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SINGAPORE

Selected Issues

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Approved by the Asia and Pacific Department

March 3, 2006

Contents Page

I. Savings and Investment: An Emerging Asian and Singaporean Perspective 2
A. Introduction 2
B. Background 3
C. Explaining Developments in Savings and Investment 6
D. Looking Ahead 16

II. The Impact of Labor Market Uncertainty on Private Consumption 19
A. Introduction 19
B. Labor Market Uncertainty and Private Consumption 19
C. Conclusions 23

III. Trends and Variation in Domestic Competition and Markup Costs 25
A. Methodology and Data 25
B. Main Results 26

I. Savings and Investment: An Emerging Asian and Singaporean Perspective[1]

A. Introduction

1. **In the aftermath of the 1997 crisis, emerging Asia's saving-investment balance shifted from a small deficit to a significant surplus, mainly reflecting a fall in investment.** Several factors contributed to this decline, including a buildup of excess capacity in the run-up to the crisis, the bursting of the real estate bubble, corporate over-leveraging partly resulting from the widespread currency depreciation, and a postcrisis macroeconomic environment characterized by increased uncertainty.[2]

2. **The subsequent very sluggish investment recovery has led to sustained current account surpluses.** While the sharp drop in investment in the immediate aftermath of the crisis could be expected, it is more difficult to explain the very sluggish investment recovery in most countries in the region. With some of the important factors behind the initial drop ebbing and a prolonged period of strong economic growth following, investment should expectedly have picked up and Asia's postcrisis large saving-investment surplus should have declined. Instead, eight years after the crisis, emerging Asian countries have, with few exceptions, investment rates well below their precrisis peaks and falling short of their historical averages.

3. **Singapore is no exception to the postcrisis investment drought.** While Singapore was not affected as severely by the Asian crisis, it still experienced a sharp reduction in construction-related investment. Moreover, since the Asian crisis, domestic investment rates have been held down by additional external shocks hitting the economy (the bursting of the technology bubble in 2000/01 and the SARS outbreak in 2003) and the rise in outward investment, including by the government. However, since Singapore was running large current account surpluses well in advance of the Asian crisis, its savings-investment balance should also be seen in a longer-term context. The saving-investment balance has been consistently improving since the early 1980s reflecting the transition to an industrialized economy with the associated expansion of the savings base and less need for investment growth to build up productive capacity and infrastructure. Moreover, the deliberate pursuit since the 1980s of a very prudent fiscal policy to build up fiscal reserves combined with demographics have supported savings.[3]

4. **Empirical analysis at the regional level and for Singapore points to an 'investment drought' as an explanation for the increase in the savings-investment**

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[1] Prepared by Giovanni Dell'Ariccia and Leif Lybecker Eskesen.

[2] See for example IMF: Asia Pacific Regional Outlook, September 2005.

[3] See Monetary Authority of Singapore (2004) for a discussion of long-term trends in the savings-investment balance.

imbalance in the post-Asian crisis period, rather than a "saving glut." In particular, our cross-country analysis finds, coinciding with the Asian crisis, a structural break in the relationship between investment and its determinants, which does not find a counterpart in the savings equation. Evidence of investment drought is also found in the country-specific analysis for Singapore, although the high savings rate in Singapore is an important factor in explaining the savings-investment surplus over the long term.

5. **Looking ahead, the saving-investment gap is expected to narrow.** Private savings are expected to decline as the economic expansion in emerging Asia, including Singapore, continues. Moreover, over the medium term, aging is expected to lower savings as the average propensity to save decreases, although households might choose to save more in the period immediately before aging becomes more prominent. Public savings, however, might increase as governments prepare for the impact of aging, although this is not expected to play a material role in Singapore given the already very high levels of fiscal reserves. Investment is expected to increase as many of the factors inhibiting investment growth fade, although it might be difficult to reach pre-Asian crisis levels of investment.

B. Background

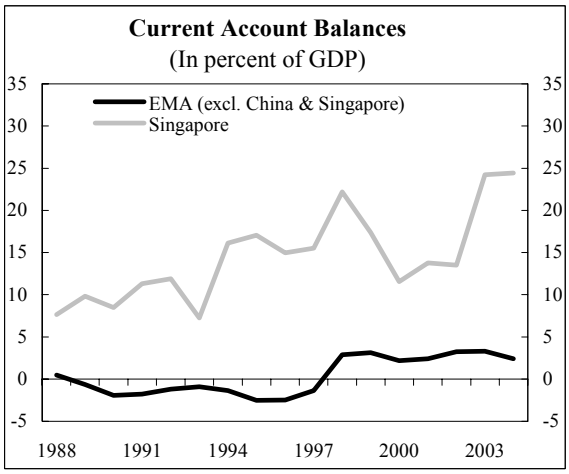
6. **Current account balances of Asian countries have shifted significantly over the past decade (Figure 1).** In the years immediately prior to the crisis of 1997–98, emerging Asian economies were running current account deficits equivalent to over 1 percent of GDP on average (and over 3 percent when excluding China and Singapore). Singapore, on the other hand, ran large current account surpluses in excess of 15 percent of GDP. After the crisis, current account balances in emerging Asian economies swung to large and sustained surpluses, averaging around 3 percent of GDP since 1998. In the case of Singapore, the current account surpluses also increased, averaging 18 percent of GDP over the same period. The counterparts to the adjustment in current account balances are movements in underlying saving and investment behavior.

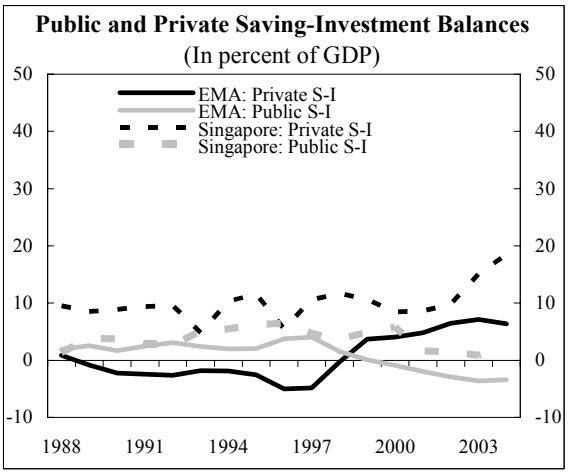
7. **Saving rates have been relatively stable in Asia, albeit at higher levels than in other regions.** Over the past 15 years, gross savings in Asia have averaged around 30 percent of GDP, about double the level in the United States, and 50 percent higher than in the Euro area:

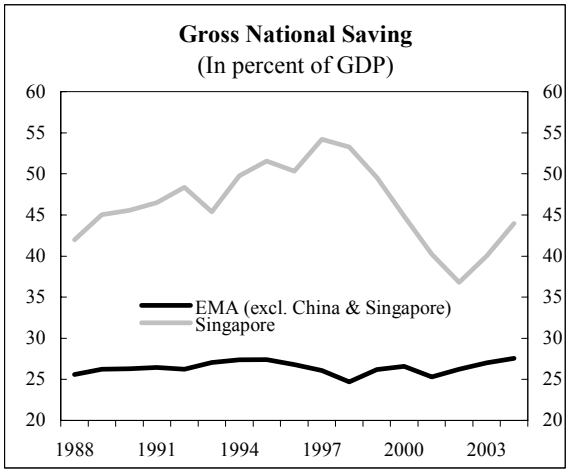
- *In emerging Asia (excluding China and Singapore), savings dipped slightly during the Asian crisis*, reflecting a sharp and sustained decline in public sector savings, but was subsequently offset by an increase in private savings above the precrisis levels.

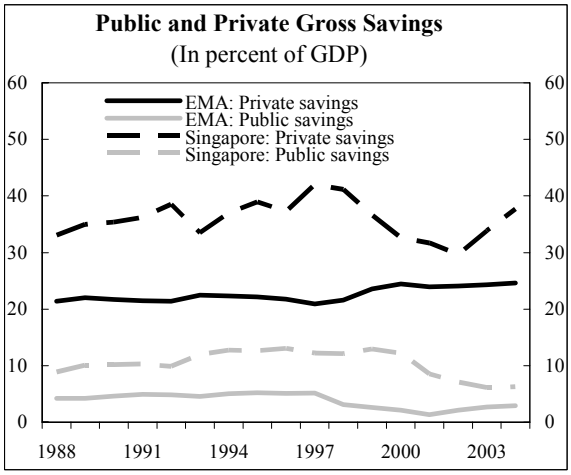
- *Singapore's saving rate has been very high relative to other countries, including in the postcrisis years.* Savings (both public and private—as derived by IMF staff) increased more or less without interruption from the mid-1980s to around the onset of the Asian crisis when they fell back to the levels prevailing in the late 1980s. Much of Singapore's private savings are undertaken by corporations (including

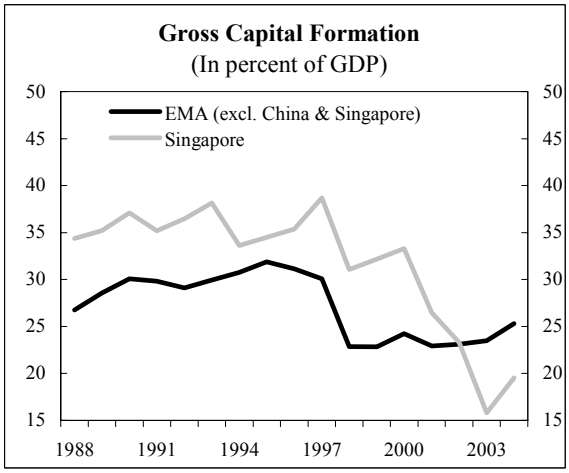
Figure 1. Emerging Asia and Singapore: Saving-Investment Trends

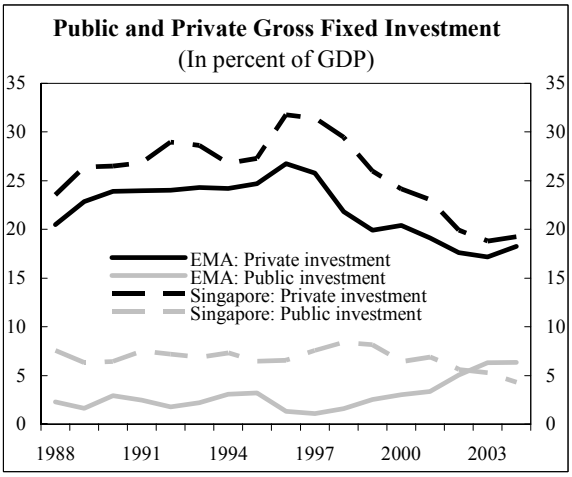










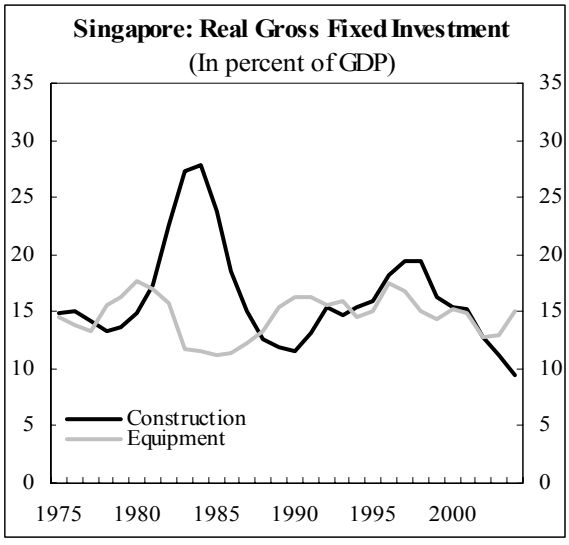


Government-Linked-Companies (GLCs)) at around 25–30 percent of GDP, reflecting the large share of profits in national income. Household savings are comparable to international levels at around 8–10 percent of GDP, of which net savings through the mandatory saving program (CPF) accounts for around 2½ percent of GDP. However, households save a relatively large portion of their disposable income, around 20 percent.

8. **Investment in Asia as a whole dipped during the Asian crisis and has failed to return to precrisis levels.** That said, investment has been, and still is, higher than in other regions:

- *Investment rates in emerging Asia (excluding China and Singapore) collapsed sharply during the crisis* (by 8 percentage points of GDP between 1996 and 1998). Investment rates have remained depressed since the crisis, having risen by only 2 percentage points of GDP from 1998 levels with private investment still below precrisis levels. Domestically financed investment has experienced the sharpest decline; after dipping slightly, FDI has returned to precrisis levels.

- *In Singapore, investment started falling around the time of the Asian crisis, driven mostly by a drop in construction-related investment.* Historically, investment increased rapidly during the 1970s as the economy transitioned to NIE status and as large infrastructure investment was undertaken. The investment rate subsequently fell significantly during the 1980s as large infrastructure investment was completed and investment to build up productive capacity slowed. The investment slump was reversed during the 1990s with construction investment again picking up strongly, resulting in a large buildup of residential and office supply prior to the Asian crisis. With the onset of the crisis, investment fell and especially construction-related investment, while investment in equipment remained more stable. The technology bubble burst in 2000/01 pushed the decline further, as investment in equipment and inventories, especially by the important electronics sector, fell. Interestingly, real investment rates fell less than nominal rates, particularly in the case of equipment investment where investment rates have increased recently. This possibly reflects the drop in capital equipment prices (including IT) also experienced in other countries and reflecting relative technological progress.



9. **These developments point to an 'investment drought' in emerging Asia and Singapore, rather than a 'saving glut' as an explanation behind the rise in the savings-investment balance in the post-Asian crisis period.** As noted above, the adjustment in investment in the immediate aftermath of the crisis dwarfed the drop in savings. In a longer perspective, the decline in investment of 3 percentage points of GDP between the 1990–97 average and 2004 in emerging Asia (excluding China) almost fully explains the increase in the saving-investment balance over this timeframe, with the private sector bearing the bulk of the adjustment.

C. Explaining Developments in Savings and Investment

10. **This section conducts a quantitative analysis of the determinants of savings and investment.** First, a cross-country analysis is undertaken to get a sense of developments in emerging Asia (including Singapore) relative to the rest of the world and to gauge the importance of the Asian crisis on the determinants of savings and investment. Second, regressions are run for Singapore to assess the possible importance of country-specific factors.

Empirical Analysis

Cross-Country Regression

11. **This section examines the behavior of savings and investment in a panel of countries.** It builds and estimates two econometric models that relate savings and investment to a range of macroeconomic and structural variables. The models build on a large empirical literature on the determinants of savings and investment. In particular, they borrow heavily from the specification recently used in Cardarelli and Terrones (2005).

12. **The empirical estimation employs a dynamic panel methodology.** The GMM approach developed by Arellano-Bond (1991) produces an unbiased estimator while including a lagged dependent variable and allowing the constant term to change across countries and over time. Time-varying and country-specific constant terms are necessary because of the high degree of macroeconomic heterogeneity of the countries in the sample and the substantial economic development occurring over the sample period.

13. **A data set covering 45 industrial and developing countries from 1971–2004 is used.** Both models are estimated for the full set and then for a sub-set of nine Asian countries, including Singapore.

14. **In the savings equation for the full sample, the following variables proved significant (Table 1, column 1):**

Table 1: Savings (GMM Estimator, country- and time-specific fixed effects)

	WEO Model Full Sample	WEO Model Asia 9	WEO Model + Crisis Asia 9
Lagged Savings	0.62***	0.79***	0.76***
	(0.03)	(0.03)	(0.06)
GDP Growth	0.17***	0.19***	0.26***
	(0.05)	(0.05)	(0.05)
Public Saving Rate	0.27***	0.02	0.09
	(0.05)	(0.05)	(0.06)
ΔTerms-of-Trade	0.08***	0.03	0.05*
	(0.02)	(0.03)	(0.03)
Real Interest Rate	0.005	0.1***	0.09***
	(0.01)	(0.03)	(0.02)
Credit-to-GDP ratio	-3.47***	1.22	1.32
	(0.94)	(1.77)	(2.99)
Δcredit-to-GDP ratio	2.17	0.25	1.41
	(1.40)	(1.32)	(2.13)
Youth dep. ratio	-0.10	-0.17**	0.11
	(0.13)	(0.08)	(0.12)
Elderly dep. ratio	-0.44**	-0.18	2.09**
	(0.18)	(0.25)	(0.83)
GDP Growth*CRISIS			-0.19**
			(0.08)
Public Saving Rate*CRISIS			0.01
			(0.12)
ΔTerms-of-Trade*CRISIS			-0.11**
			(0.05)
Real Interest Rate*CRISIS			0.46***
			(0.18)
Credit-to-GDP ratio*CRISIS			0.62
			(2.14)
Δcredit-to-GDP ratio*CRISIS			-3.29
			(4.67)
Youth dep. Ratio*CRISIS			0.30*
			(0.16)
Elderly dep. Ratio*CRISIS			-0.04
			(0.60)
Number of Obs.	1424	247	247
Number of Countries	45	9	9

- *Higher per capita income growth is associated with higher saving rates.* A sustained one percent increase in per capita output growth is associated with only ½ percent increase in the saving rate.[4]

- *Higher public savings only partially offset private savings.* The coefficient of the public saving rate is positive and significant implying that the Ricardian equivalence does not hold. In the long run, a 1 percent sustained increase in public savings is associated with a 0.7 percent increase in total savings.

- *Saving rates tend to be lower in countries with high credit-to-GDP ratios.* This may reflect lower precautionary savings in countries with more developed financial systems and, hence, easier access to credit.

- *Terms of trade shocks are positively associated with the saving rate.* This behavior is consistent with the permanent income hypothesis to the extent that these shocks are often perceived as temporary.

- *Finally, saving rates are negatively associated with population aging.* This is consistent with the life cycle consumption model. In the long run, a 1 percentage point increase in the elderly dependency ratio is associated with an decrease in the saving rate of about 1.2 percentage points.

15. **The results for Asia differ significantly from those for the full sample (Table 1, columns 2 and 3).** High saving rates are still associated with fast output growth, although with a larger long run multiplier. However, most of the coefficients that enter significantly the full sample regression do not appear to matter in our Asian sample. For example, consistent with a Ricardian behavior, public savings do not appear to affect total savings. Moreover, savings appear to be positively associated with the real interest rate. Furthermore, only some of these differences appear to depend on postcrisis behavior.[5]

16. **In the investment equation for the entire sample two coefficients, in addition to that for the lagged dependent variable, turn out to be significant (Table 2, column 1):**

[4] Long-run multipliers are calculated as the ratio of the right-hand variable coefficients over one minus the coefficient of the lagged dependent variable.

[5] A specification including interacted terms was estimated to allow the slope coefficients to vary after 1997. Each interacted term is the product of a dummy variable taking value 0 until 1997 and 1 afterwards and one of the explanatory variables from our main specification. Statistically significant coefficients for these terms indicate the existence of a structural break in the relationship between the dependant variable and its determinants in conjunction with the 1997 crisis.

Table 2: Investment (GMM Estimator, country- and time-specific fixed effects)

	WEO Model Full Sample	WEO Model Asia 9	WEO Model + Crisis Asia 9
Lagged Investment	0.75***	0.89***	0.86***
	(0.04)	(0.03)	(0.05)
GDP Growth	0.29***	0.38***	0.31***
	(0.05)	(0.08)	(0.07)
Real Interest Rate	0.001	0.02	0.04
	(0.007)	(0.03)	(0.03)
Credit-to-GDP ratio	-0.95	-1.75***	-0.65
	(0.85)	(0.54)	(1.19)
Δcredit-to-GDP ratio	0.08***	0.06**	0.02
	(0.02)	(0.03)	(0.03)
Youth dep. ratio	0.08	0.11	-0.23**
	(0.08)	(0.09)	(0.11)
Elderly dep. ratio	-0.18	-0.17	-1.49*
	(0.14)	(0.35)	(0.86)
GDP Growth*CRISIS			0.25***
			(0.09)
Real Interest Rate*CRISIS			-0.35***
			(0.10)
Credit-to-GDP ratio*CRISIS			-2.24**
			(1.00)
Δcredit-to-GDP ratio*CRISIS			-0.11**
			(0.05)
Youth dep. Ratio*CRISIS			-0.20*
			(0.11)
Elderly dep. Ratio*CRISIS			0.21
			(0.22)
Number of Obs.	1415	247	247
Number of Countries	45	9	9

- *Higher investment is associated with stronger per capita output growth*. This coefficient may reflect demand shocks and changes in productivity, but is also affected by an obvious reverse causality bias. The positive coefficient is also consistent with the accelerator model. The results imply a long-run multiplier of about one.

- *Higher investment is also associated with increased availability of bank credit.* This reflects the reliance of firms on external finance. In particular, the availability of bank credit has often been identified as a precondition for the development of SMEs.

17. **Overall, results for Asia are consistent with those for the full sample.** Thus, higher investment is associated with faster output growth and faster credit growth. However, a high credit-to-GDP ratio, reflecting a highly developed banking system, has a negative impact on investment rates (Table 2, column 2) for Asian countries. While this could be explained as an effect of convergence—more advanced countries have more developed financial systems, but also lower investment rates—it appears to be related to the Asian crisis.

18. **The Asian crisis seems to have caused a structural break in the relationship between investment and its determinants (Table 2, column 3).** In particular:

- *The elasticity of investment to GDP growth increases after the crisis.* The coefficient for the postcrisis period (obtained as the sum of the overall coefficient and the coefficient for the interacted term) is almost twice as large as for the precrisis period. This may reflect increased reliance on retained earning by corporates and risk averse behavior of corporates and lenders.

- *The real cost of capital is negatively correlated with investment in the postcrisis period.*[6] This result suggests that monetary conditions play a more important role in the postcrisis lower-growth environment than in the booming period before 1997. It is consistent with country studies, such as Mallikamas, Thaicharoen, and Rodpengsangkaha (2003), which indicate that monetary policy has played a complementary role in supporting investment in the postcrisis recovery.

- *High credit-to-GDP ratios are associated with low investment rates in the postcrisis period.* This could reflect that countries with more developed banking systems suffered more during the crisis. This helps explain the negative sign of this coefficient in the restricted regression and its insignificance when allowing for a structural break.

19. **While further quantitative analysis of the factors behind the structural break goes beyond the scope of this paper, a more qualitative assessment can shed some light on this:**

- Over-investment in the early 1990s may have led to over-capacity which continued to act as a drag on investment well after the onset of the Asian crisis. In the run-up to the crisis, a number of countries and sectors—for example, construction in Singapore, Thailand, and Malaysia, and manufacturing in Korea—saw the emergence of bubbles. The overhang of capacity created during the boom has, consequently, depressed new investment for a prolonged period.

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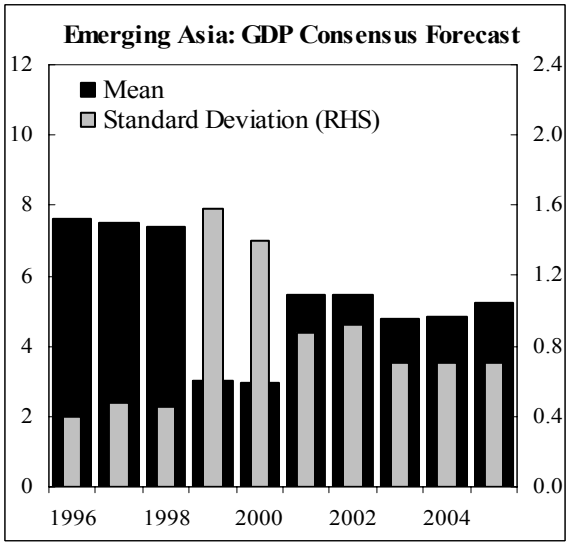
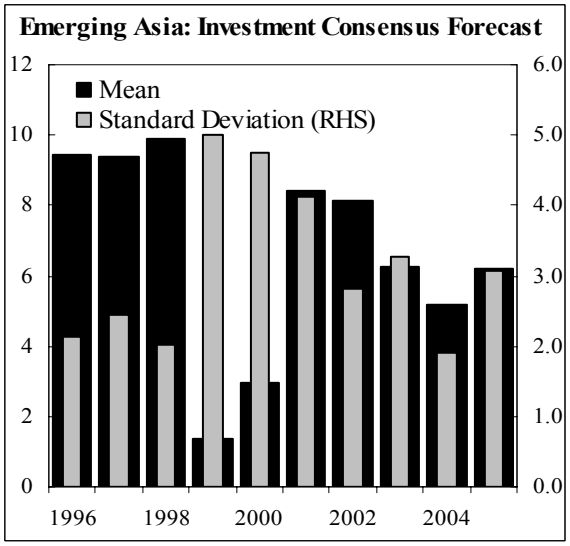
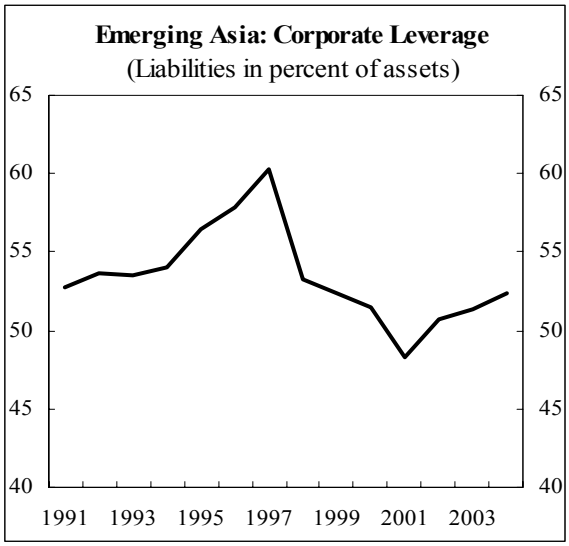
[6] This is measured as the product of the real interest rate and the relative price of capital (defined as the investment deflator over the GDP deflator).

- Heightened macroeconomic uncertainty in the postcrisis period also likely depressed the investment climate. The coefficient of variation of consensus estimates on GDP growth and investment growth increased sharply after 1997.[7] Unfortunately, the limited length of this series did not allow us to include it in the regressions. A specification including the coefficient of variation of GDP growth for the 5-year window preceding each observation returned a negative coefficient, although it was not statistically significant.





- Corporate restructuring may also have depressed investment. The Asian crisis hit the corporate sector hard, leading to widespread bankruptcies, expanding debt burdens, and collapsing sales. The immediate priority for corporations was to restructure their finances and operations. This involved restructuring and paying down debts, revamping operations, and improving efficiency. In this situation, demand for new investment was reduced. A structural change in these economies, such as a change towards less capital and more skill- and knowledge-intensive sectors could also have played a role.[8] For



[7] See Kramer and Siregar (2006).

[8] See Lee, McKibbin, and Park (2004).

Singapore, there was furthermore an issue of substitution of domestic with foreign investment (including by the government) as part of the economic diversification and companies' attempts to deal with increased competition by establishing operations abroad in low-cost countries. However, despite the improvement in the health of the larger corporate sector in emerging Asia, other key sectors remain weak. The small- and medium-sized enterprise (SME) sector was hit especially hard by the crisis and, given the domestic focus of its operations, benefited little from exchange rate depreciations. Moreover, SMEs' access to private financing dried up, as banks became particularly hesitant to lend to small scale enterprises with less healthy balance sheets. For a number of reasons, including a squeeze on profits arising from reliance on domestic demand and competition from China, SMEs have made slower progress in restructuring than larger export-oriented corporations.

Singapore-Specific Regressions

20. **Looking at determinants of savings and investment in Singapore, suggests that many of the same factors found in the cross-country study have indeed been at play here too.** Using a simple Ordinary-Least-Square methodology for an annual data set covering 1975–2004, we ran several specifications with variables specific to Singapore and not available for the cross-country study. A selection of these specifications is presented in Table 3:

21. **Savings appear to be influenced by a number of factors, structural and transitory:**

- *Fiscal policy seems to have played an important part in determining savings, more than elsewhere.* While one should not read too much into the exact size of the coefficient, the high level would imply that there does not appear to be much private sector off-set from higher public savings. Indeed, a private savings specification does not find a significant relation between public and private savings. An explanation for this could be that the private sector does not necessarily expect or is uncertain about the timing and extent of the distribution of the fiscal reserves being built up, obfuscating any Richardian behavior. Moreover, credit constraint could have prevented the private sector from borrowing against future distributions of fiscal surpluses.

- *Demographics have also supported savings.* With an increase in the number of people in the working age population during the observed period, savings have benefited from the associated increase in the propensity to save among workers compared to the young (often with no incomes) and the elderly (drawing down on their saved incomes).[9] The presence of low income replacement rates for pensions in the mandatory CPF savings scheme together with rising health care costs, could also have contributed to increasing the importance of demographics as the marginal propensity to save per working age person in Singapore, consequently, could have risen.

[9] See also Faruqee and Hussein (1995).

Table 3. Singapore: Savings and Investment Functions - OLS Regression Results

	Savings		Fixed Investments				
				Real			
	Levels	Differences	Nominal	Total	Private Constr.	Private Machin.	Private Transp.
Lagged dependant variable	0.59***	0.18	0.85***	0.76***	0.70***	0.51***	0.32**
	(0.10)	(0.25)	(0.07)	(0.09)	(0.09)	(0.09)	(0.12)
Public savings	0.57***	0.59*					
	(0.17)	(0.30)					
Per capita real GNI growth	0.25*	0.18**					
	(0.13)	(0.09)					
Change in real house price	-0.05**	-0.06**					
	(0.02)	(0.02)					
Working-age population share	0.59**	0.70					
	(0.24)	(1.13)					
Real interest rates			-0.42*	-0.53**	-0.33**		-0.18**
			(0.24)	(0.22)	(0.14)		(0.08)
Change in credit			0.24***	0.1399**	0.07*		0.08***
			(0.07)	(0.07)	(0.04)		(0.02)
Total trade			0.03*			0.03***	
			(0.01)			(0.01)	
Real houseprice, lag 1				0.04*	0.04***		
				(0.02)	(0.01)		
Composite Confidence Index						0.06***	
						(0.01)	
Crisis dummy 1998-2004			-2.72***	-3.62***	-2.38***		-0.71**
			(0.93)	(0.95)	(0.56)		(0.25)
Crisis dummy 2000-2004						-2.16***	
						(0.42)	
Number of Observations	29	28	29	29	29	29	29
R^2	0.91	0.39	0.93	0.91	0.92	0.89	0.73

- *Higher income growth is reflected in higher savings.* As Singaporean companies and households earn more money, they are likely to set more money aside to smooth consumption, and as more reach higher levels of income, the propensity to save furthermore, increases.

- *Wealth effects and uncertainty likely also play a role.* The negative coefficient on the change in real house prices could both reflect a wealth effect and precautionary behavior. With the rise in house prices in the run-up to the Asian crisis came an added sense of wealth and strengthening of consumption, while the drop in house prices since the late 1990s had the opposite effect. Changes in house prices could also capture more generally the uncertain economic environment in the years following the Asian crisis. While incomes fell in the aftermath of the Asian Crisis and savings were depleted to smooth consumption, these were partly compensated for by precautionary savings in response to the more uncertain environment. Household savings might also have increased recently due to the higher income uncertainty associated with the increased use of variable wage contracts.

- *Other factors have also likely been at play.* Private savings have likely also been held up by the mandatory savings scheme, which could have led to high savings, especially among liquidity-constrained households.[10] However, the liberalization of withdrawal rules and numerous changes to contributions have made this relationship less stable.[11]

22. **Investment seem more cyclically determined than savings, reflecting also more sector-specific developments:**

- *The cost of capital plays a role in determining investment.* The negative relation between the cost of capital and investment suggests importance of the interest channel of monetary policy, particularly when looking at real investment and for the private sector.

- *Investment responds positively to the availability of credit.* This suggests that the investment, at least in part, depend on external financing and are not just generated through changes in profitability.

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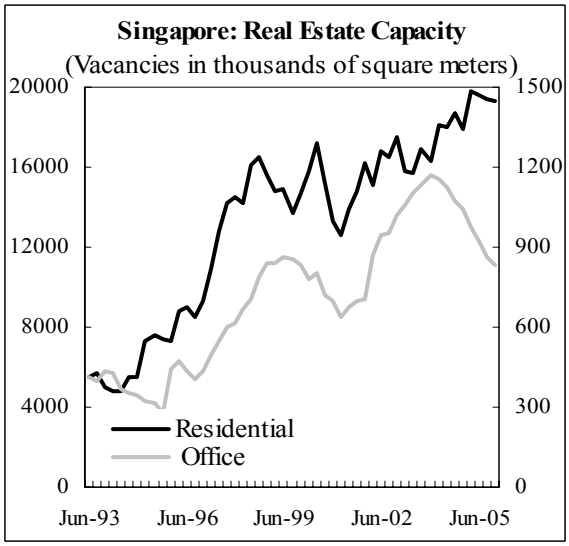
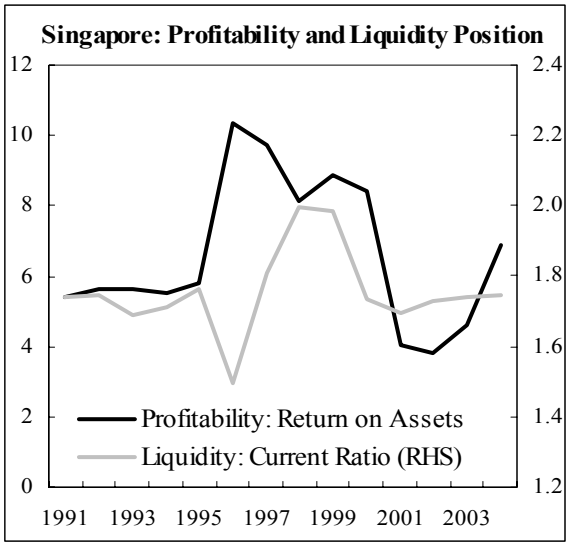
[10] See also Faruqee and Hussein (1995) and Monetary Authorities of Singapore (2002) for discussion of savings determinants.

[11] Running the regression in first differences to control for the existence unit-roots confirm the above results. The demographic variable and the lagged dependant variable become insignificant. This could reflect the longer-term relationship between demographics and savings. However, the fact that both the saving rate and the working-age population have followed a general upward trend could also have given rise to a spurious relationship between these variables in the level regression.

- *Conditions in the property market have also driven investment.* A positive coefficient on the lagged level of real house prices testifies to the significance of real estate bubbles driving the investment cycle, especially for private investment.

- *The post-Asian crisis period signified a downward correction in the level of the investment function.* This possibly reflects a combination of factors such as increased uncertainty and a more lasting correction in construction-related investment following over-investment in the precrisis period, and a subsequent unwinding of excess capacity. Some evidence also suggests that the Singapore firms chose to build up profitability and de-leverage, potentially reflecting tightened access to external financing as well increased financial prudence among companies. Moreover, it might also have played a role that Singaporean firms during this period increasingly channeled funds abroad (through direct investment and ownership acquisitions) to seek out new markets and move operations to low cost economies to cope with an increasingly competitive environment. The short times series did not, however, allow us to use postcrisis slope dummies.





- *Sector analysis reveals some heterogeneity across sectors, but also common factors.*[12] Relative to other sectors, private construction investment is more impacted by conditions in the real estate market. The availability of credit also plays a role, which could reflect the strong lending to this sector in the run-up to the Asian crisis and the dependence of small contractors/sub-contractors on bank financing. The same factors, with the exception of real estate conditions, seem to play a determining role for real private investment in transport. For investment in machinery and equipment, largely carried out by the important electronics sector, external conditions such as trade

[12] See also Eng and Ping (2004).

determine the level of investment. Alternative specifications (not shown), including global semi-conductor sales, show the importance of the global IT cycle. Moreover, general business confidence also affects the investment in machinery, testifying to the cyclical nature of these investments. In all three cases, the post-Asian crisis signified a downward shift in the investment rate beyond what can be explained by the other factors, although for machinery investment the bursting of the technology bubble in 2000 was a more decisive factor.

D. Looking Ahead

23. **Underlying trends point to a narrowing of the saving-investment balance, as saving declines and investment recovers.** The sharp swing in the saving-investment balance came in response to forces unleashed by the Asian crisis and in the case of Singapore also the bursting of the real estate and the technology bubble. As these forces dissipate further, underlying influences are likely to lower savings and raise investment.

24. **Private saving rates are expected to decline modestly as the economic expansion in the region continues and, over the medium-term, as the population ages.** As economic uncertainty dissipates with the continued healthy economic conditions in the region, including in Singapore, households and corporates should feel less inclined to hold precautionary savings. Over the medium-term, household saving should diminish as populations age and the average propensity to save fall. However, these demographic changes may not hit in full force for many years. While the share of the workforce in the overall population is already past its peak in Korea, this share will peak in Singapore in 2010, in China between 2010 and 2015, and in India and the Philippines after 2035. During this more immediate pre-aging period, households might continue to save in anticipation of aging and especially in the absence of an expansive social safety net providing high income replacement rates for retirees and high coverage of health care costs.

25. **Against this decline, public savings are expected to rise as authorities across the region deal with high debt levels and prepare for aging.** Fiscal consolidation is needed in emerging Asia, although specific consolidation plans have not yet been elaborated in many countries. As individuals do not fully reduce their savings to offset increased public savings (i.e., full Ricardian equivalence does not apply), public sector developments in Asia will tend to support high saving rates. However, in Singapore the already high level of fiscal reserves provides a cushion against the fiscal impact from aging and no significant savings are needed on this account.

26. **With many of the factors weighing down investment lifting, the investment rate should begin to pick up.** Corporate restructuring appears well advanced with bankruptcy rates having fallen sharply and debt ratios below precrisis levels in a number of countries. The process of operational restructuring is still ongoing, as firms seek to raise the return on assets and equity, but corporate balance sheets have been substantially rehabilitated. Ongoing problems in the SME sector remain a drag, but there is some evidence that the restructuring process is slowly reaching this sector as well. In addition, the overhang of excess capacity

has narrowed, with capacity utilization rates approaching precrisis levels. In Singapore, for example, vacancy rates for office and residential space have dropped, but remain above precrisis levels, and the property prices appear to be trending upward, albeit only slowly. For Singapore, fixed investment is expected to rise as the investment environment improves with the strengthening economic conditions, including the strengthening global IT cycle, and the implementation of a number of large construction projects such as the integrated resorts with casinos and the financial and business centers. However, a number of factors could possibly serve to hold down the rise in Singapore's investment rate: (i) aging will lower the prospective number of new home buyers and, thereby, investment in new residential building, (ii) the private sector, including GLCs, and the government (through Temasek and GIC) will likely continue to channel investments abroad to tackle the increased competition in the region and diversify the economy; and (iii) the nominal investment rate might be held down by the impact of technological progress on equipment prices (including IT), holding down the investment deflator relative to the GDP deflator. Moreover, a shift towards less capital and more skill- and knowledge-intensive sectors could also keep a lid on the investment rate.

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II. The Impact of Labor Market Uncertainty on Private Consumption[1]

A. Introduction

1. **In the wake of the Asian crisis, the Singapore economy has been undergoing substantial restructuring.** Reflecting this restructuring, the economy has rebounded very strongly in the last 10 quarters and unemployment has steadily declined. However, the rise in the unemployment since the Asian crisis was unprecedented in the last 30 odd years and could have changed the risk perception of households. In particular, the rise in income uncertainty may have adversely affected consumption and raised savings. This chapter examines the relationship between labor market developments and private consumption behavior and notes that employment uncertainty did have a significant negative impact on consumption and raised precautionary savings.

B. Labor Market Uncertainty and Private Consumption

2. **While the ongoing economic expansion has generated significant job gains, Singapore's unemployment rate has remained, for the most part of the period after the Asian crisis, significantly above its long run average.** The average unemployment rate rose to over 3 percent in the postcrisis period compared with lower than 2 percent in the precrisis period, while the standard deviation also rose substantially. The increase in the level of unemployment has also been associated with some structural changes in the labor market as evidenced by the flattening of the Beveridge curve (unemployment—vacancy relationship) in recent years.[2] This increase in structural unemployment has been, to some extent, attributable to the economic restructuring that has occurred in response to increased competition from low-wage regional economies.[3] Industries in Singapore have moved up the value-added ladder, and companies have shifted their low-end operations to the low-wage economies. As a result, demand for labor has shifted toward high-skilled workers. While these changes helped Singapore firms to retain their competitiveness, they also brought about redundancies among the less-skilled workers. Notwithstanding these structural changes, the NAIRU (nonaccelerated inflation rates of unemployment) has declined

Unemployment Rate 1/		
	Average	Standard Deviation
1992–1997	1.68	0.44
1998–2005	3.08	0.86

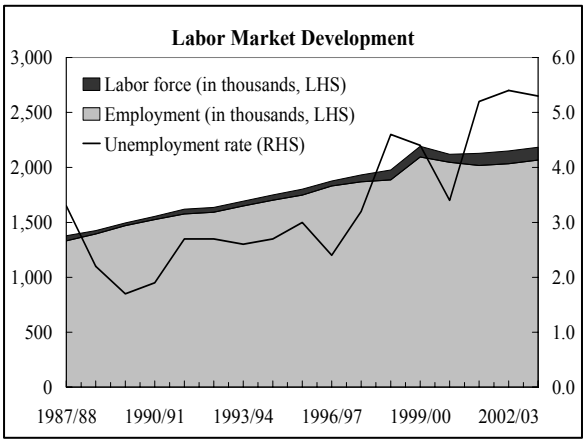
1/ Nonseasonally adjusted.

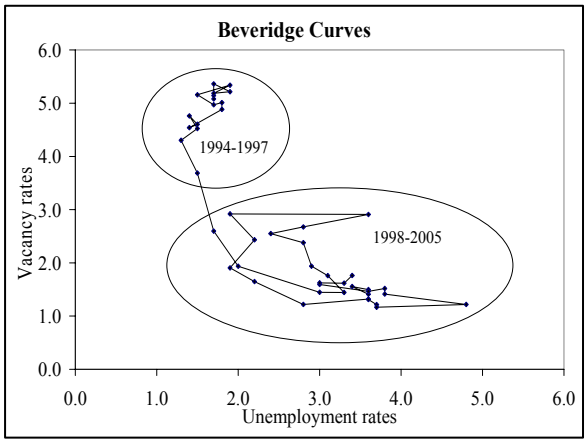
[1] Prepared by Ayako Fujita.

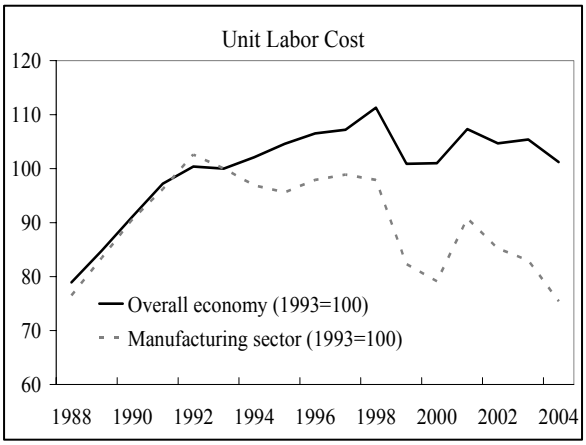
[2] Teo, and others (2004) also concluded that the labor market in Singapore became more inelastic since the Asian crisis.

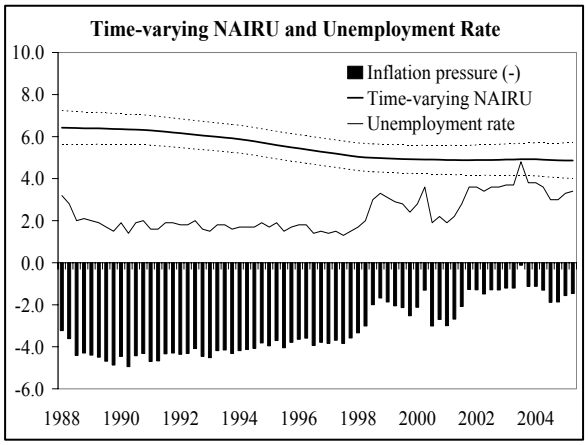
[3] Since the late 1990s, the government has taken strong initiatives to redesign the competitive labor market, through encouraging existing workers to upgrade their skills, increasing wage flexibility, and relaxing conditions for hiring foreign workers.

somewhat, perhaps suggestive of increased productivity growth that has kept price increases down.[1]









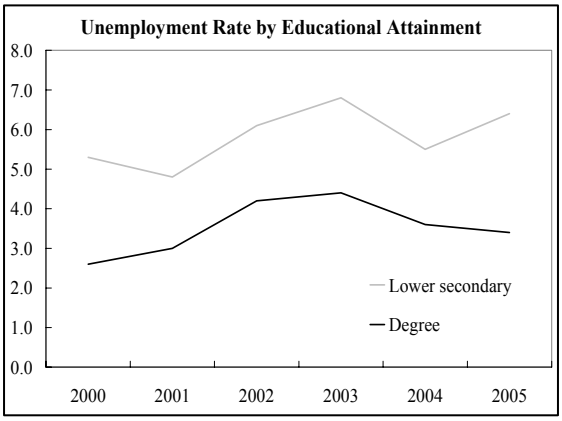
[1] Time-varying NAIRU is estimated with the following equation using the Kalman filter. The sample period is 1987:1Q-2005:3Q.

$$\pi_t = -0.09 \cdot (U_t - U_t^{NAIRU}) + 0.30 \cdot \pi_{t-1} + 0.007 \cdot oil + \varepsilon_t$$
(-2.70) (2.25) (2.83)

$$U_t^{NAIRU} = U_{t-1}^{NAIRU} + \nu_t$$

$$\sigma_\varepsilon = 0.38 \qquad \sigma_\nu^2 = \sigma_\varepsilon^2 / 5$$
(14.18),

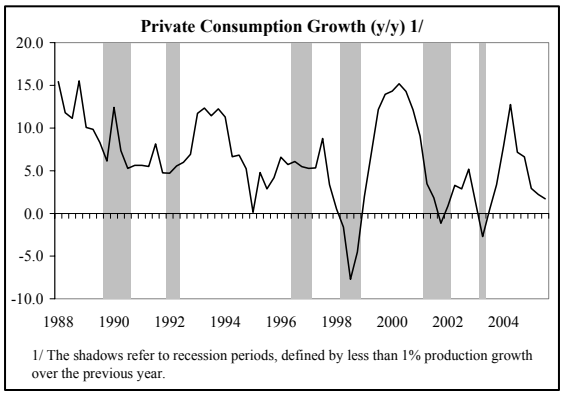
where π is consumer price inflation excluding housing costs, U is the unemployment rate, U^{NAIRU} is the NAIRU, and *oil* is international oil price inflation. Following Hirose and Kamada (2002), the error variance for the state equation is set a priori to one-fifth of the error variance for the observation equation, assuming a slower transition path in the NAIRU.

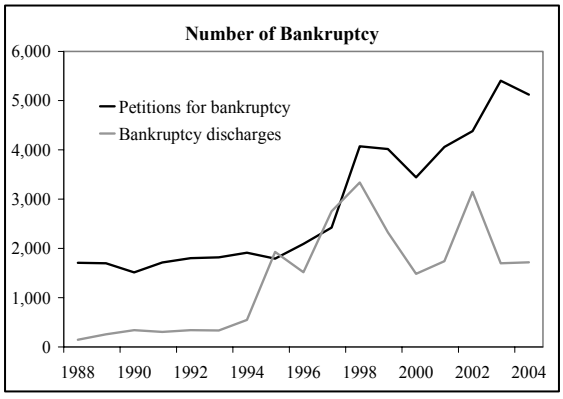


3. **During this period, private consumption growth also fell and became more volatile.** Consumption growth before 1997 was relatively stable even during recession periods, while it became more volatile in the aftermath of the Asian crisis.

Private Consumption Growth

	Q/Q growth		Y/Y growth	
	Average	Standard Deviation	Average	Standard Deviation
1988–1997	1.72	1.86	7.24	3.16
1998–2005	1.09	2.02	4.46	5.69





4. **A rise in the precautionary savings motive may explain such a change in consumption behavior.**[2] An increase in labor market uncertainty, especially in absence of unemployment insurance, could reduce current consumption and affect the future consumption path: consumers facing future income uncertainty would save more than the optimal level based on the life cycle and permanent income hypothesis during the current period to compensate for the possible future loss in income in the event of a layoff. While a consistent set of consumer confidence indicators is not available, related data suggest a persistently unfavorable income environment despite the robust economic recovery. For example, data for the number of bankruptcies suggest an increasing trend in the risk of financial difficulties after the late

[2] A previous estimation using data for the OECD countries concluded liquidity constraint and precautionary savings were key factors in explaining why consumption expenditures were determined by current rather than expected income (Sarantis, 2003).

1990s, indicating deteriorating labor market conditions.[3]

5. **To estimate the impact of labor market uncertainty on private consumption, a modified model of permanent income hypotheses was employed.** The model tracks four explanatory variables as determinants of private consumption: (i) intertemporal rate of return on assets; (ii) a wealth effect represented by equity prices; (iii) the effect of precautionary savings under labor market uncertainty represented by the unemployment rate; and (iv) liquidity constraint that presumably affect low-income households. The final specification is:[4]

$$\ln\left(\frac{c_{t+1}}{c_t}\right) = a_1 + a_2 * R_t + a_3 * \ln\left(\frac{q_t}{q_{t-1}}\right) + a_4 * U_t + a_5 * \ln\left(\frac{w_{t+1}}{w_t}\right) + v_{t+1}$$

where c_t is real private consumption, R_t is average real deposit rates by both banks and finance companies, q_t is the stock price index, U_t is the unemployment rate, and w_t is the average real monthly wage in period t. The model is estimated with data for 1988:1Q-2005:2Q using the full-information maximum likelihood (FIML) method[5].

6. **The estimation results suggest that labor market uncertainty is an important factor in determining private consumption behavior.** All coefficients have the expected signs and are significant at the 5 percent level.[6] Along with the other determinants, both contemporaneous labor income growth and labor market uncertainty represented by the unemployment rate appear to play a significant role in determining consumption behavior, suggesting the existence of liquidity constraint and a role for precautionary savings in response to the high unemployment rate in Singapore.

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[3] Although both the government and communities provide income assistance schemes, these are mainly targeted to households experiencing severe financial difficulties. Moreover, these schemes do not guarantee adequate assistances to the unemployed, since the level of benefits is quite low and applications are rarely approved (Wai-lam, 2000).

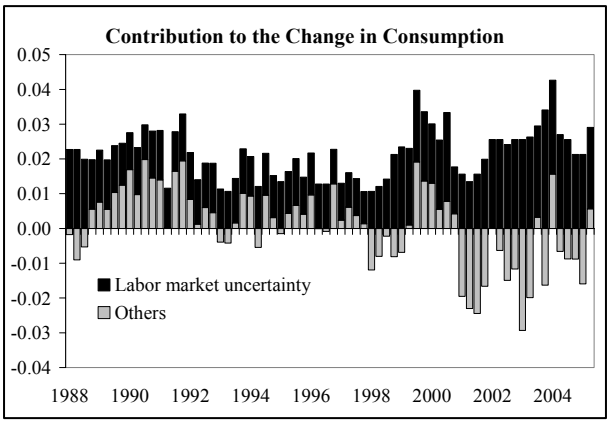
[4] The model specification, which derives a reduced estimation formula from the representative consumer's optimal utility maximization framework, owes much to Hall (1978), Flavin (1981), and Nakagawa (2000).

[5] Following Hall (1978) and Flavin (1981), data used for the estimation are quarterly basis. Due to the limited availability of data, data for private consumption also include durable goods such as automobiles, and data for quarterly wage are estimated using annual wage and GDP. Equity prices used in the estimation are three-months moving average of the SGX stock prices.

[6] All parameters should be positive in this model: higher real interest rates and unemployment risk in period t would make consumers increase their resource allocation for the next period; and current income level and accumulated wealth level would have a positive impact on the current consumption level especially for those who have constraints on borrowing.

Estimation Results of the Consumption Function						
a_1	a_2	a_3	a_4	a_5	adj. R^2	D.W.
-0.521 (-2.200)**	0.501 (2.207)**	0.089 (2.663)***	0.007 (2.433)**	0.321 (2.433)**	0.266	2.159
Note: Absolute values of asymptotic t-statistics in parentheses; *** significant at the 1 percent level; ** significant at the 5 percent level.						

7. **The contribution of labor market uncertainty to private consumption behavior has also increased in recent years.** These results suggest that higher precautionary savings stemming from labor market uncertainty, in the absence of sufficient unemployment insurance, have played a relatively big role in determining the consumption path in Singapore. Although evidence of a change in consumers' sensitivity to labor market uncertainty could not be captured, labor market uncertainty has become the main cause of the recent increase in consumption volatility simply due to the recent increase in the unemployment rate.[7]



C. Conclusions

8. **To a large extent, the cyclical upturn in the economy should reduce employment uncertainty over time and help to bolster consumption.** However, a section of the work force, namely the low-skilled, faces the prospects of longer-term unemployment. This could continue to be a drag on consumption growth. To this end, the government's continued strong support to the low-skilled through retraining and education to improve skill matching, along with in-work benefits that support family expenditures on children's schooling and health care will be important.

[7] To test if the consumers' sensitivity to the labor market uncertainty has changed after the crisis, the model including dummy variables was also estimated. However, the dummy coefficients were not significant, suggesting no evidence of changes in consumers' sensitivity to the unemployment rate.

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III. Trends and Variation in Domestic Competition and Markup Costs[1]

1. Over the past decade, the Singapore economy has been buffeted by increased competition from low-cost regional economies and a series of external shocks. In response to these challenges, the government adopted the recommendations of the Economic Review Committee (ERC) in 2003 and has begun implementing a reform agenda focused on improving external competitiveness, enhancing labor market and wage flexibility, reducing business taxes and costs, and upgrading and diversifying Singapore's manufacturing and services sectors. The ERC also recommended the need to improve private sector entrepreneurship and promote domestic competition, including through the recently legislated Competition Law.

2. **This chapter examines quantitative, industry-level measures of the intensity of domestic competition in the manufacturing and services sectors during the past two decades in Singapore.** The measures, which are estimates of the markup or margin above average or marginal cost, are typically used in the economic literature to assess the intensity of domestic competition. In this chapter, these estimates for Singapore are compared with similar estimates for Hong Kong SAR and other countries at the aggregate and industry level.[2] In addition, the measures are used to access trends and cyclical variation in competition in Singapore. Finally, the measures are employed to correct for biases in estimates of total factor productivity (TFP) growth, reflecting the impact of imperfect competition on observed labor shares in the national accounts.

A. Methodology and Data

3. **In the literature, three broad approaches have been taken to estimate price to average (or marginal) cost markups and margins.** The first is a direct measurement of price-average cost margin (P-AC) and follows the methodology of Domowitz, Hubbard, and Peterson (1986) and Allayannis and Ihrig (2001). The main advantage of this method is that it allows for a calculation of P-AC margins for each year, even allowing estimates from short time series. The main drawback is that P-AC margins are more difficult to interpret as measures of competition than P-MC (price-marginal cost) margins.[3] P-AC margins are

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[1] This chapter is based on research by Raphael W.K. Lam, during a summer internship at the IMF, and was prepared by Ranil Salgado. More details of the underlying research can be found in Lam (2005).

[2] Markups are defined as Price/Cost and margins as (Price-Cost)/Price. The two concepts are closely related, as higher markups imply higher margins.

[3] Under Cournot competition, for example, the P-MC margin is proportional to the level of collusion or the inverse of the effective number of firms, which is equal to one if the firms are perfectively colluding or the actual number of firms if the firms are not cooperating. The P-AC margin is related to the P-MC margin by adjusting for capacity utilization and the long-run returns to scale (see Morrison, 1990). In addition, it should be noted that higher P-MC or P-AC margins or markups do not necessarily imply less competition as both measures are also inversely proportional to the market elasticity of demand. Thus, higher markups may be due

(continued)

calculated both on a gross output basis and a valued-added basis.[4] The second method makes econometric estimates of P-MC margins. It is based on Hall (1988), Domowitz, Hubbard, and Peterson (1988), and Roeger (1995), but does not allow for time-varying estimates of the margins.[5] A third method estimates P-MC and P-AC markups using a structural model, following Morrison (1990).[6] In this chapter, the results from primarily the first method are presented for Singapore so as to examine the time variation in markups/margins.

4. **The quantitative measures of domestic competition are estimated at the industry level for the period 1983–2003.** The industry-level data are on an annual basis based on the Singapore Standard Industrial Classification (SSIC 2000). Manufacturing sector data are primarily from the annual Census of Manufacturing Activities, while services sector data (which are more limited) are from the annual Economic Survey Series (ESS) published by the Department of Statistics.[7] Data on wages are based on the official release of average monthly earnings, with labor assumed to be homogeneous across sectors. The average of lending rates from the 10 leading banks is used as a proxy for the rental cost of capital.

B. Main Results

5. **Margins in Singapore are similar to those found in the United States and the average of OECD countries at the aggregate level and for most industries, but generally somewhat higher than in Hong Kong SAR (Table 1).** Margins measured on a gross output

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to lower demand elasticity. However, if the elasticity of demand is constant across countries for a given sector, then differences in markups and margins can reveal differences in competition.

[4] The gross output measure is the ratio of gross output value less labor remuneration and material cost plus change in inventory to the sum of gross output value and change in inventory. The value-added measure is the ratio of value-added net of payroll expenses to the sum of value added and material costs.

[5] In this chapter, the econometric specification (panel, fixed effects on cross section) used is:

$$(\hat{y} - \hat{k}) = \hat{z} + \mu * \theta * (\hat{l} - \hat{k}) + (\lambda - 1) * \hat{k}$$

where *y*, *k*, *l*, and *z* are, respectively, output, capital, labor, and the parameter of technical progress; ^ represents the first difference in logarithms; μ, θ, and λ are, respectively, the P-MC margin, the observed labor share, and the scale of operations. The estimation included instrumental variables to identify changes in industry output not related to changes in its productivity—namely, contemporaneous and lagged real aggregate output and world commodity prices. Constant returns to scale are imposed, after checking that constant returns cannot be rejected for most of the industries. For details, including the derivation of the specification, see Lam (2005).

[6] The method requires measures of capital utilization not directly available in Singapore. However, a proxy using the ratio of utility expenses (on electricity, gas, and water) to gross output, shows little variation during the sample period for Singapore.

[7] A list of the industries in each sector and other details of the data are provided in Lam (2005). In the results below, services sectors are aggregated into broader groups following the classification of the annual ESS.

Table 1. International Comparison of Price-Average Cost Margins (Selected Industries)
(In decimal points)

SSIC Code	Selected industries	Gross Output Measure				Value-added Measure			
		Singapore	Hong Kong SAR	OECD countries	United States	Singapore	Hong Kong SAR	OECD countries	United States
15	Food and beverages	0.155	0.201	0.117	0.134	0.252	0.302	0.481	0.478
17,18,19	Textiles and textile products	0.110	0.111	0.097	0.088	0.273	0.178	0.273	0.271
20	Wood and wood products	0.110	0.112	0.119	0.136	0.216	0.218	0.321	0.309
21	Paper and paper products	0.235	0.104	0.123	0.139	0.319	0.193	0.327	0.309
24	Chemicals and chemical products	0.334	0.157	0.159	0.108	0.426	0.247	0.479	0.417
26	Non-metalic minerals	0.178	0.141	0.084	0.095	0.320	0.235	0.200	0.265
27	Basic metals	0.143	0.064	0.088	0.067	0.287	0.091	0.325	0.266
28	Fabricated metal except machinery	0.152	0.124	0.151	0.125	0.291	0.206	0.301	0.227
29	Machinery and equipment	0.174	0.167	0.145	0.063	0.320	0.251	0.289	0.204
30,31	Electronic products	0.147	0.148	0.110	0.174	0.271	0.229	0.241	0.266
33	Transport equipment	0.275	0.152	0.064	0.051	0.496	0.226	0.201	0.237
34	Other manufacturing	0.102	0.101	0.100	0.216	0.222	0.161	0.202	0.327
	Total manufacturing	**0.163**	**0.134**	**0.115**	**0.118**	**0.283**	**0.203**	**0.348**	**0.308**
70-74	Business serivces and rentals	0.205	0.182	-	-	0.601	0.348	0.772	0.788
55	Hotels and restaurants	0.150	0.097	-	-	0.411	0.277	0.429	0.406
60-64	Transportation, storage and communications	0.252	0.222	-	0.140	0.649	0.578	0.370	0.333
50-51	Wholesale and retail trade	0.024	0.045	-	-	0.521	0.589	0.450	0.417
	Total services	**0.091**	**0.159**	-	**0.140**	**0.551**	**0.421**	**0.464**	**0.445**

Sources: Staff estimates for Singapore and Hong Kong SAR; estimates for the OECD and the United States are reported as in Zitzewitz (2000). The industrial classification across countries may not be entirely consistent.

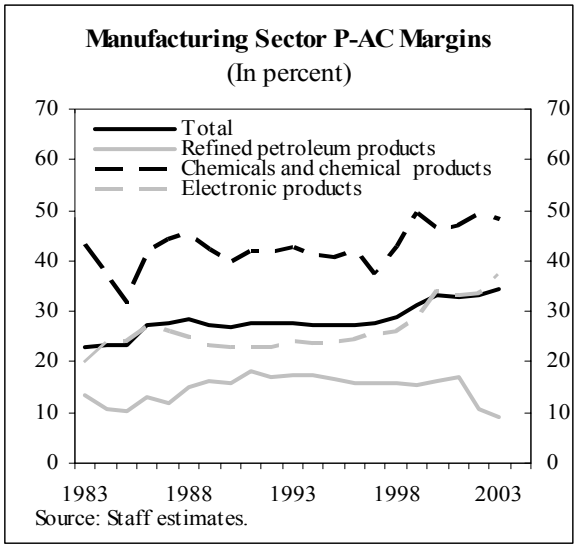
basis are always smaller, particularly more so for the services sectors, than the margins measured on a value-added basis. In a few industries, the margin is higher in Singapore than in the other countries on both the gross output and the value-added output measures, possibly suggesting a lower level of domestic competition in those sectors, assuming that the elasticity of demand for the listed sectors are constant across countries. These industries are the non-metallic minerals sector, the machinery and equipment sector, and transport equipment sector in manufacturing; and the transportation, storage, and communications sector in services. Moreover, it is noteworthy that industries in Hong Kong SAR, another small open economy, generally have lower margins. Regression estimates of P-MC margins show similar results.[8]

6. **Margins have generally increased in Singapore in the manufacturing sector in recent years.** The pattern has been more evident since the late 1990s. In the manufacturing sector, the margins (on the value-added basis) were stable at around 25 percent before 1997 but increased to around 32 percent by 2003.[9] This partly reflects the shift in the composition of manufacturing toward chemical and chemical products, a sector that includes the fast-

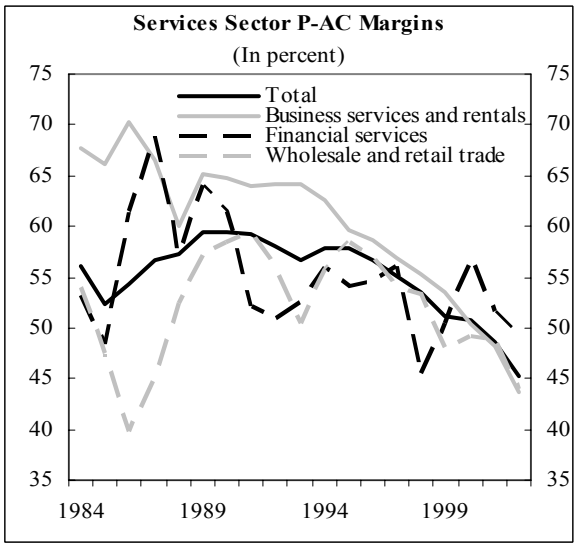
[8] See Lam (2005). Kee (2002), however, found substantially higher markups for Singapore during the period 1970–92.

[9] Henceforth, P-AC margins are based on the value-added measure (unless otherwise stated).

growing pharmaceutical and bio-pharmaceutical products industry.[10] Indeed, this sector has higher margins than the average manufacturing sector, and these margins have increased in recent years. Margins in the electronic products sector, which is the largest manufacturing sector accounting for roughly a third of manufacturing output, have also increased in recent years, although the margins are about at the level of the overall manufacturing sector. Margins in some of the other sectors, such as refined petroleum products, have declined recently.



7. **By contrast, margins have decreased in the services sector.** For most industries, the decline began in the early 1990s, although the pace of the decline appears to have accelerated in the late 1990s. Deregulation of services, particularly financial services, may be partly responsible for the improvements in competition. Margins, however, remain higher (on a value-added basis) than in the manufacturing sector. With services now accounting for about 65 percent of the aggregate GDP, improved competition in these sectors will likely drive improvements in the overall level of domestic competition.



8. **Mark-ups appear to be slightly countercyclical in Singapore for the aggregate manufacturing and services sectors and for most industry sub sectors (Table 2).** Statistical tests suggest, however, that acyclical markups cannot be rejected in the aggregate or for most sub sectors.[11] By contrast, the margins are generally procyclical in the average OECD country and generally acyclical in Hong Kong SAR.[12] Rotemburg and Saloner (1986)

[10] Overall, chemical and chemical products have almost doubled as a share of GDP in the last two decades, and now account for about fifth of total manufacturing.

[11] See Lam (2005).

[12] Zitzewitz (2000) found that the services sector margins are procyclical in Hong Kong SAR over the period 1986–97.

showed that imperfect competition that leads to countercyclical markups could slow down price adjustment, leading to difficulties for open economies with fixed exchange rates. This is, of course, less of a concern in Singapore given the managed float exchange rate regime. However, Singapore's dominant services sector appears to be more countercyclical than manufacturing, with statistical significance at the 5 percent level for the community, social, and personal services sector and the hotels and restaurants sector.

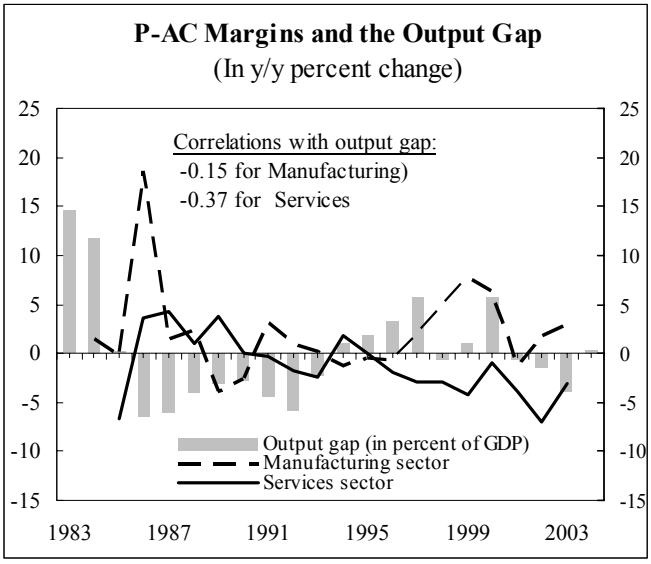
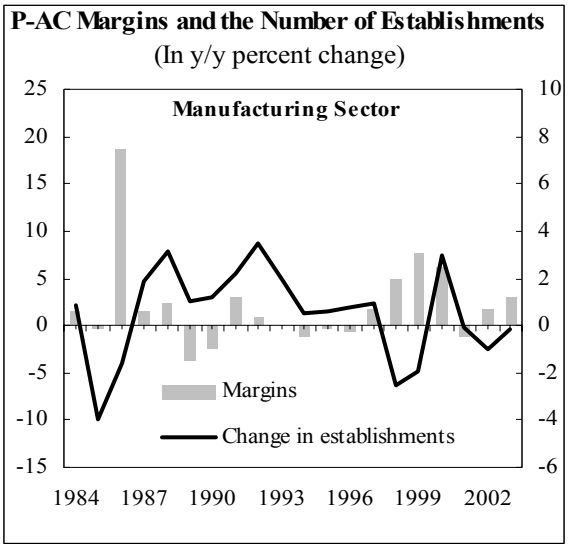


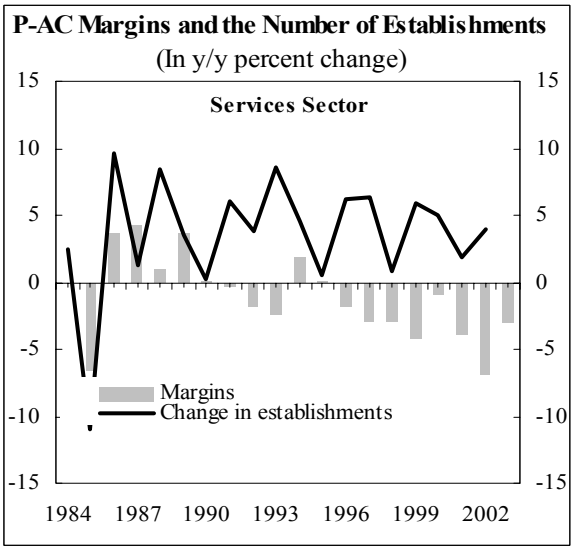
Table 2. Cyclicality of P-AC Margins (Selected Industries)
(In percentage point effect on the margin of a one percentage point change in the output gap)

SSIC Code	Selected industries	Singapore	Hong Kong SAR	OECD Countries
15	Food and beverages	-0.039	0.415	-0.780
17,18,19	Textiles and textile products	-0.037	-0.117	-0.240
20	Wood and wood products	0.013	0.319	0.030
21	Paper and paper products	-0.050	0.041	0.300
24	Chemicals and chemical products	-0.256	-1.168	0.150
26	Non-metalic minerals	-0.014	-1.346	-4.710
27	Basic metals	-0.078	0.600	0.720
28	Fabricated metal except machinery	-0.018	-0.809	-0.040
29	Machinery and equipment	0.150	-0.880	0.900
30,31	Electronic products	-0.077	1.433	0.610
33	Transport equipment	-0.230	0.750	-0.090
34	Other manufacturing	-0.038	-0.064	0.560
	Total manufacturing	**-0.081**	**-0.058**	**0.32**
70-74	Business serivces and rentals	-0.189	-0.991	-0.300
55	Hotels and restaurants	-0.278	0.216	-0.100
60-64	Transportation, storage and communications	-0.184	-0.264	0.060
50-51	Wholesale and retail trade	-0.167	-0.215	-0.390
	Total services	**-0.215**	**-0.140**	**0.09**

Sources: Staff estimates for Singapore and Hong Kong SAR; estimates for the OECD are reported as in Zitzewitz (2000). The industrial classification across countries may not be entirely consistent.

9. **The counter-cyclicality of markups could be due to a variety of reasons.** Cyclical patterns in price-cost margins, of course, reflect important underlying differences in cyclical responses of variables such as wages and prices, and decisions about production and inventory. In addition, given the high import content of output, the cyclical pattern of the margins could also reflect the behavior of import prices. Lam (2005) presents a model of imperfect competition with heterogeneous firms, subject to aggregate demand and idiosyncratic sectoral productivity shocks.[13] Implications of the model are that firm entry is facilitated during business cycle booms and markups are counter-cyclical and an increasing function of market share. This model is broadly consistent with data in Singapore, where changes in margins are negatively related to firm turnover and positively related to changes in market share. Another explanation is that when external demand is high, the manufacturing sector—which is very export oriented—absorbs resources and puts pressure on wages. This shrinks the markup of the less export-oriented services sector producing counter-cyclicality.





10. **The presence of high margins also distorts traditional growth accounting exercises for economies such as Singapore, where the capital-labor ratio has been rising.** Intuitively, markups lowers the observed labor share of total income below the "true" labor share that would be applicable under perfect competition. This leads to an underestimation the contribution of labor in GDP growth and, in cases where capital-labor ratios are rising, the contribution of total factor productivity (TFP) growth. The impact is relatively larger for countries, such as Singapore, which have experienced very rapidly rising capital-labor ratios. Correcting for this bias using the estimated P-AC margins raises TFP growth estimates for Singapore by roughly 0.75 percentage points during 1983–2003 compared with traditional

[13] The model is an extension of Jaimovich (2004), which has homogeneous firms/sectors.

estimates made using the Solow residual with observed factor shares (Table 3). For industrial countries, such as the United States, Germany, and France, the comparative adjustment is 0.3 percentage points (Zitzewitz 2000).

Table 3. Bias in Traditional Measures of TFP Growth (1983-2003)
(In percentage points)

SSIC Code	Selected industries		Share of Aggregate Sector [1]
15	Food and beverages	-1.79	4.0
17	Textiles and textile products	-0.98	0.5
18	Wearing and apparels	-0.54	1.9
19	Leather and leather footwear	-0.04	0.2
20	Wood and wood products	0.35	0.5
21	Paper and paper products	-0.84	1.4
22	Printing and reproduction of recorded media	-0.53	4.5
23	Refined petroleum products	-0.12	6.0
24	Chemicals and chemical products	-0.78	12.5
25	Rubber and plastic products	-1.00	2.9
26	Non-metalic minerals	-0.67	2.0
27	Basic metals	-0.98	0.8
28	Fabricated metal except machinery	-1.26	5.9
29	Machinery and equipment	-2.13	7.7
30	Electrical machinery and apparatus	-0.43	3.2
31	Electronic Products	-0.72	33.3
32	Medical, precision and optical inst.	-0.79	2.5
33	Transport equipment	-0.91	8.3
34	Other manufacturing	0.50	1.8
35	Recycling of metal and wastes [2]	0.51	0.1
	Total manufacturing	**-0.86**	**100**
70-74	Business serivces and rentals	-0.14	22.0
75-95	Community, social, and personal services	-0.07	17.1
64-65	Financial services and insurance	-1.49	17.0
55	Hotels and restaurants	-0.08	4.6
60-64	Transportation, storage, and communications	-0.38	19.7
50-51	Wholesale and retail trade	-1.49	19.8
	Total services	**-0.67**	**100**

Source: Staff estimates.
[1] Average over 1983-2003. Value added as a share of total manufacturing or services.
[2] Data from 1990 onwards, only.

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