. Motorola, for example, has a 3G R&D centre in Singapore, and manufactures some 60% of its 3G phones here. Dell has also set up a design centre to support its entry into display and imaging products, such as scanners, projectors, and flat-panel displays. In addition, Philips established an Innovation Centre in 2000 that is responsible for the global design and development of its flat-panel TVs and DVD players.

Chart 3.13
Asian Electronics Exports by Segment



Source: United Nations Comtrade Database, DOS and Taiwan Bureau of Foreign Trade

Chart 3.14
Contribution to Manufacturing Output Growth by Cluster



The biomedical and transport clusters should do well next year.

Turning to the non-electronics sector, the three key growth clusters, i.e. biomedical, chemical and transport, are likely to continue along a strong if volatile growth trajectory next year. These clusters, on average, contributed 6.6% points per annum to the 12% growth in overall manufacturing in the last two years. (Chart 3.14) In the first eight months this year, the three clusters contributed some 9.0% points to overall manufacturing growth of 15%.

Although there could be sharp fluctuations in output from quarter to quarter, the biomedical industry is likely to expand at a healthy pace in 2007. According to industry feedback, some pharmaceutical plants may ramp up capacity next year, as Singapore consolidates its position as a major production centre.

Moreover, despite the recent fall in oil prices, the oil-related manufacturing segments are not expected to see any slowdown in activity. The petrochemicals sector, which produces raw materials for manufactured goods, will probably grow at a similar pace to the past years, underpinned by regional demand. At the same time, in the marine & offshore engineering segment, demand for oil-rigs and rig-conversion projects still outpaces supply, resulting in a backlog of orders in Singapore's shipyards which will stretch into the next three to four years.

A broad range of services industries will provide support ...

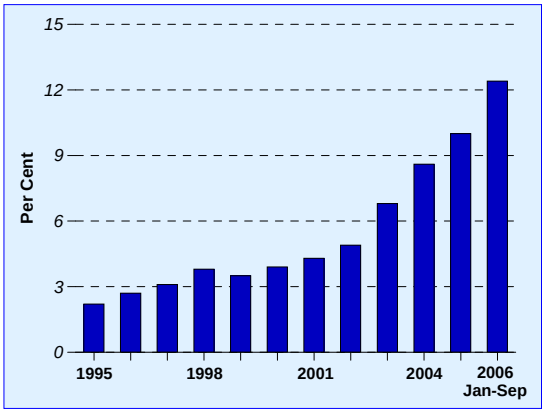
The services sector should continue to provide an important source of growth support. Steady growth is forecast for a broad range of activities, including the trade-oriented and financial services industries driven, in part, by healthy growth in the Asian region.

... with China as a key player.

Singapore's transport-hub services will be further boosted by China's burgeoning demand for both final and intermediate products. In particular, the share of Singapore's NORX to China[2] has increased from 2.2% in 1995 to 10% last year. (Chart 3.15) For the first nine months of this year, NORX to China expanded by a staggering 53%, supported by strong growth in domestic consumption and demand for intermediate inputs. Looking ahead, NORX to China is expected to post further rapid growth, in tandem with the strong outlook for the Chinese economy.

Likewise, Singapore's tourism-related industries should continue to see strong inflows of Chinese tourists next year. Chinese tourists reached some 31 million globally last year, and the World Tourism Organisation expects this number to grow to 50 million by 2010 and 100 million by 2020. In Singapore, Chinese tourists represent an important source of revenue for the tourism industry and now account for about 11% of

Chart 3.15
Share of China in Singapore's NORX



Note: Data excludes trade with Indonesia.

[2] Excludes trade with Indonesia.

visitor arrivals, roughly twice the share in 2000 and four times that a decade ago. In terms of tourist dollars, Chinese visitors spent about $574 million in 2004, which worked out to 9.2% of total tourist expenditure for that year.

The financial sector is also expected to perform well.

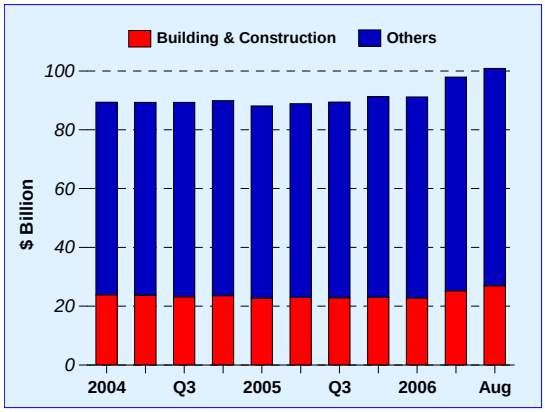
Notwithstanding the slower growth in Q3 this year, the generally sanguine outlook for the domestic financial services industry remains largely intact.

In the stock market, investor sentiment does not appear to have been dramatically impacted following the global equity market sell-off earlier in the year, with stock prices having rebounded strongly since then. Indeed, trading volumes have not suffered any lasting effects, and are expected to hold up into the new year. Elsewhere in the capital markets, investor sentiment has been resilient as well. The fund management industry, in particular, should be buoyed by the sustained expansion in private banking activities alongside the growing affluence and investor sophistication in the region. Another positive factor has been the continued outperformance of the Asian hedge funds market, where returns have remained attractive. Nevertheless, the possibility of an escalation in geopolitical tensions in the Korean Peninsula remains a significant risk to global financial markets.

On the banking front, lending activity in the offshore segment will be supported by firm credit demand from offshore financial institutions. This reflects, in part, the growing demand for trade financing services accompanying the strong expansion in regional trade. At the same time, the syndicated loans business is projected to boost bank earnings. This takes into account the greater liquidity on the part of banks, which has enabled them to take advantage of new lines of business such as real estate investment trusts (REITs), and companies venturing outside their domestic markets for the first time – particularly from India and China.

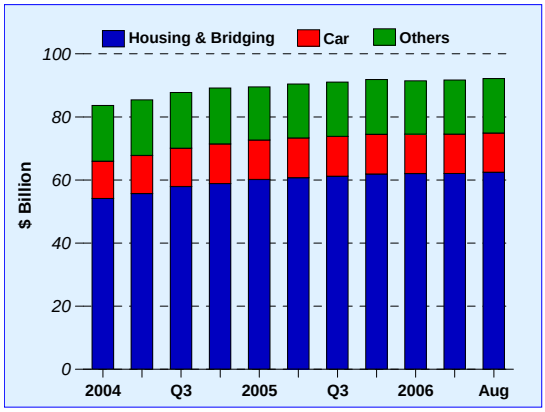
In the domestic banking sector, the recent turnaround was underpinned by continued expansion in credit extended to the building & construction industry. (Chart 3.16) With property market developers expected to ramp up the supply of new private residential projects – particularly at the higher end of the market – this could signal the start of a more sustained uptrend as such loans tend to be associated with longer tenures.

Chart 3.16
Breakdown of Loans to Non-bank Customers (Corporate)



On the consumer loans front, housing loans could see some pickup going forward, as the recovery in the high-end property market gradually filters down to the mass market segment. (Chart 3.17)

Chart 3.17
Breakdown of Loans to Non-bank Customers (Consumer)



Meanwhile, continued recovery in the property market will have spillovers on the construction sector.

The recovery in property prices in Singapore will have spillovers on construction as well. According to the latest data, private home prices rose by an estimated 2.5% in Q3 2006 – their biggest quarterly increase since 2000 – on the back of steep price gains in the luxury segment of the market. This recovery, together with non-residential projects, such as the Business and Financial Centre and developments in the Marina Bay vicinity, will provide an impetus to growth for the construction industry next year.

GDP growth will ease back to potential next year.

In sum, the prognosis for the Singapore economy is generally positive. GDP growth for 2006 is likely to be in the upper half of the official forecast range of 6.5-7.5%. For next year, there are other sources of growth which should help keep the domestic economy expanding at a healthy pace. Against this backdrop, GDP growth is expected to approach its medium-term potential rate next year.

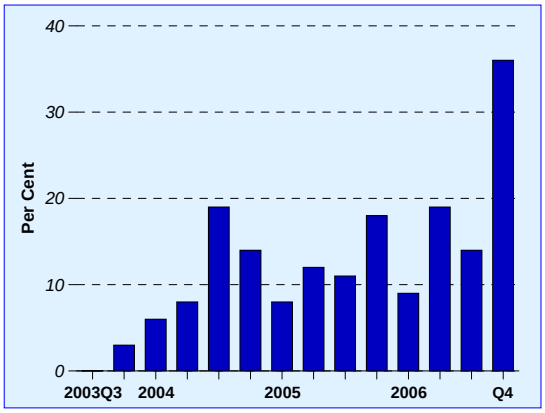
3.3 Labour Market

Hiring intentions are poised to remain robust.

The labour market is likely to remain fairly firm in the near term. According to a recent poll by Manpower Inc., more than one third (37%) of the 685 employers surveyed intend to increase hiring in Q4 2006, the brightest employment outlook in three years. (Chart 3.18)

Solid hiring intentions were indicated for most services industries, given the positive business outlook. In particular, the financial services sector foresees robust hiring. For instance, Credit Suisse indicated that it would recruit more than 900 staff by end 2007 for its global asset management and investment banking

Chart 3.18
Net Employment Outlook



Source: Manpower Inc.

businesses. Barclays Capital also intends to boost its headcount by 25% for its wealth management and investment banking activities in Singapore over the next three years. Likewise, other services industries should see increases in employment. The commerce sector anticipates job gains, especially with the opening of the largest shopping mall, VivoCity, which is estimated to create 7,000 new jobs.

The employment outlook for the manufacturing sector, however, is mixed for Q4 2006. This is partly due to the planned retrenchment of 2,000 staff by HDD producer Maxtor at the end of the year. In contrast, the marine & offshore engineering industry is likely to increase headcount considerably, given stronger orders for oil-rigs, oilfield equipment and shipbuilding.

The ratio of job vacancies to unemployed persons continues to rise.

Bright employment prospects are corroborated by the rise in the ratio of job vacancies to unemployed persons, which reached a high of 0.67 in Q2 2006. This came on the back of the continued increase in the number of job vacancies to 27,500 in the same quarter. (Chart 3.19)

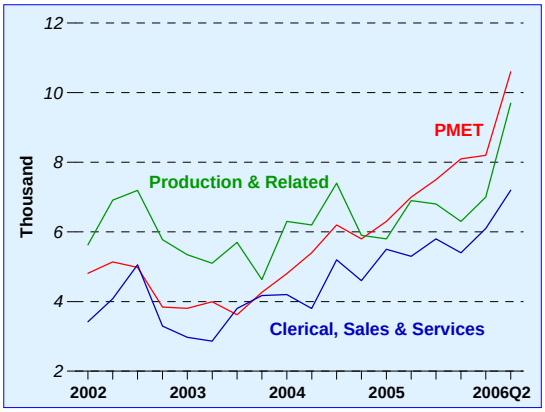
As observed in Chart 3.20, job vacancies for all three occupational groups have been on the rise. PMETs accounted for the largest proportion of job openings (39% or 10,600 vacancies), in Q2 2006. This was followed by production operators, cleaners & labourers (35%) and clerical, sales & service workers (26%).

Wages will rise in line with growing employment opportunities.

According to a recent poll by Mercer Human Resource Consulting, wages are expected to increase by 3.9% in 2006. Wage growth for next year is expected to be slightly higher at 4.0%. These are similar to EPD's wage growth forecasts of 3.5-4.0% in 2006 and 2007. After adjusting for projected inflation in the range of 0.5-1.5% in 2007, EPD anticipates real pay increases to be 2.0-3.5% next year. Given the projected rise in demand for manpower for long-term major projects, such as the Integrated Resorts at Marina Bay and the underground oil storage cavern at Jurong Island, there could be some upward pressure on overall wages.

Chart 3.19
Job Vacancies and Ratio of Job Vacancy to Unemployed Persons

Chart 3.20
Job Vacancies by Occupation



According to the Mercer survey, the industries which are experiencing the strongest wage increases are pharmaceutical & healthcare (4.4%) and consumer goods (4.0%). Among the occupational groups, R&D (8.0%), operations & engineering (6.8%) and IT (4.8%) are expected to see the strongest pay rises.

Unskilled mature workers are at the lower end of the wage distribution.

The *Report on Wages in Singapore, 2005,* published by MOM this year, showed that the average median gross monthly wages of skilled workers[3] rise with age until about 40-44 years of age. (Chart 3.21) This could be attributed to the importance placed on the knowledge, skills and work experience of such workers. In contrast, the average median gross monthly wages of unskilled workers[4] decrease with age after reaching a peak at the 35-39 age bracket. (Chart 3.22) For this group of workers, wages are less dependent on work experience, and age could become a disadvantage due to the physical nature of the jobs. Given the changing age profile of the workforce over time, an aging workforce raises concern about the long-term depressant impact on wages.

The issue of low wages and employability of unskilled mature workers has received government attention. The government and unions have targeted to raise the employment of older workers by 30,000 in five years to allow older workers to work longer and remain financially independent. One such programme is the ADVANTAGE! Scheme, which is administered by the Tripartite Committee on Employability of Older Workers that was formed recently. The scheme allows employers to tap into a $300,000 fund for job redesigning, wage restructuring, training, re-employment and retention of older workers.

The responses of the companies towards the range of schemes under the Tripartite Committee were mostly positive, as surveyed by the Singapore Human Resources Institute and Remuneration Data Specialists. 86% of the companies supported the Job Re-creation Programme where jobs are redesigned and reallocated to better suit the older workers. Restructuring wages towards a more performance-

Chart 3.21
Gross Monthly Wages of Skilled Workers by Age in 2005

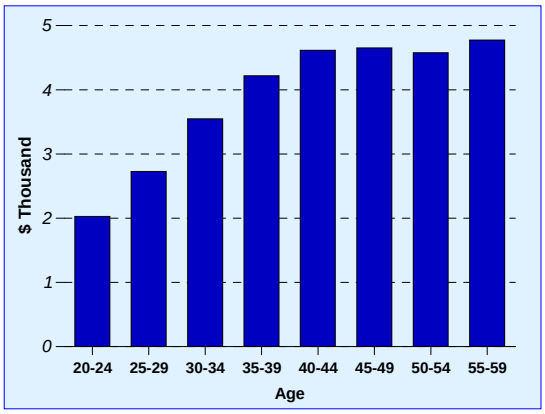
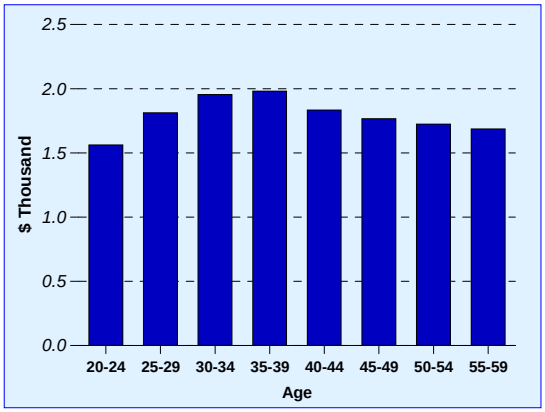


Chart 3.22
Gross Monthly Wages of Unskilled Workers by Age in 2005



[3] Skilled workers refer to managers, professionals, associate professionals and technicians (as defined in MOM's annual publication *"Report on Wages in Singapore"*).

[4] Unskilled workers refer to those in occupations such as clerical, sales, production and transport (as defined in MOM's annual publication "*Report on Wages in Singapore*").

based system instead of one that is dependent on education and age was overwhelmingly supported by 91% of the companies. With respect to raising the value of older workers, 95% of firms agreed that the government could increase assistance for skills upgrading of older workers.

3.4 Inflation

Global inflation should slow in 2007 as factors contributing to higher inflation in 2006 ease.

The global inflation outlook is fairly sanguine as prices are likely to rise at a less rapid rate in 2007 as compared to 2006. Central banks have been vigilant in combating inflation while price expectations remain generally well-anchored. Thus, inflation is likely to weaken as a result of three main factors.

First, global growth is forecast to moderate in 2007, which will ease capacity constraints. In 2006, capacity utilisation rates in several of the developed and emerging economies breached their long-term averages, while unemployment rates also registered multi-year lows in the G3 economies. In tandem with expected slower growth in 2007, resource utilisation is likely to weaken and reduce inflationary pressures. The IMF also predicts that the negative output gap in the US and Eurozone will widen, which should ease inflation.

Second, the base effect of administrative price hikes, such as the Philippines' VAT increase (Feb 2006) and Malaysia's fuel price hike (Mar 2006), would have petered out by early next year and should result in lower inflation in 2007.

Third, energy prices appear to have hit a plateau. The price of natural gas peaked in 2005 in the aftermath of Hurricane Katrina. Furthermore, fresh natural gas supplies have come on stream in recent months. Similarly, the price of crude oil has declined after peaking in July 2006, and weaker direct pass-through effects should reduce price pressures for the next twelve months.

The direct pass-through effects of higher oil prices on domestic consumer prices are likely to weaken going into 2007 ...

On the domestic front, the prices of oil-related items have been a dominant factor influencing CPI inflation since H2 2005. However, barring any sudden spikes in global oil prices, the direct pass-through effects on energy-related consumer items are expected to weaken going into 2007, as these items tend to react more promptly to changes in input prices. For instance, domestic petrol companies cut pump prices twice by a total of 11 cents in September following the plunge in global oil prices. Electricity tariffs for Q4 2006 are set to rise by a smaller 2.3% q-o-q as compared to an average quarterly increase of 3.7% over the period Q1 2005-Q3 2006. Tariffs for Q1 2007, which are based on HSFO prices in October, will probably also come in lower with the recent pullback in prices.

In addition, the higher base in H2 2005 relative to H1 2005 will also produce a weaker contribution from direct energy-related items to overall inflation in H2 2006 compared to H1. It is estimated that these components will contribute about 0.4% point to CPI inflation in H2, down from 1.0% point in the first half of the year.

... while the indirect pass-through effects could persist.

In contrast, the indirect pass-through effects on consumer prices could increase going forward. The fare hike for bus and MRT services in October 2006 will translate into a higher public road transport index in the CPI basket. On the whole, factors such as the uninterrupted domestic economic expansion, recovery in asset prices, improvement in the labour market and optimism in the retail sector could now set a more conducive environment for local businesses to raise prices in tandem with the increase in energy-related operating costs. Nonetheless, the highly competitive business environment could mitigate some of the pass-through effects on consumers.

Price pressures from non-fuel commodities may be more benign going forward.

In comparison, non-oil imported price inflation has largely stayed negative over the period 2002-2005 because of the decline in prices of machinery & transport equipment, which account for a significant 61% of Singapore's IPI basket. (Chart 3.23) It edged up, however, in recent months due to the steady increase in the prices of non-oil commodities such as rubber, wooden materials (subsumed under crude materials), manufactured materials of metallic content (subsumed under manufactured products) and food. (Chart 3.24)

Going forward, the prices of non-oil commodities are likely to soften in line with a slowing of global economic growth. The IMF's non-fuel commodity index is forecast to dip for the rest of 2006 and post a 22% increase for the full year, after a 27% y-o-y spike in the first nine months. In 2007, prices are projected to fall by 4.8%, the first decline in five years. (Chart 3.25) Meanwhile, prices of machinery are likely to continue trending downwards due to technological advancement and overcapacity in the semiconductor industry. Overall, imported price inflation should remain benign.

Domestic labour costs will remain well-contained with continued productivity gains ...

With forward-looking indicators continuing to point to optimism in the job market, wage growth could strengthen going forward, especially in the financial and business services sectors where wage pressures are strong. Wage growth is still expected to be modest at 3.5-4.0% in both 2006 and 2007, compared to 3.5% in 2005. Together with projected productivity growth of around 1.5-2.0%, the increase in unit labour costs will remain low at around 1.5% in 2007, compared to 0-0.5% this year. As labour costs stay subdued, the increase in prices of wage-sensitive services in the CPI, such as education and health care, will likewise be contained. (Chart 3.26)

... although recent property market developments could lead to higher office and retail rentals.

Recent developments in the local property market could have some spillover effects on domestic cost pressures going into 2007. First, the uptick in office rentals will add to business costs. According to the URA, office rentals in the central region rose by 27% over the period

Chart 3.23
Import Price Index (IPI)

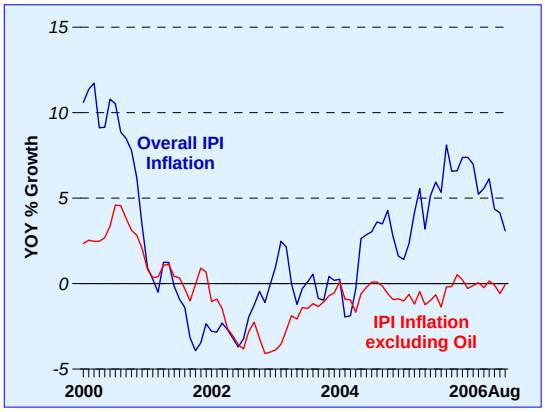


Chart 3.24
IPI of Select Categories

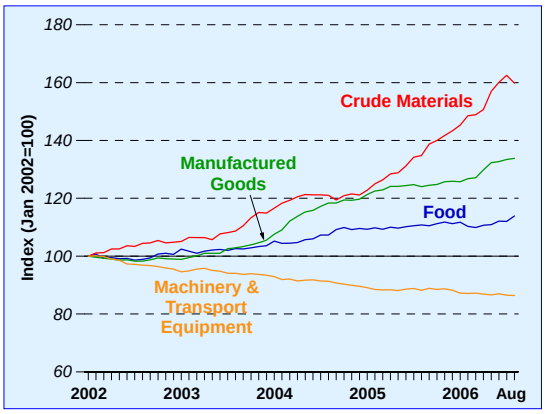
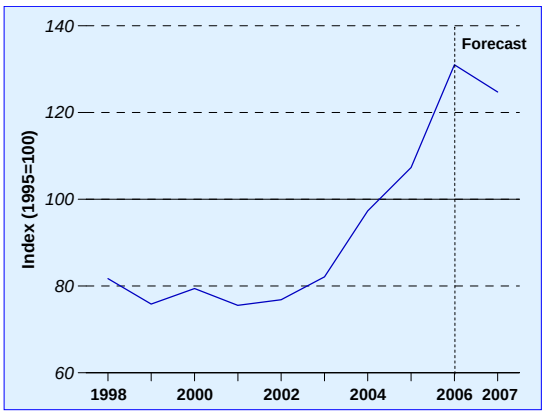


Chart 3.25
Non-fuel Commodity Prices



Source: IMF

Q1 2004-Q2 2006. (Chart 3.27) Given the strong demand and limited supply of office space especially in the Central Business District, office rentals could strengthen further.

Second, retail rentals could also face upward pressures from the bundling of shopping malls under REITs. REITs managers have actively revamped shopping malls to attract customer flow in an effort to increase investment returns for shareholders. Often, higher rentals ensue after the refurbishment projects are completed. Amidst a positive economic environment, retailers of clothing & footwear, food, recreation and other business services, could pass on the increased costs more easily.

An increase in COE supply for cars could offset price pressures induced by strong consumer spending.

At the same time, the improvement in the labour market and recovery in the property and stock markets will continue to provide some impetus to consumer spending. As shown by the MasterIndex of Consumer Confidence in Chart 3.28, consumer confidence has risen since H2 2004 and can be expected to stay high amidst positive economic factors.

In contrast, car prices may continue to come under downward pressure in the months ahead, after having subtracted 0.7% point off headline CPI inflation in the first eight months of 2006. In the recent mid-year COE quota review, the LTA raised the total number of Category A, B and E COEs by 18%, prompting many car dealers to start cutting prices. (Chart 3.29) At the same time, replacement demand is likely to remain sluggish due to the increasingly newer fleet of cars on the road.

The highly competitive business environment and continued effects of globalisation will keep a lid on cost pressures in Singapore.

Overall, barring a further spike in global oil prices, we expect consumer price pressures to remain well-contained going forward. Indeed, the analysis in Chapter 2.1 of this *Review* suggests that apart from global oil price pressures, other inflationary pressures remain subdued. This in turn has reflected a confluence of factors. First, globalisation and liberalisation of several key sectors in the domestic economy has led to

Chart 3.26
Inflation of Education and Health Care Services

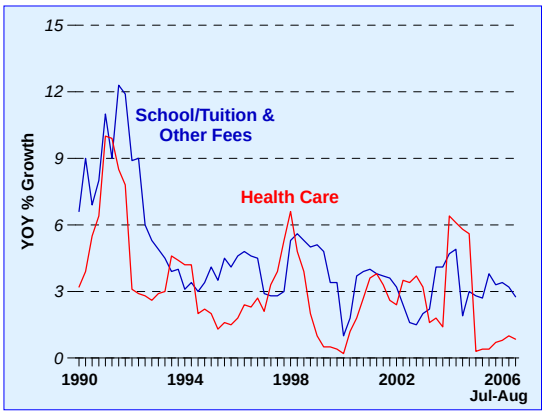


Chart 3.27
Property Rental Indices

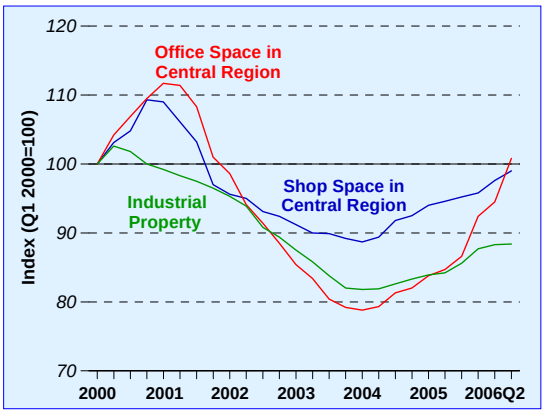
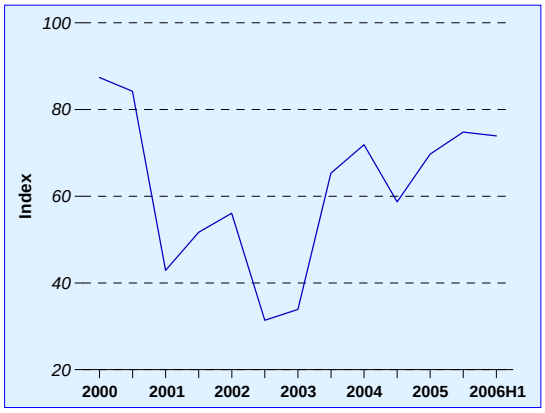


Chart 3.28
MasterIndex of Consumer Confidence



Source: MasterCard International

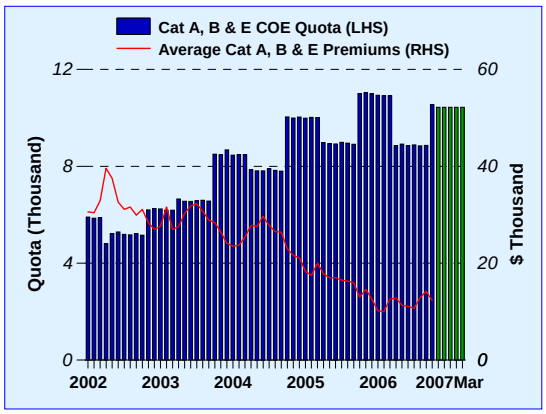
a highly open and competitive business environment in Singapore. As a result, firms have to keep costs down through improved efficiency and product and service innovation, which translates into lower prices and more innovative product choices for consumers. Second, increased globalisation has also allowed Singapore to diversify its sources of imports to include some lower-cost developing countries which keeps imported cost pressures at bay. Third, with modest wage growth, the pass-through from labour cost pressures has remained subdued.

Overall, headline CPI inflation is forecast to come in at 0.5-1.5% for 2006 and 2007.

Domestic price pressures are likely to remain fairly tame, with headline inflation for 2007 projected to be in the 0.5-1.5% range, similar to 2006. Meanwhile, the MAS underlying inflation measure, which excludes accommodation and private road transport costs, is expected to remain at 1.0-2.0% in 2007, after averaging 1.8% in the first eight months of this year. (Chart 3.30)

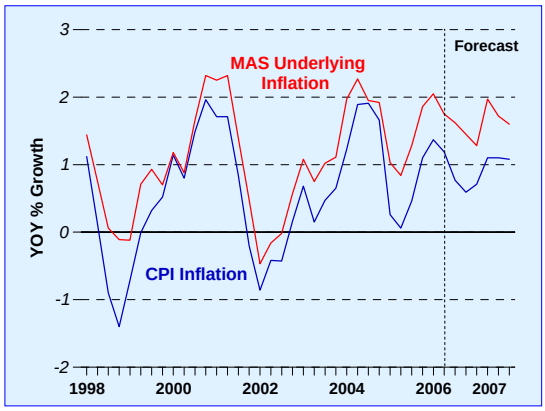
Developments in the global oil market will remain a key risk. The continued tight demand-supply situation implies that global oil prices could continue to be reactive to disruptions in oil supply. However, it remains to be seen whether the recent correction in oil prices, which started as an unwinding of risk premiums, could lead to a further slide in oil prices. There is also the risk of a sharper-than-expected slowdown in the US economy and consequently the global economy, which could further dampen inflationary pressures.

Chart 3.29
COE Quotas and Premiums for Cars



* Green bars indicate new quotas for the period Nov 2006-Mar 2007.

Chart 3.30
Forecast of CPI Inflation and MAS Underlying Inflation, 2006-2007



3.5 Monetary Policy

The current policy stance is appropriate in keeping inflationary pressures well-contained in an economy expanding at close to its potential.

As documented in Chapter 1 of this *Review*, the pace of growth in the Singapore economy strengthened in Q3 2006, following some slowdown in the previous quarter. The *Advance Estimates* released by MTI show that GDP expanded by 6.0% on a sequential basis in Q3, up from 3.4% in Q2. This was due to a rebound in the manufacturing and transport-hub services sectors after the slippage in Q2, as well as the continued growth in

the domestic-oriented, tourism-related and financial services sectors.

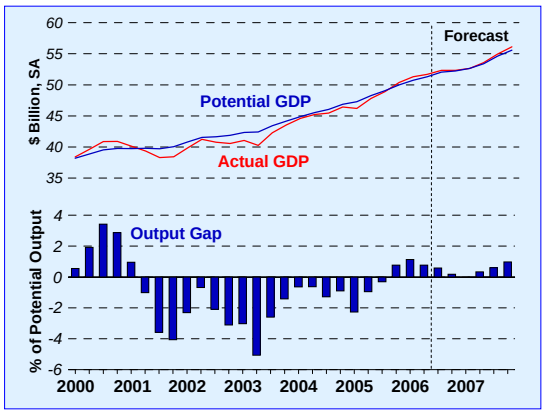
The outlook for the Singapore economy remains generally favourable at this stage, notwithstanding the risks to external demand conditions. Global economic prospects are clouded by signs of slower growth in the US economy, reflecting in part the correction in the housing market. Nevertheless, a sharp downturn in the US economy is unlikely, while the continued robust growth in China and India will provide support to regional growth. Similarly, the global IT industry is not expected to experience a severe downturn, despite a more modest pace of growth. With the recent decline in oil prices, earlier fears of an oil price shock having severe repercussions on the global economy have receded.

For 2006 as a whole, Singapore's GDP growth is expected to come in at the upper half of the official forecast range of 6.5-7.5%. The economy is likely to register more moderate growth in 2007 in line with its medium-term potential rate. (Chart 3.31)

As a result of stronger pass-through effects from higher oil prices, headline CPI inflation averaged 1.2% in the first eight months of 2006, compared to 0.5% for the whole of last year. In 2007, domestic price pressures will strengthen amidst tightening labour market conditions and the lagged effects of commodity price increases. However, the fall in oil prices, if sustained, would help ease the pressure on headline CPI inflation. Structural changes in the economy, including a more competitive environment and diversified sources of imports, have also helped to limit price increases. Headline CPI inflation is forecast to be in the 0.5-1.5% range in 2007, similar to that in 2006.

Taking all these factors into consideration, MAS announced on 10 October 2006 that it would maintain the policy of a modest and gradual appreciation of the S$NEER policy band, with no change in its level, slope or width. This policy setting is congruent with the economy expanding at close to its potential and with inflationary pressures remaining well-contained.

Chart 3.31
Real GDP and Output Gap



Source: EPD, MAS internal estimates

SPECIAL FEATURES

Special Feature A

Assessing Singapore's Financial Sector Development: A Factor Analysis Approach with Survey Data

Introduction

"Theory and evidence make it difficult to conclude that … financial development is an inconsequential addendum to the process of economic growth."

Ross Levine (1997)

"… where enterprise leads, finance follows."

Joan Robinson (1952)

The relationship between the development of a country's financial sector and its broader economic growth is a contentious one. One school of thought exemplified by the Levine quote holds that the services provided by financial intermediaries are essential drivers for innovation and growth; well-developed financial systems channel financial resources to the most productive uses. The alternative view – see Joan Robinson quote – argues that finance does not exert a causal impact on growth, but merely follows economic growth as a result of stronger demand for financial services.

In Singapore, this "finance-growth nexus" has underscored the Republic's efforts to develop its financial services industry. Indeed, this sector was recognised early on as a growth catalyst for the broader economy, rather than simply facilitating the growth of other industries. Efforts to further develop Singapore's financial sector have accelerated in recent years, following policies undertaken by MAS to liberalise the industry since 1998, and to both broaden and deepen the range of services available here.

This special feature begins by examining the finance-growth nexus in the Singapore context, and highlights the important role of financial sector development in economic growth. Next it constructs a financial development index (FDI), which allows for an assessment of the progress made in Singapore's financial sector, in terms of both its breadth and depth. The FDI represents a first attempt to combine micro-level data from MAS surveys with macroeconomic variables, and affords a more comprehensive capture of the broad range of financial services activity in Singapore. The results suggest that Singapore's financial sector development has picked up pace since the late 1990s, reflecting in part the effect of the reform measures introduced since 1998.

We are grateful to Professor Andrew K Rose, Acting Director, Risk Management Institute, National University of Singapore for helpful comments on this study.

Financial Development and Economic Growth

Research on the link between financial sector development and economic growth traces back to the seminal work of Bagehot (1873), Schumpeter (1912) and Hicks (1969). Bagehot (1873) and Hicks (1969) argued that financial development was an important channel in the industrialisation of England, in orchestrating the movement of large funds for "immense" works. Schumpeter (1912) frames the finance-growth relationship as a supply-led phenomenon, in which the financial sector leads economic growth by identifying and channelling funds to high-yielding projects. A well-developed financial system promotes economic growth by raising the rate of accumulation and the efficiency of capital. More specifically, financial intermediaries aid in lowering the costs associated with, *inter alia*, researching potential investments, exerting corporate control, managing risks and mobilising savings. These influence savings and allocation decisions in ways that positively affect an economy's long-run growth rate. Financial markets and institutions also influence liquidity levels in an economy.

An opposing view posits that finance does not exert a causal impact on growth (Robinson, 1952). Instead, as an economy grows, more financial institutions, products and services emerge in response to the higher demand for them. Lucas (1988) also argued that there has been a tendency to over-emphasise the role of financial factors in the growth process. Development of the financial markets may well turn out to be an impediment to economic growth to the extent that it may induce volatility and discourage investments as a result. Mauro (1995) further suggested that the introduction of certain financial instruments which allow hedging against risk, may lead to a reduction in precautionary savings thus lowering economic growth.

While there is by no means a clear consensus on the finance-growth nexus, the literature is generally more supportive of the original Schumpeterian view (McKinnon 1973, Shaw 1973, Fry 1988). The McKinnon-Shaw argument was that a poorly functioning financial system due, for instance, to government restrictions such as interest rate ceilings or high reserve requirements could retard economic growth. This is in line with the endogenous growth literature which proposes that financial development has a positive impact on steady state growth.

Theoretical Underpinnings

Standard growth theory holds that economic growth can be attributed to capital growth, labour growth, increases in human capital and technical progress (including efficiency improvements). This is derived from a production function relating output (y_t) to a constant (A), inputs of physical capital (k_t), labour (l_t), human capital (hc_t) and technological progress (tp_t) at time t.

$$y_t = Af(k_t, l_t, hc_t, tp_t) \qquad (1)$$

The neoclassical growth variant maintains that long-run growth is dictated by exogenously-determined variables such as technical progress. In comparison, endogenous growth theory seeks to identify the factors underlying the exogenous rate of technical progress, and hence the economy's growth rate. In particular this implies that variables that bring about non-decreasing returns to scale provide the impetus for long-run economic growth. A host of different variables have been suggested as potential sources of such non-decreasing returns, including capital accumulation (Rebelo, 1990), R&D (Romer, 1986, 1987, 1990), investment in public infrastructure (Barro, 1991) and financial development (Jung, 1986).

Application to Singapore Data

This section focuses on the last of the above mentioned variables, drawing upon an earlier IMF study (Leigh, 1996), which looks at the impact of financial development on economic growth in Singapore using VAR analysis. The basic factor inputs from the production function in equation (1) above were augmented with financial development, proxied by the share of the financial sector in total GDP, and human capital, proxied by per capita years of education. More formally, the augmented aggregate production function may be specified as:

$$y_t = \phi(fdc_t)^{\delta_1} hc_t^{\delta_2} k_t^{\alpha_k} l_t^{\alpha_l} \qquad (2)$$

where fdc_t is the financial development variable with $\phi'(fdc_t) > 0$. Using the Cobb-Douglas functional form, a long-run regression equation of this aggregate production function may be estimated:

$$y_t = \alpha + \alpha_k k_t + \alpha_l l_t + \delta_1 fdc_t + \delta_2 hc_t + \varepsilon_t \qquad (3)$$

where all variables are expressed in logarithmic terms and ε_t is a random error term. The estimation results are summarised in Table 1.

The results provide evidence of a long-run relationship between GDP growth and the four variables. Financial sector development and human capital are important elements in Singapore's long-run economic growth, as they enhance both the physical capital stock and labour. Moreover, it would appear that the importance of financial sector development in enhancing growth has increased over time.

Table 1
Summary Results

	Output elasticity, with respect to factor variables	
	1980-1990 (IMF estimates)	**1990-2005 (MAS estimates)**
Financial Development, δ_1	0.41	0.54
Human Capital, δ_2	0.08	0.19
Capital Stock, α_k	0.77	0.60
Labour, α_l	0.31	0.40

Assessing the Development of Singapore's Financial Sector

Methodology

While the financial sector was identified early on as an engine of growth in its own right, more concerted efforts have been made since the late 1990s to further develop Singapore as an international financial centre. In 1997, the MAS initiated a strategic review of its approach to financial sector development, and established the Financial Promotion Department to actively promote the domestic financial industry. In a series of calibrated measures, MAS liberalised key financial industries, including retail banking, insurance and stock broking activities, and took steps to broaden and deepen local debt markets and the asset management industry. Specific initiatives undertaken in the late 1990s included the introduction of Qualifying Full Bank privileges in the banking sector, the demutualisation of the Singapore Exchange, as well as the easing of restrictions on the borrowing of S$ to facilitate greater foreign participation in the domestic debt market.

To assess the impact of these developmental efforts on the financial sector, we employ the factor analysis (FA) methodology. This approach, while primarily a statistical technique, allows for a characterisation of the financial sector over time, and is used here in the construction of the FDI. The technique is commonly used to facilitate data reduction and summarisation, and is thus typically suited to studies involving large quantities of data. Briefly, FA condenses the information contained in a number of original variables into a smaller set of new composite dimensions (factors) with minimum loss of information. Each of the observed (original) variables is considered as a dependent variable that is a function of some underlying, latent and hypothetical set of factors (dimensions). Conversely, one can look at each factor as a dependent variable that is a function of the originally observed variables. (Please see Box E for more details on the FA methodology.)

The FDI is then estimated as a weighted average of this smaller set of derived factors, and serves as a proxy for the overall development of the domestic financial industry. A similar approach has been employed by Ang and McKibbin (2005).

Data Description

Unlike most studies which attempt to construct an FDI based solely on macroeconomic variables (a "top-down" approach), the following analysis also incorporates an additional dimension by using firm-level data from MAS' surveys of financial institutions (a "bottom-up" approach). A total of 48 variables were used, spanning the sample period Q1 1992 to Q2 2006. Accordingly, the dataset employed may be grouped broadly into two categories:

1. "Conventional" measures, which are typically used to capture the extent of financial sector development; and

2. Data drawn from MAS' surveys of financial institutions.

The conventional measures are summarised in Table 2.

Table 2
Conventional Indicators of Financial Sector Development

Type of Indicator	Description
1. "Balance Sheet" Indicators	
• **Liquid Liabilities (LLY)**	Measures the size of financial intermediaries in the financial system (including the central bank, deposit money banks and other financial institutions), relative to overall activity (GDP).
• **Private Credit (PRIVO)**	Defined as credit issued to the private sector by banks and other financial intermediaries, over GDP. It excludes credit issued to the government, its agencies and public enterprises, as well as credit issued by the monetary authority and banks.
• **Bank Assets (BTOT)**	This is the ratio of commercial bank assets to the sum of commercial and central bank assets. It proxies the advantage of financial intermediaries in channelling savings to investment, which influences corporate governance and undertaking risk management relative to the central bank.
2. Efficiency Indicators	
• **Overhead Costs (OVC)**	This refers to the ratio of overhead costs to total banking assets.
• **Net Interest Margin (NIM)**	The NIM is equal to the difference between the banking sector's interest income and interest expenses, divided by its total stock of assets.
3. Equity Market Development Indicators	
• **Stock Market Capitalisation (MCAP)**	This proxies for the size of the domestic stock market, and is the ratio of the average value of listed shares to GDP.
• **Total Value Traded (TVT)**	This is an indicator of market liquidity, calculated as the ratio of the value of domestic shares traded to GDP.
• **Turnover Ratio (TOR)**	This is the ratio of the value of domestic share transactions on the local bourse to the total value of listed domestic shares. A high turnover ratio indicates a more liquid (and potentially more efficient) equity market.
4. Other Indicators	
• **Value-Added of Fund Management Activities (VA_FUNDM)**	
• **Forex Daily Turnover (FX_TURNOVER)**	
• **Futures & Options Open Interest (FXOPINT)**	
• **DBU Assets and Liabilties (DBUASST)**	
• **SGS Average Daily Trading Volume, Outright Purchases and Sales (OUTTRDVOL)**	

The conventional measures described in Table 2 may be viewed as "top-down" indicators, for gauging the performance of the domestic financial sector. An innovation in this study is to enhance the comprehensiveness of the FA analysis – and the resulting FDI – by supplementing these more frequently employed measures with additional information from a "bottom-up" perspective.

Specifically, we draw upon data from MAS' income & expenditure surveys of financial institutions, which cover more than 600 financial institutions that come under MAS' supervisory purview. These surveys are administered on a quarterly basis, and are a rich source of information content at the firm level. These data have the advantage of more comprehensively capturing the gamut of financial services in Singapore, which range from private wealth advisory, brokerage & treasury to financial intermediation and insurance services. The inclusion of these survey data in this analysis also represents the first time that such data have been used in an econometric assessment of the domestic financial services sector.

The data drawn from MAS' surveys can be grouped broadly into four main categories, as shown in Table 3. This categorisation builds on EPD's earlier work on re-classifying financial services activities, which allows for a finer disaggregation of financial activities into various industry clusters. Please refer to the April 2006 issue of the *Review* for more details on the re-classification.

Table 3
Financial Sector Industry Clusters

Industry Clusters	Types of Institutions
Wealth Advisory	• Investment Advisors • Asset Management Firms • Private Banks
Brokerage & Treasury	• Dealers • Finance & Treasury Centres • Stock and Bond Brokers • Forex Trading Firms
Financial Intermediation	• Commercial Banks • Finance Companies • Merchant Banks
Insurance Companies	• Life Insurance • General Insurance • Captive Insurance

For each of the industry clusters listed in the table above, the following datasets were included in the FA analysis:

1. Net commissions, brokerage and other service charges (NETCOM)

2. Salaries, wages, allowances and bonuses (SAL)

3. Profit before tax (PROFIT)

4. Total number of employees (EMP)

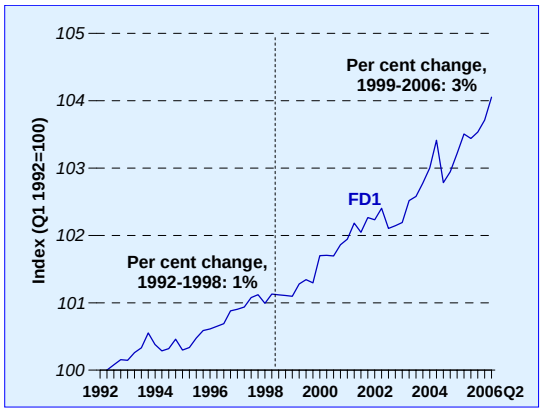
Coupled with the macro-indicators outlined in Table 2, the additional information contained in the firm-level survey data provides for a more comprehensive characterisation of the domestic financial sector, than would be the case if conventional indicators alone were used.

Results

The overall financial development index, FD1, that is estimated is presented in Chart 1, and takes as its starting point all 48 component indicators – both conventional indicators and survey-based

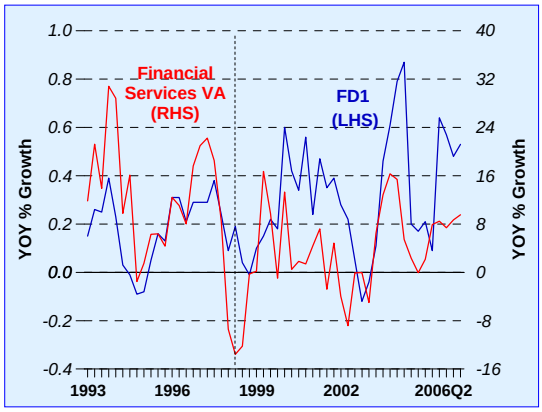
data. Table 4 at the end of this chapter presents the eigenvalues,[1] proportion of variance explained, and the factor loadings[2] of the first eight factors from which the new indices of financial development are defined. The proportion of variance explained is used as the coefficient (weight) for each of the factors in the linear combination. Table 4 shows that the factor loadings of each factor included in FD1 indicate mostly positive correlations between these variables and the common factors. The eigenvalue variance proportions indicate that the first and second factors explain around 42% and 14% of the standardised variance, respectively, while the remaining six factors account for 33% of the variation. Next, the "uniqueness" column containing the percentage of variance for the variable that is not explained by the common factors is close to zero. Thus, these eight factors in the linear combination explain the variation in the dependent variable quite well (nearly 90%), and provide a good basis for the construction of the FD1. In Chart 1 these components are weighted according to their variance proportions to obtain the FD1 indicator.

Chart 1
Overall Financial Development Index, FD1



It can be observed that the FD1 series has trended steadily higher since Q1 1992, the earliest point of the sample data. This suggests that the domestic financial services industry has experienced a sustained uptrend in its development path over the past decade and a half. In addition, Chart 2 shows that there is a discernible positive correlation between the *changes* in the FD1 measure and financial services VA, which corroborates the robustness of the constructed FD1 series. (The correlation coefficient is not particularly high, however, at around 0.4. This is not unexpected since the FD1 index includes various other measures of financial development in addition to the output indicators that are included in GDP.)

Chart 2
Financial Development Index and Financial Services VA



In addition, a closer inspection of the FD1 series reveals that financial sector development has progressed at a somewhat quicker rate since the late 1990s. In particular, the growth rate for FD1 averaged 1% over the period 1992 to 1998. (Chart 1) This compares with a corresponding figure of 3% between 1999 and 2006. This broadly coincides with the various initiatives that have been introduced by MAS since the late 1990s to promote and develop the domestic financial industry. Indeed, component indicators from emerging financial

[1] The amount of variance accounted for by a factor.

[2] The correlation between the original variables and the factors, and the key to understanding the nature of a particular factor.

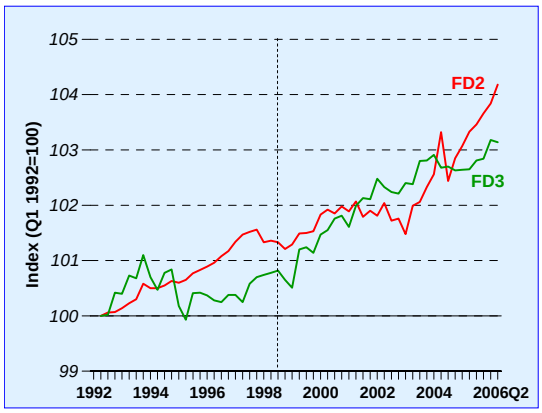
industries – such as the advisory and brokerage & treasury clusters – were found to be more highly correlated with the FD1 series since the late 1990s. The correlation coefficient of an FA-constructed index of emerging financial industries and the FD1 series shows a marked increase from 0.45 over the period 1990-1998 to 0.96 for the period after 1999. This implies that emerging financial industries may have played a larger role in driving the FD1 series since the late 1990s, whereas overall financial sector development prior to the late 1990s was fuelled to a larger extent by banking-related activities.

Indeed, based on EPD's re-classification of financial services, the share of emerging clusters such as wealth advisory services accounted for 9.0% of total financial services value added in 2005, double the 4.5% share in 1999, a year after the commencement of MAS' targeted developmental efforts.

Finally, we constructed two separate sub-indices of financial development: one based on a "bottom-up" approach using MAS' survey data (FD2), and the other using conventional macro-variables (FD3), or a "top-down" approach.

The results reinforce our earlier finding that financial sector development in Singapore has advanced steadily since the early 1990s. Both series are observed to trend upwards, as shown in Chart 3 and the sharper uptrend in the FD3 series since the late 1990s also suggests that the pace of financial development has accelerated since then. In comparison, the FD2 series – whilst also trending upward since the late 1990s – exhibits greater fluctuations. This could reflect in part the inclusion of firm-level data (such as wages, profits and revenue flows), which may be expected to respond with greater sensitivity to fluctuations in business conditions.

Chart 3
Financial Development Index, based on Survey Data (FD2) and Conventional Indicators (FD3)



Sum-up

While the finance-growth nexus remains the subject of debate within the development literature, the results in this feature appear to support the importance of financial sector development in Singapore's economic progress and suggest that the domestic financial sector has made steady developmental progress over the past decade and a half. The overall FD1 series, which was constructed using both conventional macro-variables and firm-level survey data, further suggests that the pace of

development has been more rapid since the late 1990s. The sustained uptrend observed in the FD1 series for Singapore is particularly notable, in view of several large economic shocks which had buffeted the economy since the late 1990s.

Indeed, the past decade had seen considerable progress made in both the depth and breadth of Singapore's financial services industry. A major catalyst behind this rapid growth has been the growing sophistication of both financial markets and investors in the region. In addition to serving as an Asian asset management hub, the emergence of an "affluent class" in rapidly growing Asian countries has raised the demand for specialty financial services. Regional governments have also been actively fostering the development of capital markets to diversify their financial systems. This has presented new opportunities for Singapore, to play a hub role in asset management, private banking and brokerage & treasury services, segments which have experienced rapid growth in recent years. These segments are expected to play a growing role in the development of Singapore's financial industry in the years ahead.

Table 4: Summary Statistics for the Overall Financial Development Index, FD1

Sample: Q1 1992 to Q2 2006									Uniqueness
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	
Eigenvalue	20.48	6.95	4.67	3.36	2.23	2.15	1.86	1.28	
Variance Prop.	0.42	0.14	0.10	0.07	0.05	0.04	0.04	0.03	
Cumulative Prop.	0.42	0.56	0.66	0.73	0.78	0.82	0.86	0.89	
Factor loadings (pattern matrix) and unique variances:									
Variable	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**	
EMP_BANKS	0.82	0.48	0.04	0.21	-0.02	0.07	-0.02	-0.10	0.0012
EMP_DEALERS	-0.48	0.77	0.12	0.11	0.20	0.10	0.11	-0.03	0.0010
EMP_FCOS	-0.96	0.15	0.15	0.13	0.00	0.01	0.01	0.05	0.0003
EMP_FTC	0.73	0.05	0.46	-0.14	-0.17	-0.08	-0.04	0.02	0.0077
EMP_IA	0.91	0.32	-0.07	0.16	0.06	0.11	0.03	0.02	0.0003
EMP_FUTURES	-0.16	0.82	-0.41	-0.01	0.05	0.04	0.21	0.03	0.0030
EMP_MERCH	-0.49	0.52	0.42	0.50	0.02	0.10	0.06	0.10	-0.0002
EMP_MONEY	-0.82	-0.22	0.43	0.11	0.12	-0.01	-0.09	-0.05	0.0012
EMP_INS	0.92	0.16	0.15	0.24	0.00	0.14	0.03	-0.02	0.0000
NETCOM_BANKS	0.97	-0.04	0.08	0.02	0.01	0.12	-0.07	-0.03	0.0001
NETCOM_DEALERS	-0.22	0.32	0.61	-0.58	-0.28	0.03	0.15	0.11	0.0001
NETCOM_FCOS	0.14	-0.32	-0.17	0.00	-0.28	0.37	0.31	0.50	0.0241
NETCOM_FUTURES	0.51	-0.51	0.22	0.23	-0.15	0.08	0.19	0.20	0.0208
NETCOM_IA	0.94	0.09	0.25	0.11	0.13	0.05	-0.01	0.00	0.0007
NETCOM_MERCH	0.47	0.52	0.05	-0.19	-0.02	0.09	-0.32	-0.08	0.0054
NETCOM_MONEY	0.65	-0.41	0.48	0.16	0.12	0.09	0.02	-0.22	0.0000
NETCOM_FTC	0.31	-0.15	0.20	0.05	0.31	-0.73	0.16	0.31	0.0047
PROFIT_BANKS	0.49	-0.24	-0.05	-0.49	0.49	0.24	0.14	-0.11	0.0034
PROFIT_DEALERS	-0.24	0.00	0.69	-0.49	-0.26	-0.07	0.14	0.03	0.0021
PROFIT_FCOS	-0.52	0.60	0.02	-0.35	0.34	0.14	0.00	0.04	0.0011
PROFIT_FTC	0.52	0.31	-0.14	-0.15	0.23	-0.59	-0.07	0.22	0.0104
PROFIT_FUTURES	-0.06	0.50	-0.12	-0.03	-0.47	-0.31	0.05	-0.36	0.0188
PROFIT_IA	0.84	0.07	0.41	0.07	0.18	0.08	0.00	-0.03	0.0027
PROFIT_MERCH	0.19	-0.19	0.06	-0.48	0.61	0.29	0.14	0.11	0.0099
PROFIT_MONEY	0.27	-0.17	-0.12	0.13	-0.21	-0.35	0.54	-0.42	0.0088
PROFIT_INS	0.66	0.02	0.26	-0.04	0.09	-0.30	0.04	-0.24	0.0255
SAL_BANKS	0.94	0.27	-0.06	0.12	-0.09	0.07	-0.04	0.04	-0.0001
SAL_DEALERS	0.33	0.82	0.24	-0.23	-0.06	0.10	-0.03	0.01	0.0029
SAL_FTC	0.62	0.13	0.18	0.01	0.23	-0.61	0.13	0.27	0.0037
SAL_FCOS	-0.76	0.50	0.18	0.15	0.16	0.08	0.06	0.09	0.0061
SAL_FUTURES	0.50	0.73	-0.33	0.04	0.05	0.03	0.15	-0.02	0.0015
SAL_IA	0.96	0.10	0.07	0.11	0.08	-0.02	-0.05	0.03	0.0018
SAL_MERCH	0.63	0.47	0.31	0.33	-0.13	0.05	-0.26	-0.04	0.0078
SAL_MONEY	0.62	-0.33	0.54	0.19	0.08	0.18	-0.12	-0.15	0.0011
SAL_INS	0.94	0.16	-0.05	0.17	-0.02	0.07	-0.01	0.11	0.0025
LLY	-0.69	-0.04	0.10	0.39	0.08	0.11	0.41	0.05	0.0004
PRIVO	-0.90	-0.07	0.16	0.26	0.08	0.04	0.16	0.06	0.0000
BTOT	-0.22	0.65	-0.53	-0.05	-0.01	0.00	0.22	0.03	0.0010
OVC	0.07	0.24	0.05	0.24	-0.42	-0.04	-0.49	0.44	0.0021
NIM	-0.87	-0.03	-0.18	-0.22	-0.14	-0.15	-0.03	0.02	0.0167
MCAP	-0.78	0.37	0.39	-0.04	0.13	-0.01	0.00	-0.10	-0.0001
TVT	0.10	0.15	0.55	-0.69	-0.36	0.00	0.18	0.03	-0.0001
TOR	0.76	-0.21	0.05	-0.40	-0.30	0.08	0.16	0.09	0.0000
VA_FUNDM	0.84	0.23	0.23	0.07	0.20	0.07	0.19	0.07	0.0011
FX_TURNOVER	-0.28	-0.31	0.40	0.55	-0.11	-0.04	0.35	0.03	0.0017
FXOPINT	-0.25	0.52	0.43	0.16	-0.05	0.14	0.38	0.07	0.0106
DBUASST	0.73	0.31	-0.30	0.06	-0.13	0.00	0.31	-0.02	0.0001
OUTTRDVOL	0.69	-0.15	-0.42	-0.07	-0.17	0.20	0.23	0.02	0.0028

Box E
Using Factor Analysis to Derive a Financial Development Index

Introduction

Factor analysis (FA) is a procedure which is commonly used for simplifying data, by reducing multi-dimensional datasets to lower dimensions for analysis whilst retaining most of the original variability in the data. In many scientific fields, particularly the behavioural and social sciences, latent variables such as "financial development" cannot be measured directly. Such variables can, however, be measured by other "quantifiable" variables, which reflect the underlying variables of interest. Here we use FA specifically to transform a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called common factors in order to compile a measure of financial development in terms of a single index.

Factor Analysis Methodology [1/]

Procedurally, FA takes N specific indicators and produces new indices or "factors" $f_1, f_2, ..., f_N$, which are mutually uncorrelated. Each factor, as a linear combination of the N indicators, captures a different dimension of the data. Using matrix notation the vector of original variables can be expressed in terms of a new factor structure:

$$x = \mu + \Lambda f + U + e \qquad (1)$$

where $\Lambda = \{\lambda_{ij}\}$ is a $N \times N$ matrix of constants, called the matrix of factor loadings, f is a random vector representing the N common factors, U is a random vector representing N unique factors associated with the original variables, μ is a constant vector and e is a random error vector term.

The factor loadings are the correlation coefficients between the variables and factors. Analogous to Pearson's coefficient r, the squared factor loading is the percentage of variance in the variable, explained by a factor. Therefore, it is necessary to find the loadings, then solve for the factors, which will approximate the relationship between the original variables and underlying factors. The loadings are in turn derived from the magnitude of eigenvalues associated with individual variables when the system is solved. Once a factor structure is selected, the chosen variables can then be transformed into linear combinations of an underlying set of hypothesised or unobserved components (factors). But since there are exactly N such linear combinations, we retain factors whose eigenvalues are greater than 1 and ignore those with eigenvalues less than 1 as the factor is accounting for less variance than an original variable. So rather than working with all the original variables $x_1, x_2, ..., x_N$, FA is first performed, following which only a subset of factors are used that account for the greatest amount of the variation in the original set of indicators.

Thus FA allows different measures of financial development to be expressed in terms of a single index, FD. This new index should theoretically encapsulate most of the information contained in the original dataset, which in our case, comprises 48 individual indicators of financial sector development. This single index or linear combination corresponds to the first eight factors which account for the greatest amount of the variation (approximately 90%) in the original set of indicators as follows:

$$FD = \sum_{i}^{8} \alpha_i f_i \qquad (2)$$

where α is the weight allocated to each factor using their respective variance proportions.

1/ FA closely resembles principal components analysis (PCA). Both techniques use linear combinations of variables to explain sets of observations on many variables but PCA is primarily a tool for simplifying the interpretation of the observed variables. In FA, however, the intrinsic interest is in the "underlying factors". The other difference is that for the purposes of matrix computations, PCA assumes that all of the variance is common, and all unique factors are set equal to zero; while FA assumes that there is some unique variance dictated by the FA model which is chosen. Accordingly, PCA is a model of a closed system, while FA is a model of an open system.

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Special Feature B

Uncovered Interest Parity in Singapore

Introduction

This special feature addresses some of the issues concerning the determination of interest rates in Singapore, in the context of MAS' exchange rate-centred monetary policy framework.

Standard international macroeconomic theory postulates a fundamental policy trade-off: central banks have a choice between targeting interest rate or exchange rate, but not both simultaneously within an environment of free capital mobility. We examined the validity of this trade-off for Singapore using a recent econometric test framework and found that Singapore's exchange rate-centred regime has indeed limited the extent to which local interest rates can diverge from foreign (US) interest rates.

A more systematic analysis of the link between domestic and international financial markets is provided for by the Uncovered Interest Parity (UIP) framework. UIP is essentially an equilibrium condition that links the domestic interest rate with the foreign interest rate taking into account expected movements in the bilateral exchange rate. In its simplest form, the UIP condition states that the interest rate differential between two countries will be equal to the expected change in their bilateral exchange rate.

Empirically, the UIP condition is found to hold in Singapore both before, and after, the Asian Financial Crisis. Moreover, UIP holds both for domestic interest rate versus the US$ SIBOR, and for domestic interest rate versus the trade-weighted interest rate (TWIBOR).

Exchange Rate Management and Interest Rate – the Policy Trilemma

"The point is that you can't have it all: A country must pick two out of three. It can fix its exchange rate without emasculating its central bank, but only by maintaining controls on capital flows (like China today); it can leave capital movement free but retain monetary autonomy, but only by letting the exchange rate fluctuate (like Britain--or Canada); or it can choose to leave capital free and stabilise the currency, but only by abandoning any ability to adjust interest rates to fight inflation or recession (like Argentina today)."

Paul Krugman (1999)

Standard international macroeconomic theory postulates that economic policy makers are confronted by three desirable, and at times, contradictory objectives which cannot be achieved simultaneously (Obstfeld, *et al*. 2005). This is known as the "triad of incompatibilities" or "policy trilemma". The three objectives are: managing the exchange rate (exchange rate stability), managing interest rate (ability to vary domestic interest rate or the money supply for domestic stabilisation)

We are grateful to Professor Andrew K. Rose, Acting Director, Risk Management Institute, National University of Singapore for helpful comments on this study.

and having free capital mobility (integration with international financial markets). Policy makers can choose any two out of the three objectives but would have to decide which third objective to give up.

In Singapore's case, where monetary policy is synonymous with exchange rate policy, the intermediate target of monetary policy is the trade-weighted exchange rate. It is relatively controllable and has a powerful and stable relationship with price stability, the final target of policy over the medium term. This choice of monetary policy instrument is consistent with the small size of the Singapore economy and its openness to trade and capital flows.

The choice of the exchange rate as the intermediate target instrument of monetary policy, in the context of open capital markets, imposes a constraint on our ability to influence the interest rate at the same time. For instance, if we raise the interest rate by reducing the amount of liquidity in the interbank market, this will make S$ deposits more attractive and, other things equal, would lead to a short-term rise in the demand for S$ in an open capital market. Capital would flow in from abroad as economic agents take advantage of the higher yield on S$ assets. This could lead to undesired movements in the S$ exchange rate away from the target range.

Thus, because we have no control over cross-border capital flows, domestic interest rates are market-determined, largely by foreign (US) interest rates and market expectations about the movement of the S$/US$ exchange rate. Indeed, domestic interest rates have closely tracked foreign (US) interest rates.

We investigated the validity of the policy trilemma for Singapore using a recent econometric test framework suggested by Obstfeld, *et al*. (2005).

The equation examined is:

$$\Delta R_{it} = \alpha + \beta \Delta R_{bit} + u_{it} \qquad (1)$$

where R_{it} is Singapore's 3-month domestic interbank rate (S$ SIBOR) at time *t*, R_{bit} is the base or representative global interest rate, proxied by the 3-month US$ SIBOR at time *t*, u_{it} is an error term and Δ is the difference operator. With perfect capital mobility and an exchange rate that is permanently and rigidly pegged, *a priori* β should equal 1 and the domestic and foreign interest rates would always move one-for-one. The home country (Singapore) would then have no monetary independence in the sense of managing the domestic interest rate. If β <1, then the home country has some monetary independence, which it can use to offset foreign interest rate shocks. Conversely, if β >1, then foreign monetary shocks are reinforced in the home country.

We estimated the value of β in equation (1) above for Singapore over two periods: (a) between 1975 and 1980, and (b) since 1981. This is because of the shift in emphasis in monetary policy in the early 1980s towards managing the exchange rate as the intermediate target. Prior to 1981, monetary policy was conducted by way of monitoring a variety of intermediate targets including the monetary base, interest rate, loan growth and the trade-weighted S$ exchange rate. The management of domestic liquidity conditions was an important objective during that period. In 1978, most foreign exchange controls were removed, permitting greater capital mobility. We estimated that the value for β between 1975 and 1980 was 0.18.

For the second period, beginning in 1981, our estimate for β rose significantly to 0.39. This is consistent with the shift towards using the exchange rate as the primary instrument of monetary policy, and the greater openness of the capital account.

These results are consistent with the policy trilemma which implies that domestic interest rate movements are more affected by changes in the foreign interest rate within an environment of free capital mobility, as the monetary authorities tighten their management of the exchange rate.

Consequently, after Singapore moved to an exchange rate-centred policy regime in 1981, the estimate for β went up, indicating a lower degree of independence for domestic interest rates.

Uncovered Interest Parity Condition

In the previous section, we alluded to the lack of monetary independence in the domestic economy, as reflected in the correlation between domestic and foreign interest rates. We now consider more systematically the factors underpinning the determination of interest rates in Singapore. A useful framework for this is provided for by the principle of UIP, which is essentially an equilibrium condition that links international currency and money markets together. In its simplest form, the UIP condition states that the interest rate differential between two countries will be equal to the expected change in their bilateral exchange rate. If this were not so, then clearly arbitrage opportunities to profit from the discrepancy would arise, which would act to remove the discrepancy and restore the UIP condition.

The nominal UIP condition is given by:

$$i_{t+k} - i^f_{t+k} = S^e_{t+k} - S_t \qquad (2)$$

where i_{t+k} is the nominal interest rate of the domestic currency asset purchased at time t and maturing at time $t+k$, i^f_{t+k} is the corresponding foreign interest rate with identical default risk, S_t is the logarithm of the spot exchange rate quoted at time t and S^e_{t+k} is the logarithm of the expectation of the spot rate formed at t for time $t+k$.

Condition (2), however, holds only if investors are risk neutral and regard domestic and foreign currency securities as perfect substitutes. To the extent that investors are risk averse and require a risk premium to compensate for the perceived riskiness of holding domestic versus foreign assets, equation (2) can be modified to incorporate a risk premium, rp at time $t+k$ formed at time t:

$$i_{t+k} - i^f_{t+k} = S^e_{t+k} - S_t - rp_{t,t+k} \qquad (3)$$

Equation (3) cannot be tested directly in the absence of observations on market expectations of future exchange rate movements.

To operationalise the concept, UIP is generally tested jointly with the assumption of rational expectations in foreign exchange markets. In this case, future realisations of S_{t+k} will equal the value expected at time t plus a white-noise error term $\xi_{t,t+k}$ that is uncorrelated with the information known at time t, including the interest differential and the spot exchange rate:

$$S^e_{t+k} = S^{re}_{t+k} + \xi_{t,t+k} \qquad (4)$$

where S^{re}_{t+k} is the rational expectation of the exchange rate at time $t+k$ formed at time t. Substituting equation (4) into (3) gives the following relationship:

$$i_{t+k} - i^f_{t+k} = S^{re}_{t+k} - S_t - rp_{t,t+k} + \xi_{t,t+k} \qquad (5)$$

If the realised change in the exchange rate is used and written as $\Delta S_{t+k} = S_{t+k} - S_t$ and we assume risk neutrality, the following regression equation can be used to test for UIP:

$$\Delta S_{t+k} = \alpha + \beta(i_{t+k} - i^f_{t+k}) + \varepsilon_{t,t+k} \qquad (6)$$

Thus, under the combined assumptions of risk neutrality and rational expectations, the disturbance in equation (6) reduces to the deviation of the exchange rate from its rational expectation value, that is, $\xi_{t,t+k}$ in equation (5). The test for UIP then reduces to a test of the null hypothesis that β = 1.

Although UIP is an appealing theory and a standard assumption in many economic models, it has not been easy to verify statistically. The UIP condition does not appear to hold in most cases and this has made it one of the best established and most resilient puzzles in international finance.

In "A Reconsideration of the Uncovered Interest Parity Relationship," McCallum (1992) notes that "the bulk of the evidence indicates not just that exchange rate changes fail to move one-for-one with interest rate differentials (and forward

premia), but rather that these changes are substantial and in the opposite direction to that implied by UIP." Bacchetta and van Wincoop (2006) also found that, contrary to expectations, the forward discount (or interest rate differential) is *negatively* related to the subsequent change in the exchange rate.[1] They went on to investigate the extent to which incomplete information processing can explain this puzzle. Other explanations include the existence of a time-varying foreign exchange risk premium, expectations that are not "rational", or market inefficiencies. The existence of "carry trades", where market participants favour higher yielding currencies, also supports the observation of a negative relationship between the interest rate differential and the change in the exchange rate, as noted by McCallum and others.

Nevertheless, as with the purchasing power parity relationship, some studies have found that the evidence for UIP builds up over a longer-term horizon. Chinn and Meredith (2005), for example, found coefficients for β of 0.67 and 0.68 for equation (6) when they tested for UIP using long bond yields and changes in the exchange rate measured over a 5- and 10-year horizon respectively.[2] Other studies looking at inflation and interest rate differentials between developing and industrial countries over the long run have found that the persistently higher inflation observed in a number of developing countries vis-à-vis the US (which should result in relatively higher nominal interest rates in the former) is associated with a tendency for these countries' exchange rates to depreciate against the US$. This observation is consistent with the UIP condition.

In the following section, we examine whether the UIP condition holds for Singapore.

[1] The forward discount, which is the log of the forward exchange rate for time $t+k$ minus the log of the spot rate at time t, is equal to the interest rate differential at time t by way of risk-free arbitrage under the Covered Interest Parity (CIP) condition. The forward discount puzzle arises because it is found not to be an unbiased predictor of the future spot exchange rate.

[2] Note that the beta coefficient here differs from that used in the Obstfeld *et al.* (2005) study.

Testing the UIP Condition for Singapore

In an earlier empirical study (MAS 1999), we found that interest parity conditions held during the 1990s prior to the Asian Financial Crisis.[3]

Historically, Singapore's interest rates have tended to be below foreign rates because of the expected trend appreciation of the S$. (Chart 1) In the 20-year period to 2006, the gap between the S$ SIBOR and the corresponding US interest rate (US$ SIBOR) was about 2% points. Chart 2 shows that *ex post*, the uncovered interest differential, or the sum of the interest rate differential and the change in the exchange rate, generally lies within two standard error bounds (mean of zero), except during the volatile period of the Asian Financial Crisis. This casual observation suggests, therefore, that the UIP condition generally holds in Singapore.

Since Singapore's monetary policy involves the management of a trade-weighted basket of currencies, it would be useful to see if there is a similar link between the interest rate differential (S$ SIBOR against the TWIBOR of our major trading partners) and movements in the S$NEER.

Chart 3 shows the TWIBOR and US$ SIBOR spreads over S$ SIBOR for the period 1983 to 2006, while Chart 4 shows annualised changes in the S$NEER. In general, S$ SIBOR tracks both the TWIBOR and US$ SIBOR closely, with a discount on the domestic interest rate averaging 207 bps for US$ SIBOR and 177 bps for the TWIBOR. More recently, the TWIBOR and US$ SIBOR spreads have moved in opposite directions, with the unusual development of the TWIBOR-S$ SIBOR spread turning negative. While the domestic interest rate has risen alongside the US interest rate, thus preserving the usual differential, interest rates in many parts of the world have remained low. This has helped to pull the TWIBOR down below the S$ SIBOR. Over time, we would expect interest rates in other parts of the world to "catch up" as stronger growth and inflationary pressures push nominal interest rates upwards. Accordingly, this anomaly is not expected to persist, and has indeed started to correct in recent months.

If the foreign interest rate is proxied by the TWIBOR instead of the US$ SIBOR, Chart 5 shows that *ex post*, the UIP differential (the sum of the TWIBOR-S$ SIBOR

Chart 1
3-month US$ SIBOR and S$ SIBOR

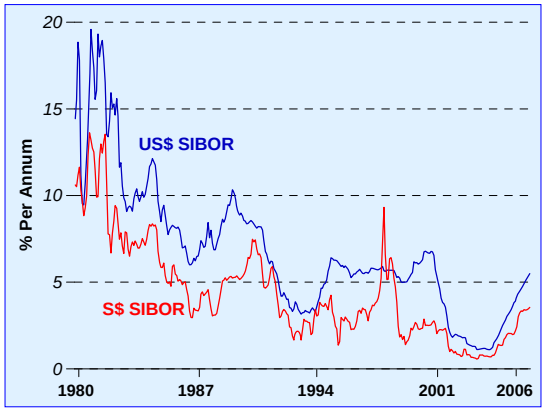


Chart 2
3-month Uncovered Interest Differential

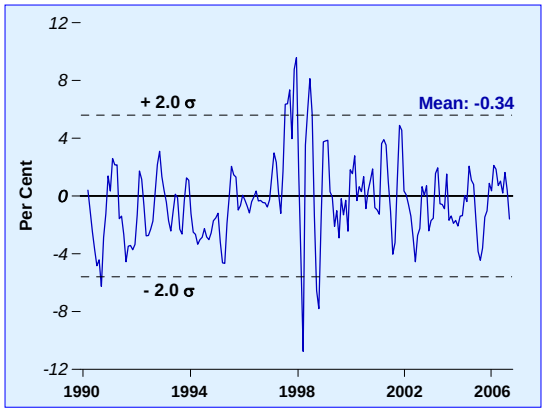
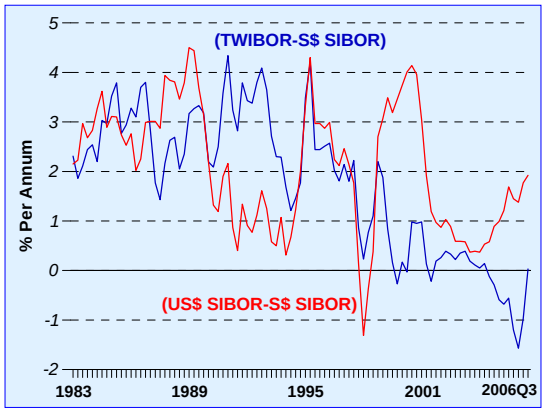


Chart 3
Spreads of 3-month US$ SIBOR and TWIBOR over 3-month S$ SIBOR



[3] Covered and uncovered interest parity held during this period, but did not hold during the crisis period.

differential and the change in the actual S$NEER) generally lies within two standard error bounds (mean of zero), except during the volatile period of the Asian Financial Crisis. Thus the UIP condition seems to hold for the TWIBOR composite interest rate as well.

Since the UIP hypothesis involves the expected value of the future spot exchange rate, an alternative way to see if UIP holds in Singapore is to make use of *ex ante* survey data on exchange rate expectations. Accordingly, we used monthly survey data from *Asia Pacific Consensus Forecast* to extract the *ex ante* consensus (mean) forecasts for the S$/US$ exchange rate. We assume that the sample of forecasters is sufficiently large to avoid any significant bias in the forecasts and that expectations are formed "rationally". The consensus three-month ahead forecast of the S$/US$ was used as the predictor for the level of the spot rate instead of the *ex post* S$/US$ rate used to calculate the UIP differential in Chart 2.

Chart 6 shows that the UIP, calculated as the sum of the three-month interest rate differential and the change in the exchange rate expected by the survey of respondents in the *Asia Pacific Consensus Forecast* three-months ahead, lies within two standard error bounds over the period January 1999 to May 2006. Also, when the change in the spot exchange rate expected by the survey respondents is regressed on the interest rate differential, the slope coefficient does not differ significantly from one. Therefore, we are not able to reject the null hypothesis that UIP holds in Singapore, based on these survey responses.

Chart 4
Annualised 3-month S$NEER changes

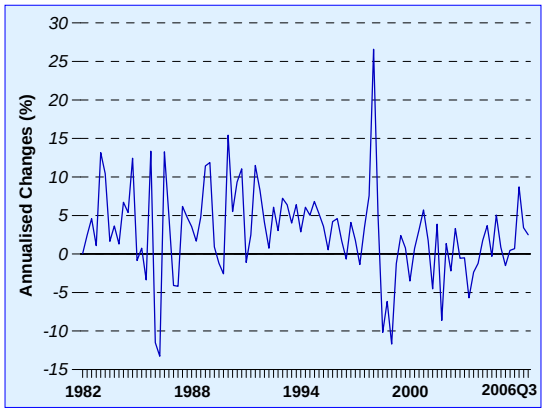


Chart 5
3-month Uncovered Interest Differential, based on S$NEER and TWIBOR

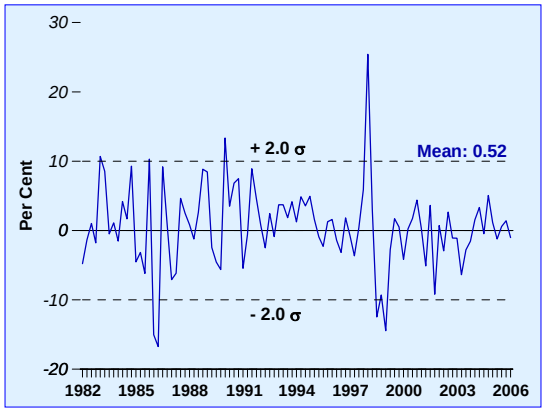
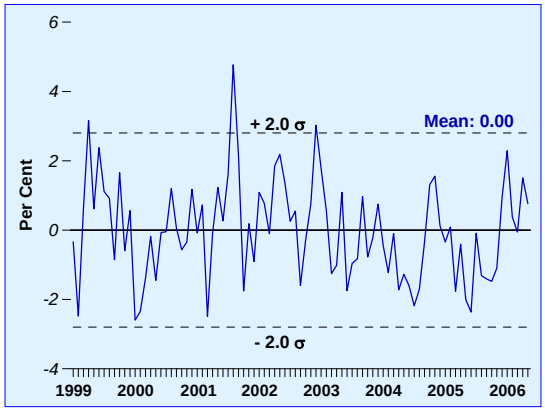


Chart 6
3-month Uncovered Interest Differential using Survey Data



Econometric Tests

Following the MAS (1999) study, we have extended the econometric tests of the UIP condition for Singapore to cover the period since 1999 using monthly data.

The test equations are based on equation (5), from which the deviation from UIP, δ_{t+k} can be defined as

$$\delta_{t+k} = i_{t+k} - i^{f}_{t+k} - (S^{re}_{t+k} - S_t)$$
$$\delta_{t+k} = -rp_{t,t+k} + \xi_{t,t+k} \qquad (7)$$

The deviation from UIP can thus be due either to the time-varying risk premium or systematic forecast error.

A simple test of the UIP condition is to determine if $\delta_{t+k} = 0$, i.e. whether the unconditional mean of δ_{t+k} is statistically different from zero. Table 1 presents the unconditional mean of the deviation from UIP. The results show that the deviation from UIP for the two periods highlighted is not statistically different from zero, i.e. we are not able to reject the null hypothesis that UIP holds.

Nevertheless, even if on average the deviation from UIP is close to zero, there may still be systematic variations over time. Following Marston (1995), the systematic components in δ_{t+k} can be related to a variety of variables in the current information set. Rewriting equation (7) gives us the following single-equation test:

$$\delta_{t+k} = \phi_0 + \phi_1 Z_t + \varepsilon_{t+k} \qquad (8)$$

This relates the deviations from the UIP condition to a set of variables in the current information set, Z_t, which includes one-month lagged changes in the S$ SIBOR and the US$ SIBOR, and two-month lagged Singapore and US inflation rates. All these variables are known when projections are made at each period t. Failing to reject the null, $H_0 : \phi_0, \phi_1 = 0$, would imply that UIP holds.

Table 2 presents the test results on the validity of the UIP condition using equation (8). The results show that UIP cannot be rejected except for the period which includes the Asian crisis: 1990-99. Once the period of extreme market turbulence is excluded, there is little systematic exchange rate forecast error or evidence of an exchange rate risk premium that causes persistent deviations from UIP. Our formal econometric test results thus confirm our casual observations in Charts 2, 5 and 6 above and show that – barring the extreme volatility experienced during the Asian crisis – the UIP condition

Table 1
Unconditional Mean

	Deviation from UIP
Jan 2000 – Jan 2006	
Mean	-0.1903 (0.4402)
Jan 1990 – Jan 2006	
Mean	-0.3416 (0.0991)

Note: Figures in parentheses are p-values for the null hypothesis that the mean is zero.

Table 2
Test Results for UIP

	H_0: UIP holds
Jan 1990 – Jun 1997	10.51 (0.0210)
Jan 1990 – Dec 1999	25.41 (0.0001)*
Jan 2000 – Jan 2006	10.04 (0.0741)

Note: Figures represent chi-squared test statistics for $H_0 : \phi_0, \phi_1 = 0$ and those in parentheses are corresponding p-values.
* Reject the null at the 1% significance level.

holds for Singapore, both before and after the crisis. The domestic interest rate continues to trade at a discount to the US interest rate, with the difference largely "explained" by the expected appreciation of the S$ against the US$.

Sum-Up

Standard international macroeconomic theory postulates that central banks have a choice between targeting the interest rate or exchange rate, but not both simultaneously within an environment of free capital mobility. EPD has examined the validity of this trade-off for Singapore and found that its exchange rate-centred regime has indeed limited the extent to which local interest rates can diverge from the foreign (US) interest rates.

A useful framework to assess the links between domestic interest rates and global (US) interest rates is provided for by the principle of UIP, which is essentially an equilibrium condition that links international currency and money markets together. A number of empirical tests were conducted to determine if UIP holds in Singapore. The results suggest that UIP holds in Singapore before and after the Asian Financial Crisis for both domestic interest rate against US$ SIBOR, and domestic interest rate against the TWIBOR.

A sharp increase in the risk premium during the Asian crisis may be one explanation as to why the UIP condition does not hold between 1997 and 1998. During such extreme market conditions, heightened risk aversion by investors would tend to overshadow normal exchange rate expectations based on interest rate differentials.

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Statistical Appendix

TABLE 1: REAL GDP GROWTH by sector

Period	Total	Manu-facturing	Financial & Business Services			Con-struction	Commerce			Transport & Commun-ications	Total	Manu-facturing	Financial & Business Services			Con-struction	Commerce			Transport & Commun-ications
			Total	Financial Services	Business Services		Total	Wholesale & Retail Trade	Hotels & Rest-aurants				Total	Financial Services	Business Services		Total	Wholesale & Retail Trade	Hotels & Rest-aurants	
	Year-on-Year % Change										Seasonally-adjusted Quarter-on-Quarter Annualised % Change									
2004	8.7	13.9	4.0	5.4	2.8	-6.1	15.1	15.6	11.5	8.5										
2005	6.4	9.3	5.6	6.5	4.9	-1.1	9.8	10.5	4.6	4.5										
2004 Q1	8.5	10.3	8.4	15.4	3.1	0.6	15.3	17.1	3.4	3.3	10.1	18.2	-5.6	-15.6	3.9	-1.6	18.7	20.6	4.5	6.6
Q2	12.3	20.0	4.7	5.5	4.1	-7.0	19.6	17.6	39.5	17.5	5.7	17.1	3.6	2.6	4.5	-21.3	11.4	12.4	3.7	9.0
Q3	7.4	11.1	2.0	2.4	1.8	-10.1	14.7	15.5	8.5	8.3	2.0	-3.5	-1.1	0.0	-2.1	-8.8	8.3	9.2	1.6	3.8
Q4	6.9	14.3	1.2	-0.1	2.4	-7.6	11.5	12.7	2.5	5.7	9.0	25.6	8.7	15.3	3.5	3.5	7.3	8.3	-0.7	3.1
2005 Q1	3.4	3.2	2.5	2.2	2.7	-1.1	8.0	8.7	1.9	4.5	-2.1	-19.0	-0.9	-7.8	5.3	27.9	5.8	6.1	3.6	2.4
Q2	5.7	5.9	5.7	7.9	3.9	-1.1	9.7	10.2	5.4	4.1	14.6	28.2	17.2	27.6	9.1	-20.5	17.5	17.5	17.8	7.4
Q3	7.6	13.1	7.4	8.5	6.6	-1.4	10.1	10.7	4.7	4.3	9.6	25.6	5.5	2.1	8.5	-9.9	10.0	11.3	-0.7	4.3
Q4	8.7	14.2	6.8	7.4	6.3	-0.8	11.4	12.1	6.2	5.1	12.5	28.1	6.2	10.7	2.5	5.6	12.1	13.0	4.6	5.9
2006 Q1	10.8	20.7	7.5	8.7	6.5	-0.8	14.3	15.1	7.1	5.0	7.6	3.9	1.5	-3.3	5.9	26.9	18.3	19.5	7.8	2.9
Q2	8.1	12.5	7.9	9.5	6.4	0.2	9.7	10.1	6.1	3.7	3.0	-4.2	19.0	31.6	9.0	-16.3	-0.8	-2.2	12.8	1.7

Source: Singapore Department of Statistics

TABLE 2: REAL GDP GROWTH by expenditure

Year-on-Year % Change

Period	Total Demand	Domestic Demand							Exports of Goods & Services	Imports of Goods & Services
		Total	Consumption			Gross Fixed Capital Formation				
			Total	Private	Public	Total	Private	Public		
2004	18.3	11.1	4.5	5.9	-1.1	10.2	16.0	-11.2	20.6	23.2
2005	9.1	2.6	3.3	2.5	6.5	-1.9	-1.4	-4.5	11.0	10.3
2004 Q1	16.8	15.8	5.9	5.4	7.5	13.5	18.1	-1.4	17.1	21.6
Q2	22.7	13.8	7.0	10.1	-6.0	13.2	19.5	-13.2	25.8	28.3
Q3	19.3	9.3	2.6	5.1	-7.7	13.8	22.3	-16.8	22.5	25.4
Q4	14.6	5.8	2.4	3.2	-1.0	0.4	4.4	-14.5	17.5	18.1
2005 Q1	8.8	3.4	4.5	2.6	10.4	-7.9	-12.4	10.0	10.6	11.4
Q2	6.6	0.8	1.4	2.1	-1.8	-6.4	-6.2	-7.4	8.5	7.1
Q3	7.9	2.5	1.8	1.2	5.1	-6.8	-5.8	-12.1	9.4	8.0
Q4	12.8	3.9	5.1	4.0	9.8	15.0	21.2	-12.4	15.4	14.7
2006 Q1	13.5	4.3	4.4	2.3	10.6	10.1	18.5	-16.5	16.4	14.7
Q2	11.5	4.9	4.8	4.2	7.6	11.1	14.9	-11.0	13.4	12.8

Source: Singapore Department of Statistics

TABLE 3: CONSUMER PRICE INDEX

Period	All Items	Food	Housing	Clothing & Footwear	Transport & Commun-ications	Education & Stationery	Health Care	Recreation & Others	All Items	Food	Housing	Clothing & Footwear	Transport & Commun-ications	Education & Stationery	Health Care	Recreation & Others
	2004 = 100								Year-on-Year % Change							
2004	100.0	99.9	100.0	99.9	100.0	100.0	100.0	100.0	1.7	2.0	-0.1	0.1	1.2	4.2	6.0	2.3
2005	100.4	101.3	100.8	99.9	97.8	102.0	100.4	101.7	0.5	1.3	0.8	0.0	-2.2	2.0	0.4	1.7
2004 Q1	99.5	99.5	98.6	99.8	100.0	99.5	99.9	99.7	1.2	1.8	-1.4	0.2	0.7	5.1	6.4	1.7
Q2	99.9	99.4	99.9	99.7	100.1	99.8	99.8	100.6	1.9	1.5	-0.6	0.7	1.4	5.2	6.1	4.1
Q3	100.3	100.2	100.6	99.8	100.6	100.0	100.1	99.7	1.9	2.3	0.3	-0.4	1.9	3.1	5.8	2.6
Q4	100.2	100.8	100.8	100.2	99.2	100.6	100.1	99.8	1.7	2.6	1.3	-0.2	0.7	3.7	5.6	0.9
2005 Q1	99.7	101.1	99.0	100.4	97.5	101.4	100.1	100.5	0.3	1.6	0.4	0.5	-2.4	1.9	0.3	0.8
Q2	100.0	101.0	99.5	99.6	97.6	101.5	100.2	101.6	0.1	1.7	-0.5	-0.2	-2.5	1.7	0.4	1.0
Q3	100.7	101.2	101.7	98.5	98.3	102.4	100.5	101.6	0.5	1.1	1.1	-1.3	-2.3	2.4	0.4	1.9
Q4	101.3	101.6	102.9	101.1	97.8	102.8	100.8	102.9	1.1	0.9	2.1	1.0	-1.4	2.2	0.7	3.1
2006 Q1	101.1	102.3	102.6	100.6	96.2	103.7	100.9	102.7	1.4	1.2	3.7	0.3	-1.4	2.3	0.8	2.1
Q2	101.2	102.7	103.2	100.1	96.4	103.6	101.3	101.8	1.2	1.6	3.7	0.5	-1.2	2.1	1.0	0.1

Source: Singapore Department of Statistics

TABLE 4: LABOUR MARKET (I)

Year-on-Year % Change

Period	Average Monthly Earnings	Labour Productivity								Unit Labour Cost	
		All Sectors	Manufacturing	Construction	Wholesale & Retail Trade	Hotels & Restaurants	Transport & Communications	Financial Services	Business Services	Overall Economy	Manufacturing
2004	3.6	6.9	9.7	-1.1	13.7	7.1	7.9	1.5	-0.5	-3.9	-7.3
2005	3.5	1.9	2.6	-1.9	6.6	1.1	2.0	-0.6	-3.0	-1.5	-3.0
2004 Q1	4.4	8.6	9.9	7.6	17.3	1.5	4.0	13.1	1.6	-5.7	-7.7
Q2	4.1	10.8	16.6	-2.3	16.0	31.8	17.5	2.3	1.4	-8.7	-13.1
Q3	1.4	5.0	5.2	-5.9	12.8	2.9	7.1	-2.1	-1.5	-3.1	-3.7
Q4	4.4	3.7	7.4	-3.6	9.3	-0.8	3.9	-5.3	-3.5	1.9	-4.7
2005 Q1	4.8	0.0	-2.7	1.2	5.4	-1.2	2.4	-4.2	-3.7	1.2	3.3
Q2	2.5	1.5	-0.8	-1.0	6.5	2.2	1.7	0.9	-3.4	-1.0	-1.1
Q3	4.5	2.6	6.1	-3.4	6.3	1.5	1.7	1.1	-2.5	-2.2	-6.3
Q4	2.2	3.3	7.0	-4.3	7.8	1.7	2.3	0.0	-2.5	-4.1	-8.3
2006 Q1	3.0	4.8	12.5	-5.5	10.8	1.6	2.3	1.7	-4.3	-3.2	-9.2
Q2	3.8	1.6	4.7	-5.2	5.6	-0.9	0.7	1.8	-5.8	0.5	-2.5

Note: Labour productivity figures are based on SSIC 2000 classification.

Source: Singapore Department of Statistics/Central Provident Fund Board

TABLE 5: LABOUR MARKET (II)

Thousand

Period	Changes in Employment											
	All Sectors	Manufacturing	Construction	Wholesale & Retail Trade	Hotels & Restaurants	Transport & Storage	Financial Services	Real Estate & Leasing	Education & Public Administration	Health & Social Work	Other Services	Others
2004	71.4	27.0	-9.1	11.0	4.1	2.8	6.2	-0.2	1.3	1.8	27.8	-1.3
2005	113.3	29.1	8.7	12.6	5.7	6.4	7.7	2.5	4.1	1.4	33.3	1.7
2004 Q1	13.7	6.0	-3.6	2.5	-0.6	0.8	1.2	-1.7	0.8	0.5	8.2	-0.3
Q2	10.9	6.4	-2.7	1.6	0.5	-0.2	1.8	-1.0	-0.7	0.4	5.8	-0.9
Q3	14.1	8.5	-1.7	0.2	-0.3	1.0	1.2	0.9	-0.9	0.4	5.0	-0.2
Q4	32.7	6.2	-1.1	6.7	4.5	1.2	2.0	1.6	2.2	0.5	8.9	0.1
2005 Q1	17.8	5.5	1.5	2.2	-1.2	1.4	2.1	0.1	1.2	0.6	4.2	0.3
Q2	31.7	9.2	3.4	2.6	0.4	1.4	2.1	0.3	1.1	0.4	10.7	0.1
Q3	28.5	8.0	2.2	2.7	0.9	0.8	1.7	1.2	0.2	0.1	10.9	-0.2
Q4	35.3	6.4	1.7	5.1	5.6	2.9	1.8	0.9	1.7	0.3	7.5	1.5
2006 Q1	45.0	11.1	5.6	3.5	1.1	1.7	2.1	1.5	2.7	0.9	14.6	0.4
Q2	36.4	8.4	3.5	3.0	1.5	1.6	3.3	1.3	0.6	0.5	12.5	0.1

Note: Changes in employment numbers are based on SSIC 2005 classification.

Source: Ministry of Manpower

TABLE 6: EXTERNAL TRADE

Year-on-Year % Change

Period	Total Trade	Exports	Domestic Exports					Re-exports	Imports	Exports	Domestic Exports			Re-exports	Imports
			Total	Oil	Non-oil						Total	Oil	Non-oil		
					Total	Electronics	Non-electronics								
	At Current Prices									At 2000 Prices					
2004	21.9	20.5	19.7	35.9	16.1	13.2	19.2	21.4	23.6	20.1	17.9	11.8	19.0	23.0	22.0
2005	13.8	14.0	15.1	41.5	8.2	3.9	12.7	12.7	13.6	12.2	11.0	5.1	12.0	13.7	9.4
2004 Q1	16.5	14.7	11.6	7.9	12.5	4.4	21.7	18.6	18.6	16.9	14.1	8.5	15.2	20.5	20.7
Q2	26.1	24.2	20.9	34.4	17.8	16.3	19.3	28.2	28.2	23.8	19.0	10.3	20.8	30.2	26.8
Q3	27.2	25.2	25.2	48.0	20.4	19.0	22.0	25.1	29.5	22.9	20.4	12.0	21.9	26.1	26.2
Q4	18.1	17.7	20.7	54.1	13.5	13.1	14.1	14.5	18.4	16.9	17.7	16.3	17.9	16.0	15.2
2005 Q1	11.7	11.5	12.6	33.2	7.8	2.8	12.7	10.2	11.9	12.2	12.5	4.9	13.8	11.8	8.9
Q2	10.5	10.8	11.6	47.9	2.1	-0.1	4.3	9.9	10.2	8.8	6.9	8.2	6.7	11.1	6.1
Q3	12.3	12.4	13.8	51.8	3.9	0.5	7.6	10.7	12.1	9.8	8.5	8.0	8.6	11.3	7.4
Q4	20.2	20.7	21.8	32.8	18.6	11.6	26.5	19.4	19.7	17.8	16.0	-0.5	18.7	20.1	15.2
2006 Q1	20.9	22.4	22.5	42.0	16.8	18.1	15.7	22.3	19.1	19.0	16.0	5.6	17.6	22.8	14.6
Q2	17.8	17.3	18.0	26.2	14.9	11.1	18.5	16.4	18.4	15.4	14.2	-3.6	17.5	16.7	14.4

Source: International Enterprise Singapore

TABLE 7: NON-OIL DOMESTIC EXPORTS by selected countries

Period	All Countries	ASEAN				NIEs				China	EU	Japan	US
		Total	of which			Total	Hong Kong	S. Korea	Taiwan				
			Indonesia	Malaysia	Thailand								
	Year-on-Year % Change												
2004	16.1	11.4	5.3	12.3	25.3	14.9	16.1	15.8	12.4	41.4	25.4	7.7	6.4
2005	8.2	13.5	17.7	9.9	23.2	7.7	0.9	9.7	17.2	27.2	5.8	-1.2	-1.7
2004 Q1	12.5	6.3	-9.3	13.7	12.1	7.7	10.9	7.7	3.2	38.6	35.0	7.6	-6.8
Q2	17.8	6.2	-14.8	13.8	30.8	25.9	30.7	23.2	20.2	56.7	29.8	9.1	1.5
Q3	20.4	14.6	15.6	15.2	34.3	15.0	12.0	22.6	15.0	43.6	20.0	9.5	19.9
Q4	13.5	17.9	35.7	7.1	24.6	11.9	12.3	10.9	12.0	30.7	18.8	4.9	11.5
2005 Q1	7.8	11.4	22.0	9.1	18.8	3.8	4.8	2.2	3.4	30.2	-2.0	-1.9	18.6
Q2	2.1	14.0	27.7	2.3	24.7	-2.7	-10.8	-0.2	9.5	23.3	-4.3	-6.3	-11.9
Q3	3.9	8.9	8.1	5.1	19.6	12.6	4.0	15.7	24.5	26.7	0.8	-4.1	-9.3
Q4	18.6	19.6	15.8	22.6	29.2	16.0	5.9	20.2	28.8	28.6	27.6	7.2	-1.0
2006 Q1	16.8	15.9	8.3	15.4	35.1	21.9	22.2	17.8	24.5	18.7	20.4	14.2	4.0
Q2	14.9	7.9	-5.1	16.5	22.0	22.3	31.6	8.3	18.8	17.1	5.3	7.6	26.4
	% Share of All Countries												
2004	100.0	22.7	7.1	8.6	3.9	15.1	7.3	3.3	4.5	8.2	19.2	7.4	15.8
2005	100.0	23.8	7.7	8.7	4.4	15.0	6.8	3.3	4.9	9.7	18.8	6.7	14.4

Source: International Enterprise Singapore

TABLE 8: ELECTRONICS LEADING INDEX

Period	1999 = 100	Year-on-Year % Change	Quarter-on-Quarter % Change
2004	78.7	-1.0	
2005	79.1	0.5	
2004 Q1	79.3	-0.6	0.2
Q2	78.8	-1.3	-0.6
Q3	78.1	-1.7	-1.0
Q4	78.8	-0.5	0.9
2005 Q1	78.4	-1.2	-0.5
Q2	78.9	0.1	0.7
Q3	80.9	3.6	2.5
Q4	78.4	-0.4	-3.0
2006 Q1	78.3	-0.1	-0.2
Q2	79.1	0.3	1.0

Source: Monetary Authority of Singapore

TABLE 9: BALANCE OF PAYMENTS – Current Account

	Current Account Balance		Goods Account			Services Balance						Income Balance	Current Transfers (Net)
	S$ Million	% of GNI	Exports	Imports	Balance	Total	Transportation	Travel	Insurance	Government	Other		
			S$ Million										
2004	44,453	25.0	339,647	284,038	55,609	-5,455	-1,509	-7,369	-1,475	-126	5,024	-3,757	-1,944
2005	55,373	28.6	386,920	323,744	63,176	-4,914	-3,283	-6,850	-1,865	-126	7,209	-918	-1,971
2004 Q1	9,223	n.a.	76,281	64,290	11,991	-1,238	-182	-1,819	-311	-64	1,138	-1,016	-514
Q2	10,086	n.a.	83,435	70,651	12,784	-1,709	-620	-2,029	-355	-21	1,316	-533	-457
Q3	12,696	n.a.	89,940	74,775	15,165	-1,125	-332	-1,652	-425	-9	1,293	-863	-481
Q4	12,448	n.a.	89,990	74,322	15,669	-1,384	-375	-1,869	-385	-32	1,277	-1,345	-492
2005 Q1	10,623	n.a.	85,211	72,981	12,229	-1,123	-641	-1,744	-342	-59	1,664	18	-501
Q2	12,984	n.a.	92,457	77,804	14,653	-1,492	-1,047	-1,812	-458	-11	1,837	304	-481
Q3	15,753	n.a.	101,107	83,758	17,350	-933	-774	-1,443	-543	-34	1,863	-163	-501
Q4	16,012	n.a.	108,145	89,201	18,944	-1,367	-821	-1,850	-521	-21	1,846	-1,078	-488
2006 Q1	14,963	n.a.	103,979	86,645	17,333	-1,941	-1,250	-1,272	-465	-47	1,092	124	-553
Q2	16,260	n.a.	108,503	91,051	17,453	-1,515	-1,334	-1,535	-473	-52	1,879	856	-533

Source: Singapore Department of Statistics

TABLE 10: BALANCE OF PAYMENTS – Capital & Financial Accounts

S$ Million

Period	Capital & Financial Account Balance	Capital Account	Financial Account						Errors & Omissions	Overall Balance	Official Foreign Reserves (End of Period)
			Total	Direct Investment	Portfolio Investment	Other Investment					
						Total	Banks	Others			
2004	-24,645	-310	-24,334	10,662	-19,050	-15,946	-1,413	-14,534	624	20,433	183,844
2005	-33,718	-336	-33,382	24,240	-22,755	-34,867	-5,824	-29,043	-1,258	20,397	193,601
2004 Q1	398	-71	470	7,236	-5,968	-799	4,207	-5,006	998	10,619	172,153
Q2	-8,293	-76	-8,217	4,961	-9,076	-4,102	-6,939	2,837	-1,488	304	175,204
Q3	-11,692	-84	-11,607	-3,645	-1,526	-6,437	-867	-5,569	-186	819	172,855
Q4	-5,058	-78	-4,980	2,109	-2,480	-4,609	2,187	-6,796	1,301	8,691	183,844
2005 Q1	-6,566	-78	-6,488	4,329	-3,989	-6,829	-7,035	207	721	4,778	186,772
Q2	-1,620	-91	-1,529	6,446	-7,460	-515	7,847	-8,362	-1,383	9,981	195,371
Q3	-15,772	-84	-15,688	7,644	-5,817	-17,514	-5,206	-12,308	1,309	1,290	195,885
Q4	-9,759	-82	-9,678	5,821	-5,489	-10,010	-1,430	-8,580	-1,905	4,347	193,601
2006 Q1	-7,655	-86	-7,569	8,609	-1,583	-14,595	-6,814	-7,781	1,079	8,388	197,428
Q2	-10,370	-97	-10,273	10,693	-11,362	-9,604	3,208	-12,812	-775	5,116	203,111

Source: Singapore Department of Statistics/Monetary Authority of Singapore

TABLE 11: EXCHANGE RATES

End of Period	Singapore Dollar Per									
	US Dollar	Pound Sterling	EURO	100 Swiss Franc	100 Japanese Yen	Malaysian Ringgit	Hong Kong Dollar	100 New Taiwan Dollar	100 Korean Won	Australian Dollar
2004	1.6338	3.1455	2.2243	144.10	1.5916	0.4299	0.2102	5.1474	0.1578	1.2723
2005	1.6642	2.8717	1.9754	126.91	1.4189	0.4403	0.2146	5.0701	0.1646	1.2207
2004 Q1	1.6790	3.0778	2.0553	131.78	1.6054	0.4418	0.2154	5.0785	0.1462	1.2734
Q2	1.7163	3.1038	2.0747	135.68	1.5807	0.4516	0.2201	5.0822	0.1490	1.1822
Q3	1.6908	3.0406	2.0835	134.15	1.5248	0.4449	0.2168	4.9746	0.1466	1.2112
Q4	1.6338	3.1455	2.2243	144.10	1.5916	0.4299	0.2102	5.1474	0.1578	1.2723
2005 Q1	1.6498	3.1010	2.1329	137.68	1.5389	0.4342	0.2115	5.2191	0.1620	1.2732
Q2	1.6832	3.0425	2.0350	131.45	1.5268	0.4429	0.2166	5.3333	0.1639	1.2858
Q3	1.6891	2.9765	2.0354	130.72	1.4947	0.4481	0.2177	5.0966	0.1622	1.2875
Q4	1.6642	2.8717	1.9754	126.91	1.4189	0.4403	0.2146	5.0701	0.1646	1.2207
2006 Q1	1.6183	2.8247	1.9683	124.71	1.3783	0.4390	0.2085	4.9877	0.1660	1.1592
Q2	1.5894	2.9132	2.0198	128.88	1.3818	0.4325	0.2046	4.9039	0.1667	1.1776
Q3	1.5869	2.9792	2.0168	127.32	1.3469	0.4307	0.2037	4.8016	0.1680	1.1862

Source: Monetary Authority of Singapore

TABLE 12: SINGAPORE DOLLAR NOMINAL EFFECTIVE EXCHANGE RATE INDEX

Index (1 Apr 2005=100)

As at Week Ending	Index	As at Week Ending	Index	As at Week Ending	Index	As at Week Ending	Index	As at Week Ending	Index	As at Week Ending	Index
2005 Apr 1	100.00	2005 Jul 1	99.85	2005 Oct 7	100.10	2006 Jan 6	101.84	2006 Apr 7	103.27	2006 Jul 7	104.13
8	100.21	8	99.68	14	100.15	13	102.40	13	103.36	14	104.07
15	100.09	15	100.27	21	100.15	20	102.51	21	103.46	21	104.31
22	100.29	22	100.90	28	100.17	27	102.80	28	103.45	28	104.05
29	100.59	29	101.23	Nov 4	100.09	Feb 3	102.43	May 5	103.58	Aug 4	104.38
May 6	100.69	Aug 5	101.24	11	100.07	10	102.74	11	103.70	11	104.34
13	100.27	12	101.07	18	100.31	17	102.36	19	103.26	18	104.48
20	100.49	19	100.65	25	100.73	24	102.91	26	103.79	25	104.47
27	100.36	26	100.53	Dec 2	100.83	Mar 3	102.86	Jun 2	103.96	Sep 1	104.65
Jun 3	100.27	Sep 2	100.09	9	100.93	10	102.86	9	103.67	8	104.66
10	100.20	9	100.02	16	101.26	17	102.91	16	103.84	15	104.22
17	100.18	16	100.10	23	101.60	24	103.20	23	103.93	22	103.79
24	100.16	23	100.13	30	101.90	31	102.94	30	103.88	29	104.07
		30	100.03							Oct 6	104.19

Source: Monetary Authority of Singapore

TABLE 13: DOMESTIC LIQUIDITY INDICATOR

Change from 3 Months Ago

Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003	0.106	-0.141	-0.336	-0.697	-0.316	-0.350	-0.167	-0.103	-0.025	-0.003	-0.186	-0.033
2004	0.109	0.223	0.125	0.416	0.202	0.238	-0.134	0.091	0.407	0.647	0.573	0.280
2005	0.312	0.254	0.366	0.064	0.071	-0.222	-0.105	0.044	0.021	0.055	0.076	0.544
2006	0.901	0.732	0.486	0.204	0.281	0.294	0.260	0.188	0.070			

Source: Monetary Authority of Singapore

Note: The DLI is a measure of overall monetary conditions, reflecting changes in the S$NEER and domestic 3-month interbank rate. A positive (negative) number indicates a tightening (easing) monetary policy stance from the previous quarter. Please refer to the June 2001 issue of MAS ED *Quarterly Bulletin* for more information.

TABLE 14: MONETARY

End of Period	Money Supply								Interest Rates				
	Narrow Money M1	Broad Money M2	Broad Money M3	Reserve Money	Narrow Money M1	Broad Money M2	Broad Money M3	Reserve Money	Prime Lending Rate	3-month Interbank Rate	3-month SIBOR (US$)	Banks	
												Savings Rate	12-month Fixed Deposit Rate
	S$ Billion				Year-on-Year % Change				Rate (% Per Annum)				
2004	44.2	207.0	212.2	21.8	14.0	6.2	6.1	5.7	5.30	1.44	2.56	0.23	0.72
2005	46.1	219.8	225.7	23.4	4.4	6.2	6.4	7.2	5.30	3.25	4.54	0.30	0.86
2004 Q1	41.4	201.7	207.0	20.5	12.3	9.9	7.9	2.5	5.30	0.75	1.11	0.23	0.70
Q2	41.1	204.4	209.5	20.6	12.0	10.7	9.3	3.0	5.30	0.81	1.61	0.23	0.70
Q3	41.9	200.7	205.9	21.1	10.2	8.4	7.3	6.6	5.30	1.44	2.02	0.23	0.72
Q4	44.2	207.0	212.2	21.8	14.0	6.2	6.1	5.7	5.30	1.44	2.56	0.23	0.72
2005 Q1	45.0	210.4	215.7	22.0	8.7	4.3	4.2	7.8	5.30	2.13	3.11	0.23	0.72
Q2	45.8	213.7	219.2	22.4	11.3	4.6	4.6	8.5	5.30	2.06	3.52	0.23	0.74
Q3	45.7	217.4	223.1	22.3	9.2	8.3	8.3	5.7	5.30	2.38	4.07	0.23	0.74
Q4	46.1	219.8	225.7	23.4	4.4	6.2	6.4	7.2	5.30	3.25	4.54	0.30	0.86
2006 Q1	48.3	227.5	233.6	23.3	7.3	8.1	8.3	5.6	5.30	3.44	5.01	0.30	0.88
Q2	48.8	237.5	243.7	24.0	6.6	11.1	11.2	7.4	5.30	3.56	5.48	0.30	0.89

Source: Monetary Authority of Singapore

TABLE 15: FISCAL

Period	Operating Revenue							Expenditure			Primary Surplus (+)/ Deficit (–)	Less: Special Transfers	Add: Net Investment Income Contribution	Budget Surplus (+)/ Deficit (–)
	Total	Tax Revenue					Non-tax Revenue	Total	Operating	Development				
		Total	of which											
			Income Tax	Asset Taxes	Stamp Duty	GST								
	S$ Million													
FY2003	25,315	21,501	10,271	1,512	743	2,957	3,813	28,499	19,991	8,508	-3,184	603	1,900	-1,887
FY2004	27,469	23,799	11,468	2,058	815	3,470	3,671	28,957	20,355	8,602	-1,487	1,661	3,043	-105
FY2005 (Revised)	27,480	25,044	12,646	1,864	830	3,600	2,435	28,846	21,592	7,254	-1,367	875	2,671	430
FY2006 (Estimated)	28,956	26,433	13,456	1,885	870	3,750	2,522	30,617	24,479	6,139	-1,662	3,588	2,388	-2,862
	% of Nominal GDP													
FY2003	15.2	12.9	6.2	0.9	0.4	1.8	2.3	17.1	12.0	5.1	-1.9	0.4	1.1	-1.1
FY2004	15.0	13.0	6.3	1.1	0.4	1.9	2.0	15.8	11.1	4.7	-0.8	0.9	1.7	-0.1
FY2005 (Revised)	13.8	12.6	6.4	0.9	0.4	1.8	1.2	14.5	10.9	3.6	-0.7	0.4	1.3	0.2
FY2006 (Estimated)	14.0	12.8	6.5	0.9	0.4	1.8	1.2	14.8	11.8	3.0	-0.8	1.7	1.2	-1.4

Source: Ministry of Finance

List of Selected Publications

Title	Frequency	Online Links
Inflation Monthly	Monthly	http://www.mas.gov.sg/masmcm/bin/pt1Inflation_Monthly.htm
Monthly Statistical Bulletin	Monthly	https://secure.mas.gov.sg/frames/msb/msbIndexpage.html
Recent Economic Developments	Quarterly	http://www.mas.gov.sg/masmcm/bin/pt1Recent_Economic_Developments.htm
Survey of Professional Forecasters	Quarterly	http://www.mas.gov.sg/masmcm/bin/pt1Survey.htm
Financial Stability Review	Semi-annual	http://www.mas.gov.sg/masmcm/bin/pt1MAS_FSR.htm
Macroeconomic Review	Semi-annual	http://www.mas.gov.sg/masmcm/bin/pt1Macroeconomic_Review.htm
Monetary Policy Statements	Semi-annual	http://www.mas.gov.sg/masmcm/bin/pt1Monetary_Policy_Statements.htm
Economics Explorer	Occasional	http://www.mas.gov.sg/masmcm/bin/pt1Economic_Explorer_Series.htm
Monographs	Occasional	http://www.mas.gov.sg/masmcm/bin/pt1Monographs.htm
Staff Papers	Occasional	http://www.mas.gov.sg/masmcm/bin/pt1MAS_Staff_Papers.htm

Monographs

Title	Date	Online Links
MAS' Roles and Responsibilities in Relation to Securities Clearing and Settlement Systems in Singapore	May 2004	http://www.mas.gov.sg/masmcm/bin/pt1Monograph_Securities_Clearing_Settlement_System1.htm
Objectives and Principles of Financial Supervision in Singapore	Apr 2004	http://www.mas.gov.sg/masmcm/bin/pt1Monograph_Financial_Supervision.htm
Monetary Policy Operations in Singapore	Jan 2003	http://www.mas.gov.sg/masmcm/bin/pt1Monetary_Policy_Operations_in_Singapore.htm

Title	Date	Online Links
Singapore's Exchange Rate Policy	Feb 2001	http://www.mas.gov.sg/masmcm/bin/pt1Singapore_s_Exchange_Rate_Policy.htm

Staff Papers

Paper No.	Date	Title
43	Apr 2006	Singapore's Exchange Rate-Centered Monetary Policy Regime and Its Relevance for China
42	Dec 2005	China's Rise as a Manufacturing Powerhouse: Implications for Asia
41	Dec 2005	The Welfare Analysis of a Free Trade Zone: Intermediate Goods and the Asian Tigers
40	Sep 2005	Macroeconomic Stability in Developing Countries: How Much is Enough?
39	Jul 2005	Two Decades of Macromodelling at the MAS
38	Dec 2004	Macroeconomic Determinants of Banking Financial Performance and Resilience in Singapore
37	Dec 2004	Managed Floating and Intermediate Exchange Rate Systems: The Singapore Experience
36	Dec 2004	The Long-Run Real Effective Real Exchange Rate of Singapore: A Behavioural Approach
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