

“Graduates in Distress: The Singaporean Middle Class in the Knowledge-Based Economy”

Stephen J. Appold
Department of Sociology
National University of Singapore
10 Kent Ridge Crescent
Singapore 119260
6874-6393
Fax: 6777-9579

[http://courses.nus.edu.sg/course/socsja/
appold@nus.edu.sg](http://courses.nus.edu.sg/course/socsja/appold@nus.edu.sg)

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Pulled along by global developments, Singapore is rapidly developing a "knowledge-based economy." Between 1990 and 2000, GDP more than doubled (in 1990 dollars) and the number of managerial and professional jobs almost doubled while the resident population by increased by a much smaller proportion: 20 percent. Such advances should be a boon to the Singaporean middle class, particularly those with the education to enable them to fill the positions generated by the shift in economic base.

That has not occurred. Despite rising income inequality, the ratio of the salaries of professionals to those of manual workers has actually decreased somewhat despite the increased need for educated labour and the surplus of manual labour. Far from being privileged by the shift to a KBE, the middle class is under pressure.

Almost all of Singaporean population growth over the last decade is a product of immigration. Migration rules result in the population of educated labour increasing more quickly than the number of jobs for which they are qualified. I describe the characteristics of the migrants and estimate those of the foreign participants in the labour force that are not covered by published statistics. Breaking down the population by age group and by cohort (and paying particular attention to Singapore's "baby-boomers"), I show where the competition for jobs is most intense and illustrate how the situation would differ under alternative migration scenarios.

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A knowledge economy may be defined as one in which there is a rising reliance upon *codified* (Abramovitz and David, 1996: 35) and *tacit* (Polanyi, 1958) knowledge as a basis for the organisation and conduct of economic activities. Drucker (1993) rooted the rise of the knowledge-based economy in the successive application of systematic knowledge first to tools, processes, and products (leading to the industrial revolution), next to work (resulting in the productivity revolution), and most recently to knowledge itself (bringing about the management revolution). Possibly pulled along by global product demand Singapore may be evolving such an economic base (Chia, 2001). At the same time, low-skill manufacturing is being spun-off to neighboring countries through a process of regionalisation.

Empirical evidence for the growth of a knowledge-based economy in advanced industrial countries (primarily the United States) emerges from four general directions. First, employment trends, documented by Machlup (1962) and his successors, indicate an ongoing expansion of knowledge industries, including 1) education, 2) communications media, 3) information processing machines, and 4) information services. Second, several macroeconomic indicators, such as 1) the rise of the “residual” component of productivity growth, 2) the increase in investment in the formal education of the labour force, 3) the rapid growth of real stock of intangible capital vis-a-vis conventional tangible capital, and 4) the reversal of the decline in aggregate income attributable to labour, suggest that knowledge plays an increasing role in economic production (Abramovitz and David, 1996). Third, historical trends in the numbers of patents and academic articles (e.g., Price, 1963) imply an acceleration of aggregate learning. Finally, case studies of emerging industries, such as biotechnology, and of industrial innovation point to changes in the knowledge base and especially new dynamics in the formation of tacit and codified knowledge and the growing importance of networked knowledge.¹

The possible rise of a knowledge-based economy suggests that, because a different set of skills and persons is needed for the production process, the labour

¹ Each of these indicators is open to alternative interpretation. The nature of a knowledge-based economy and even its existence are contentious issues. For instance, Baumol, Blackman, and Wolff (1989) doubt the existence of a rise in demand for information in the economy and assert that the rise in the number of information workers is due to increased productivity in manufacturing and the lack of such productivity increases in services and information activities. Increases in investments in formal education may be due to increased demand for credentialing, rather than the technical knowledge demands of economic production (Collins, 1971). Case studies of contemporary innovation are not sufficient to support assertions about shifts in the nature of collective learning; similar assertions were made decades ago (Marshall, 1920). The growth of the productivity residual, which forms the macroeconomic basis for much of the discussion of knowledge-based economies is conspicuously absent in Singapore (World Bank, 1993).

market and the distribution of reward will shift. Who benefits from economic growth and structural change? Who suffers from structural change?

Three strands of theory predict increasing benefit to those with university educations in Singapore. The first is based on Kerr et al's study of industrialisation in developing countries. The second is based on the theory of post-industrialism. The third is based on the economic theory of rents. Each theory is, in turn, increasingly specific.

Kerr, Dunlop, Harbison, and Myers (1960) suggested that newly-emerging nations will become more middle-class oriented as they develop. All political leaders need to establish their political legitimacy and gain the support of their constituents. As they industrialise, the middle class necessarily plays a growing role in development and therefore needs to be assuaged.

Knowledge based economies are held to give rise to a new system of social stratification wherein education is the key to upward mobility and those with a command of abstract knowledge benefit (Bell, 1973). Universities are one of the key axial institutions of a knowledge-based economy and "the university, which once reflected the status system of the society, has now become the arbiter of class position. As the gatekeeper, it has gained a quasi-monopoly in determining the future stratification of the society (Bell, 1973: 410)." On this basis (along with much subsequent corroboration), we can expect the well-educated – university graduates – to be the primary beneficiaries of a shift to knowledge-based production. At the same time, those without the high level of human capital needed could be expected to be increasingly disadvantaged. Those without high levels of education might even be expected, in extreme cases, to form a permanent "underclass." Although there is little evidence of an underclass in Singapore, fears of one emerging are increasingly voiced.

The economic theory of rents as applied to the labour market (Buchanan, 1995), suggests that those with the requisite skills that fill the needs of an emerging labour market demand would accrue unexpected income – a windfall. A rapid shift towards a knowledge-based society would result in university graduates being in high demand. Four specific predictions could be derived. *First*, the real wages of those with sought-after skill could be expected to increase faster than the wages of those with a low level of education; those age-groups and cohorts that occupied critical positions immediately prior to the sectoral shift should be expected to benefit the most. *Second*, the high level of demand would result in the level of certification of those in the sought-after occupations to decline as those less-qualified were drawn into performing needed tasks. *Third*, in the absence of sufficient numbers of those with adequate skills, auxiliary occupations – para-legals in places of lawyers, nurses aides in place of nurses, etc. – could be expected to expand. *Fourth*, income inequality would rise as those with needed skills saw their wages bid up while those without education might even experience a decline in wages.

These predictions, however, were not borne out in Singapore over the 1990-2000 period. The rest of the paper explores their non-realisation and some of the implications.

Overview of Recent Social and Economic Trends

Table 1² shows several indicators of Singaporean economic and social development over the past two decades. Population increased by one-quarter during the 1980s (from 2.4 million to 3 million) and one-third in the 1990s (to 4 million in 2000). The resident population increased by approximately 20 percent in each decade (from 2.3 million in 1980 to 2.7 million in 1990 and 3.3 million in 2000). Non-resident population increased approximately 2.4 times each decade (from 132 thousand in 1980 to 311 thousand in 1990 and 755 thousand in 2000). Accordingly, the percentage of the population that are citizens declined from approximately 91 percent in 1980 to 86 percent in 1990 and to 74 percent in 2000. Gross domestic product (GDP) more than doubled (in constant 1990 dollars) over each decade.

(Table 1 about here)

The number of working persons increased by approximately 43 percent during the 1980s (from 1.1 million to 1.5 million) and by approximately 36 percent in the 1990s (to 2.1 million in 2000). The resident work force increased by approximately 30 percent in the 1980s (from almost one million in 1980 to 1.3 million in 1990) and by 15 percent in the 1990s (to 1.5 million in 2000). The non-resident work force approximately tripled in the 1980s (from 79 thousand in 1980 to 248 thousand in 1990) and increased almost 2.5-fold in the 1990s (to 612 thousand in 2000). Accordingly the percentage of the work force that are citizens declined from approximately 89 percent in 1980 to 76 percent in 1990 and to 63 percent in 2000.

Occupational change accompanied the increase in work force size with the growth of the labour force being outpaced by the growth in managers, professionals, and associate professionals. The number of jobs in those three categories increased two-and-a-half-fold in the 1980s and doubled in the 1990s until there were 749 thousand in 2000. The portion of the work force holding those positions increased from 14 percent in 1980 to 24 percent in 1990 to 35 percent in 2000.

(Table 2 about here)

These statistics suggest a developing nation successfully moving up the value chain of the global economy and they are consistent with what could be called

² The numbers reported in this paper are a combination of statistics reported by the Singaporean Department of Statistics and estimates based on those statistics. Census data is not always reported in a consistent manner and figures do not always agree. In such cases, I have chosen the number that I have the most faith in. All estimates are preliminary. The methodology used to produce the estimates will be reported in a separate appendix.

the “knowledge-based economy thesis.” But other statistics are not consistent with that thesis and, in fact, point to, if anything, increasing pressure and decreasing career opportunities for those with university degrees. Table 2 shows that the supply of educated labour has increased significantly faster than the demand for such labour. The number of those with post-secondary qualifications (polytechnic and university) increased two and a half-fold in the 1980s (from 59 thousand in 1980 to 150 thousand in 1990) and 2.7-fold in the 1990s (to 408 thousand in 2000). The pace of growth among university graduates was more substantial. The number of graduates increased two and a half-fold in the 1980s (from 33 thousand in 1980 to 85 thousand in 1990) before accelerating to a greater than three-fold increase in the 1990s (to 267 thousand in 2000). In 1980 graduates comprised two percent of the resident non-student population, in 1990 four percent, and by 2000 they were 12 percent.

Not surprisingly, although most resident Singaporean’s income has improved over the last 20 years, university graduates have fared less well than some other groups. In 1980, the median income of university graduates was almost six and a half times as high as the median income for the work force as a whole (and over three times as high as those who had a secondary school diploma). By 1990 the ratio had declined to 3.2 times as much as the overall median and 2.76 times as high as those with secondary school diplomas. By 2000, the median earnings for university graduates was just over twice that of the labour force as a whole and 2.14 times as high as those with secondary school diplomas. The median income of those with university degrees rose 1.42 times during the 1990s; that of those without any formal education at all rose 1.47 times. The position of university graduates in the labour force is significantly less elevated than it was when expectations were formed in adolescence and at the beginning of many graduate’s careers.

University graduates continue to earn more than those with lower levels of education. Contrary to expectation and to popular perception, however, the incomes of graduates are rising less rapidly than that of those without any education. The income disparity between professionals and blue collar workers has narrowed over the past several decades (Ho, 2000). The rising income inequality is, therefore, not necessarily due to differences in education (Department of Statistics, 2000).

Recent reports (Ministry of Manpower, 2001) indicate that 29.1 percent of those retrenched in the third quarter of 2001 have university qualifications. Since university graduates comprise approximately 16 percent of the work force, this implies they are more likely than average to be retrenched. Retrenched university graduates were more likely to find new jobs than those with lower qualifications. It is unclear whether the higher re-employment rate of university graduates can be best attributed to their qualifications or their age, however. In either case, a tertiary education does not ensure a secure position in the work force. During the same period, 40 percent of those under 30 who were unemployed held tertiary degrees. The number of those with post secondary school qualifications and above who are

unemployed is almost as high as the number of those with less than secondary school qualifications.

At the same time, a university degree increasingly became necessary to enter managerial and professional occupations. In 1990, 20 percent of managers were graduates; by 2000, the proportion had risen to 34 percent. In 1990, 69 percent of the professionals were degreed; by 2000, 75 percent were and associate professional positions increasingly required degrees. (Data were reported using different categories in 1980.) Rather than a shortage of educated labour brought about by the exogenous demand for those who can manipulate symbolic knowledge, these figures suggest an increasing demand for certification. The soft trajectory of income development and deeper penetration of degrees indicate a degree of stress in the careers of graduates.

The number of university graduates has increased in part because of the expansion of higher education in Singapore but the major source of university graduates has been immigration. Singapore produced approximately 80,410 university graduates between 1991 and 2000 (Yeo, 2001). Degrees granted to Singaporeans by foreign institutions added another 16,060 for a total of approximately 96,470 local graduates. An estimated 147,000 graduates were added by the immigration of permanent residents and non-residents.

Migrants in the High-Skill Work Force

(Table 3 about here)

Table 3 provides estimates of the occupational distribution by residential status. Complete data were reported by the Census for 1980 only; 1990 and 2000 figures were partially estimated. In 1980, 12 percent of managerial jobs were filled by non-citizens (permanent residents and non-residents) and 12 percent of professional and technical jobs were filled by non-citizens. By 1990, there was little change in those percentages, 17 and 13 percent, respectively. By 2000, however, the change was substantial. Twenty-seven percent of managerial jobs, 38 percent of professional jobs, and 20 percent of technical jobs were filled by non-citizens (aside from almost half of production jobs and 72 percent of unskilled blue collar jobs). While permanent residents supplied only seven percent of labour force, they comprised 12 percent of the managers (almost half of the proportion occupied by non-citizens) and 18 percent of the professionals (again, almost half of the proportion occupied by non-citizens). Singapore has come to increasingly rely on immigrants to fill the more desired occupations.

(Table 4 about here)

Tables 1 and 3 show that there was substantial occupational change in Singapore between 1990 and 2000. Sectoral change is a major reason for

occupational change (Singelmann, 1978).³ Some of the sectoral change is due to a shift out of manufacturing. Despite a substantial growth in the size of the total labour force, employment in manufacturing actually declined during that decade.⁴ In addition, government policy promoted Singapore as a business service and financial hub.

Table 4 supplies occupational projections based on assumptions of observed total and sectoral employment change and of a constant 1990 occupational distribution. If the occupational distribution of each industry in 1990 is used in combination with each industry's total employment in 2000 to predict the occupational distribution in 2000, there would be a total of 178,867 managers, 96,419 professionals, and 252,215 associate professionals employed. As it was, there were 70,423 more managers, 90,180 more professionals, and 60,846 more associate professionals employed in 2000 than would be expected on the basis of 1990 patterns. Relying on the estimates for 2000 shown in Table 3, the corresponding numbers of non-citizens those occupations is 68,280, 70,787, and 64,145, respectively. So that non-Singaporeans have, to a large extent, made occupational upgrading possible and, consequently, may have been the main beneficiaries of that upgrading.

(Table 5 about here)

Table 5 shows the distribution of educational qualifications by residence status for resident non-students and for working persons. Due to varying categories and changing patterns of reporting, not all information is consistent across decades. Some figures are reported in the census; others are estimated. In 1980, 1990, and 2000, permanent residents were substantially more likely to have a university degree than citizens. Non-residents are a diverse category with the majority being work permit holders, rather than employment pass holders. Nevertheless, non-residents contributed just over one-fifth of the university graduates in the work force in 1980 and 1990. By 2000, that proportion had risen to one-fourth. Building on the occupation projections shown in Table 4 and assuming the same educational distribution within occupations that held in 1990, there would be a need for 125,002

³ According to U.S. Bureau of Labor Statistics documents, occupational change within industry is often projected on an ad hoc basis, such as guessing about the continuation of historical trends.

⁴ The Singapore Department of Statistics does not publish statistics on the number of daily commuters from Johore and they are not included in the employment figures. The Malaysia government estimates that 40,000 commute daily to jobs in Singapore. They include 27,103 non-skilled workers, 10,235 skilled workers, and 2,832 professionals (Straits Times, 2001). They may be important to manufacturing and other sectors. It is also unclear whether all non-residents living in Singapore are included in the published figures. Those non-residents who have been in Singapore for less than a full year are not included in the sampling frame for the surveys that generate much of the information (no actual census was performed in 2000).

university graduates in the work force in 2000. That is substantially fewer than the 316,047 actually employed. Local graduates added to the 1990 base and allowing for full retirement at age 55 would have produced 36,320 more than what was needed. As it was the excess number of university graduates numbered over 112 thousand.

Age effects of migration

(Table 6 about here)

Table 6 shows the distribution by age of all residents, citizens, and permanent residents for 1990 and 2000. The table also shows the age distribution of 1990 population of citizens projected forward to 1990 assuming constant (1990) fertility and mortality. The actual number of citizens, 2,973,091, is four percent higher than it would have been without immigration (and nine percent higher than the 1980 population of citizens projected forward at 1980 fertility rates and 1990 mortality rates would have been). The age distributions, however, are very similar. The percentage distributions of each age-group usually deviating by .10 of a percent or less. The major deviations are in the youngest and oldest categories. In actuality there is a lower percentage of young children and a greater percentage of old people (80 years and older) than projected. Immigration, ironically, may have, if anything, added to Singapore's aging problem by increasing the average age of the population over what it might have otherwise been. (On the other hand, permanent residents and non-residents can be required to leave the country after a period of non-employment.) At the same time, it is likely than the local production of graduates would have filled the labour demand.

(Figure 1 about here)

Figure 1 and Table 7 show the age distribution of non-student, resident university graduates in 1990 and 2000. In the top panel the age distribution of 2000 is shifted upward to more easily allow comparisons within cohorts. In the bottom panel the age distributions are even to allow comparisons of the experience of successive cohorts.

(Table 7 about here)

Looking at the top panel of Table 7 shows that the size of individual cohorts of university graduates has grown over the past ten years. For example, while the cohort of those 40-44 in 1990 grew by only 1.5 percent (3,107), almost all of those were university-educated so that the number in that cohort who are graduates increased by 23 percent. The magnitude of the increase in size of the cohort of graduates increases as age decreases until the cohort of 1990 25-29 year-olds – which doubles in size over the course of the 1990s. The cohort of 1990 25-29 year-olds was the largest in Singapore. During the 1990s, that cohort grew by 13 percent as a whole; the number of university graduates in that cohort, however, more than

doubled. These are Singapore's baby boomers – a group that probably would have been under demographic pressure even with a rapidly expanding economy. Because university students do not finish their studies until they are in their 20's and because 55 is a mandatory retirement age for many, I can only trace those between 25 and 44 from 1990 to 2000. As a group, the size of this broad cohort of university graduates increased by two-thirds. It is interesting to note that baby boomers often have difficulties in the labour market. Given the rate of economic growth, they wouldn't have felt a squeeze without immigration.

The bottom panel of Table 7 shows that while the number of university graduates in each age group approximately triples, some age groups are more heavily affected than others. I use 1990 as a base and develop a very simple model of the need for university-educated labour at various levels of seniority in an economy that was 2.1 times as large. As a first guess, I postulate that the positions at each level increase in proportion (turns out not to be generally true) and that employment expands in direct proportion to economic expansion (this would generally not be true if wages were to rise). Normally, the increased opportunity economic expansion should result in a windfall for everyone. Examining the data shows that that has not been the case in Singapore. The most over-crowded age band is 45-49 (one of the early baby boom cohorts). Those in their late 20s come off somewhat easier, possibly because hiring may have slowed in the late 1990s – there are somewhat less than three times as many people chasing twice as many jobs. Unfortunately, age data are not available for non-residents and they are not included in these calculations. Since that group contributes a substantial portion of the university graduates in Singapore, the table understates the true degree of stress on graduates. Moreover, the model projecting labour needs is too liberal. Almost any other model (including the one used in creating Table 4) would show a lower increase in positions for educated labour. By any measure, educated labour has been squeezed, some cohorts and age groups more than others.

(Table 8 about here)

Table 8 shows the mean age of selected sub-populations in 1990 and 2000. Singapore's resident population is aging. A stationary population would maintain the same average age and distribution. Migration helped maintain or reduce the age profile of some sub-populations. Permanent residents are younger than citizens and their average age decreased over the decade. Professionals have decreased in age. Managers have maintained their age. The university educated have aged only slightly. The increasing education of women and their progressive penetration of the labour force has also been a factor holding average age of certain occupations down.

Conclusion

The analysis presented, although preliminary, suggests that the number of university graduates in Singapore grew substantially more quickly than the labour market demanded. The local production of graduates would have satisfied the need

estimated by my projection. Other projection methodologies and other assumptions might project somewhat different, possibly higher, needs. There are at least three possible reasons for the higher actual number of university-trained persons.

First, skills may have been upgraded within industries. Although difficult to measure, skills upgrading has undoubtedly occurred over the 1990-2000 decade. Some of the skills upgrading may have required a university education. University education and increased levels of schooling within occupations has not been shown to be a good proxy of skill (Berg, 1971). An independent measure of skill would be needed to establish the actual level of upgrading.

Second, university degrees may have become more needed as credentials. A rapidly growing labour market tends to overwhelm informal labour market sorting mechanisms and create a need for a formal signal of individual intelligence and motivation. University degrees have been held to be such a symbol (Riley, 1979). Such a signal is independent of the useful skills and stock of information that may or may not accompany it and so is different from human capital. In the absence of credible direct information about applicants, it may make economic sense for firms to use university degrees merely as a screening device. Likewise, in the absence of credible direct information about the quality of firms, it may make economic sense for lenders and investors to use information about the credentials of a firm's employees in making lending and investment decisions.

Third, government policy may have been to reduce the cost of educated labour in order to make Singapore a more attractive location for multinational corporations. Such a policy – largely in anticipation of future demand – would have been effective in reducing the cost of doing business in Singapore from what it otherwise would have been. Increased levels of immigration to Singapore correspond roughly to concerns about Singapore's continued competitiveness. The excess of educated labour in China and India (two countries where wage rates were lower for much of the 1990s) would have made such a policy possible.

These reasons are not at all mutually exclusive. I do not have the information necessary to adequately assess any of them. Regardless of the origin of the apparent oversupply of university-trained labour, it has a predictable effect on the graduates. Alfred North Whitehead is said to have postulated that happiness equals results divided by expectations. Such sentiments provide the basis for the relative income, relative deprivation, and J-curve hypotheses.

Richard Easterlin (1987) has applied the relative income hypothesis (based on the tension between material aspirations and resources) to the experience of successive cohorts in the U.S. He compared the changing ratio of cohort size to the number of available jobs. That same gap between expectations and results in Singapore can be envisioned by imagining a 16-year old male forming his income expectations and making his education decisions in 1990 and then comparing those expectations – based on what he sees around him in Singapore – with the results of

his education decisions a decade later when he finds his income and housing prospects to be better than what they would be without a degree but significantly worse than he had expected them to be. Such disappointment would have occurred with or without the economic crisis of the late 1990s. Such disappointment may be behind the calls for the development of civil society. The decline in marriage among university-educated females and the decline of fertility within marriage among that group are both consistent with Davis' (1963) development of the relative income hypothesis (particularly since it is fairly common for undergraduates to voice a desire to have children). The relative income hypothesis is difficult to test directly but the evidence is consistent with it and the Singaporean situation is analogous the U.S. situation which gave rise to Easterlin's work.

While an investment in a university education has shown a nearly consistent level of return in the U.S. (Murphy and Welch, 1993), the rate of return appears to be falling in Singapore with the expected effects. It is perhaps ironic that, if the U.S. experience is a useful guide, the relative returns to a university education in Singapore may still be too high. The ratio of income from work for mature university graduates has been approximately 1.6 times as high as for those with secondary school diplomas in the U.S. With a roughly similar level of GNP per capita, the ratio is substantially higher in Singapore.

The calculations used in this paper are preliminary and the analysis necessarily tentative. They do suggest the need for a more detailed examination of benefit in the new economy and a careful consideration of the role of immigrants in the Singaporean labour market.

Bibliography

- Abramovitz, Moses and Paul A. David. 1996. "Technological Change and the Rise of Intangible Investments: The U.S. Economy's Growth-Path in the Twentieth Century." Pages 35-60 in Employment and Growth in the Knowledge-Based Economy. OECD.
- Baumol, William J., Sue Anne Batey Blackman, and Edward N. Wolff. 1989. Productivity and American Leadership: The long view. Cambridge: MIT Press.
- Bell, Daniel. 1973. The Coming of Post-industrial Society: A venture in social forecasting. New York: Basic Books.
- Berg, Ivar E. 1971. Education and Jobs: The great training robbery. Boston: Beacon Press.
- Buchanan, James M. 1995. "Rent Seeking and Profit Seeking." Pages 46-58 in Robert D. Tollison and Roger D. Congleton, eds., The Economic Analysis of Rent Seeking. Brookfield: Elgar.
- Chia Siow Yue. 2001. "Singapore: towards a knowledge-based economy." Pages 169-208 in Seiichi Masuyama, Donna Vandenbrink, Chia Siew Yue, eds., Industrial Restructuring in East Asia: Towards the 21st century. Singapore: Institute of Southeast Asia Studies.
- Collins, Randall. 1971. "Functional and Conflict Theories of Educational Stratification." American Sociological Review 36: 1002-1019.
- Davis, Kingsley. 1963. "The Theory of Change and Response in Modern Demographic History." Population Index 29: 345-366.
- Department of Statistics. 2000. "Is Income Disparity Increasing in Singapore?" Occasional Paper Series, May.
- Drucker, Peter F. 1993. Post-Capitalist Society. HarperCollins.
- Easterlin, Richard A. 1987. Birth and Fortune: The impact of numbers on personal welfare. Chicago: University of Chicago Press, second edition.
- Ho Kong Weng. 2000. "The Changing Pattern of Production Fragmentation in Singapore and its Economic Consequences." NUS Economic Policy Forum, 19 September.
- Kerr, Clark, John T. Dunlop, Frederick Harbison, and Charles Myers. 1960.

Industrialism and Industrial Man: The problems of labor and management in economic growth. Cambridge: Harvard University Press.

Machlup, Fritz. 1962. The production and distribution of knowledge in the United States. Princeton: Princeton University Press.

Marshall, Alfred. 1920. Principles of Economics: An introductory volume. London: Macmillan.

Ministry of Manpower. 2001. "Labour Market: Third Quarter 2001." Manpower Research and Statistics Department, December 2110.

Murphy, Kevin M. and Finis Welch. 1993. "Occupational change and the Demand for Skill, 1940-1990." American Economic Review 83: 122-126.

Polanyi, Michael. 1958. Personal Knowledge: Towards a post-critical philosophy. Chicago: University of Chicago Press.

Price, Derek John de Solla. 1963. Little Science, Big Science. New York: Columbia University Press.

Riley, John G. "Testing the Educational Screening Hypothesis." Journal of Political Economy 87: S227-S252.

Singelmann, Joachim. 1978. From Agriculture to Services: The Transformation of Industrial Employment. Beverly Hills: Sage.

Straits Times. 2001. "No levy on those commuting to work in Singapore." December 17.

World Bank. 1993. The East Asian Miracle: Economic Growth and Public Policy. Washington D.C.: The World Bank.

Yeo Soek Lee. 2001. "Educational Upgrading through External Degree Programmes." Statistics Singapore Newsletter: 2-8. Singapore: Department of Statistics, October.

Primary data sources

Department of Statistics. 1981. Census of population 1980. Singapore.

Department of Statistics. 1991. Census of population 1990: Advance Data Release. Singapore: SNP Publishers.

Department of Statistics. 1991. Census of population 1990. Singapore: SNP

Publishers.

Department of Statistics. 2001. Census of population 2000: Advance Data Release. Singapore.

Department of Statistics. 2001. Census of population 2000. Singapore.

Ministry of Labour. 1990. Report on the Labour Force Survey of Singapore. Singapore: Ministry of Labour.

Ministry of Labour. 1999. Report on the Labour Force Survey of Singapore. Singapore: Ministry of Labour.

Figure 1

Singapore: 1990-2000

University Graduates by Age and Sex

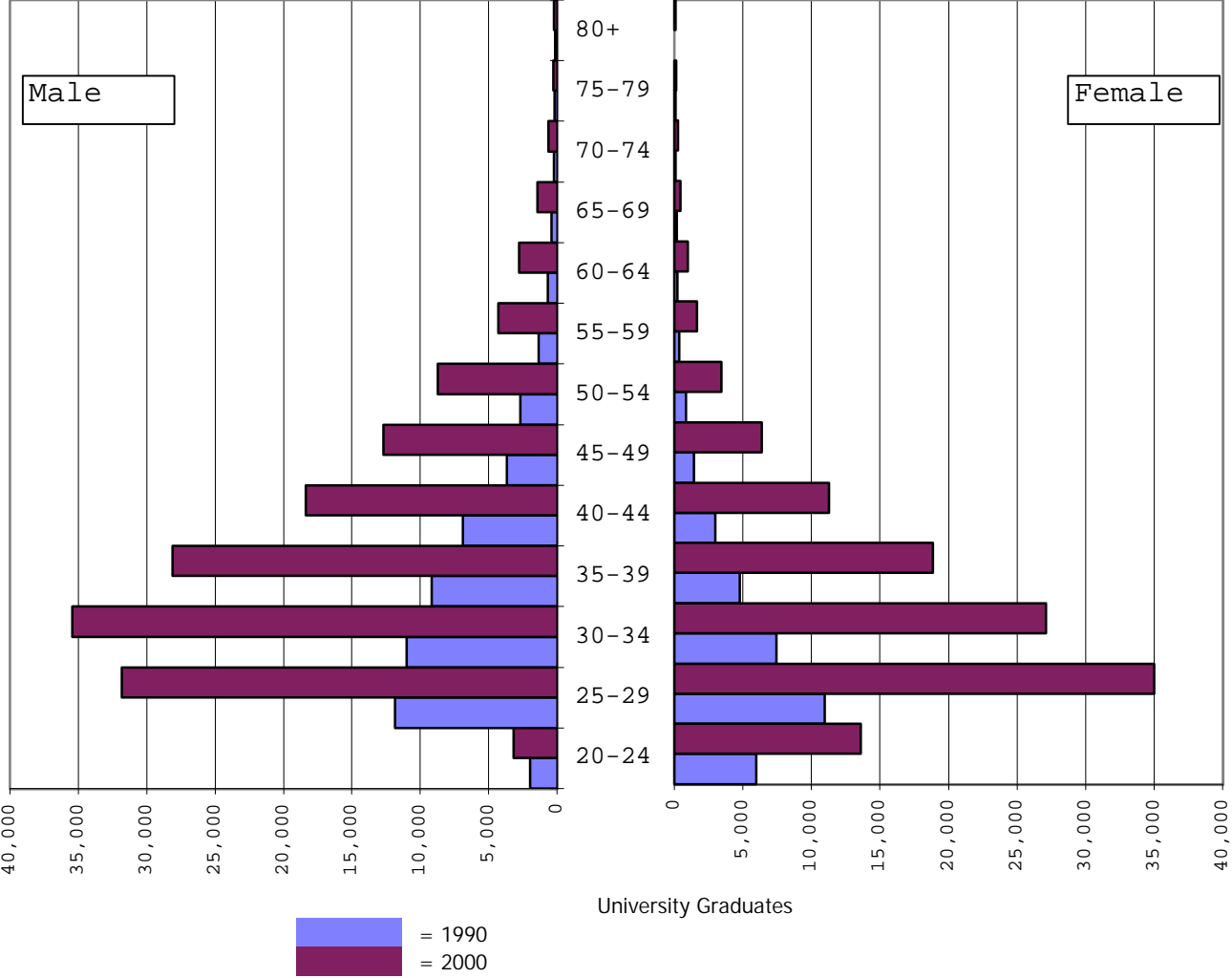


Table 1 Selected Indicators of Social and Economic Change in Singapore, 1990-2000

	1980		1990			2000		1980-1990	1990-2000	
	number	percent of total population	percent of residents	number	percent of total population	percent of residents	number			percent of total population
Population										
Total population	2,413,945	100.00%		3,016,379	100.00%		4,017,733	100.00%		
Citizens	2,194,280	90.90%	96.2%	2,595,243	86.04%	95.9%	2,973,091	74.0%	91.1%	
Permanent residents	87,845	3.64%		109,872	3.64%		290,118	7.2%		
Residents	2,282,125	94.54%		2,705,116	89.68%		3,263,209	81.2%		
Non-residents (includes students, foreign workers and others)	131,820	5.46%		311,264	10.32%		754,524	18.8%		
Non-citizens	219,665	9.1%		421,136	14.0%		1,044,642	26.0%		
Residents born in Singapore				2,292,640			2,647,393			
Working persons										
Total working persons	1,077,090	100.00%		1,537,011	100.08%		2,094,814	100.00%		
Resident working persons	997,815	92.64%		1,290,082	83.93%		1,482,579	70.77%		
Citizens	957,607	88.91%	95.97%	1,233,171	80.23%	88.92%	1,318,270	62.93%	95.59%	
Non-citizen residents	40,208	3.73%	4.03%	56,911	3.70%	4.41%	164,309	7.84%	11.08%	
Non-residents	79,275	7.36%		248,200	16.15%		612,235	29.23%		
Non-citizens	119,483	11.09%		305,111	19.85%		776,544	37.07%		
Selected occupations										
Managers	52,175	5.13%		132,149	8.60%		249,290	11.90%		
Professionals (both)				64,094	4.17%		186,599	8.91%		
Assoc profs (all three)	95,145	9.35%		176,480	11.48%		313,060	14.94%		
Managers and professionals	147,320	14.48%		372,723	24.25%		748,949	35.75%		
				353,627	23.01%		685,821	32.74%		
GDP										
(1990 Million dollars)	32,880.90			66,464.4			139,839.5			

Table 2 Highly educated persons in the Singaporean economy

	1980		1990		2000		1980-1990	1990-2000
	number	percent of residents	number	percent of residents	number	percent of residents		
Resident non-students with:								
Total	1,555,759	100.00%	1,910,015	100.00%	2,277,401	100.00%	1.23	1.19
Polytechnic diplomas	25,766	1.66%	65,314	3.42%	140,970	6.19%	2.53	2.16
University degrees	33,370	2.14%	84,919	4.45%	266,631	11.71%	2.54	3.14
both	59,136	3.80%	150,233	7.87%	407,601	17.90%	2.54	2.71
Median income								
Overall	\$291.69		\$1,041.96		\$2,331.42		3.57	2.24
University graduates	\$1,437.42		\$3,337.16		\$4,723.82		2.32	1.42
Compared to:								
overall	6.45		3.20		2.03		0.50	0.63
secondary school leavers	3.14		2.76		2.14		0.88	0.78
HDB resale prices:								
private property index (URA)			100		325			3.25
			55		135			2.45
Percent of occupation filled by graduates								
Labor force	4%		6%		16%		1.69	2.67
Managers	26% man and admin		20%		34%		0.77	1.70
Professionals	22% prof and tech		69%		75%		3.13	1.09
Assoc profs			9%		16%			1.78

Table 3 Occupation by residential status

Year	Number						Proportion				
	Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Resident	Citizens	Permanent Residents	Non-Residents	Non-Citizen
2000											
Total	2,090,610	1,482,579	1,321,821	160,758	609,493	770,251	0.7092	0.6323	0.0769	0.2915	0.3684
Senior Officials & Managers	249,281	211,835	181,010	30,825	37,269	68,095	0.8498	0.7261	0.1237	0.1495	0.2732
Professionals	186,437	150,265	115,812	34,453	36,695	71,148	0.8060	0.6212	0.1848	0.1968	0.3816
Associate Professionals & Technicians	312,125	283,361	248,915	34,446	28,949	63,395	0.9078	0.7975	0.1104	0.0927	0.2031
Clerical Workers	230,428	213,588	192,968	20,620	16,934	37,553	0.9269	0.8374	0.0895	0.0735	0.1630
Service & Sales Workers	211,575	182,966	169,944	13,022	29,215	42,237	0.8648	0.8032	0.0615	0.1381	0.1996
Production & related workers	511,131	285,505	268,302	17,203	224,989	242,193	0.5586	0.5249	0.0337	0.4402	0.4738
Cleaners, Labourers & Related Workers	335,168	101,149	95,575	5,574	234,351	239,926	0.3018	0.2852	0.0166	0.6992	0.7158
Others	54,465	53,910	49,295	4,615	1,091	5,706	0.9898	0.9051	0.0847	0.0200	0.1048
1990											
Total	1,537,011	1,288,811	1,233,171	56,928	248,200	305,128	0.8385	0.8023	0.0370	0.1615	0.1985
Administrative & managerial	132,183	121,148	111,597	9,552	11,035	20,586	0.9165	0.8443	0.0723	0.0835	0.1557
Professional	75,314	68,307	53,291	15,016	7,007	22,022	0.9070	0.7076	0.1994	0.0930	0.2924
Technical and related	165,997	157,235	150,419	6,816	8,762	15,579	0.9472	0.9062	0.0411	0.0528	0.0938
Clerical	199,811	194,610	192,871	1,739	5,201	6,940	0.9740	0.9653	0.0087	0.0260	0.0347
Sales & service workers	195,200	185,589	182,578	3,011	9,612	12,622	0.9508	0.9353	0.0154	0.0492	0.0647
Production & related workers	473,399	357,001	339,733	17,268	116,399	133,667	0.7541	0.7176	0.0365	0.2459	0.2824
Cleaners & laborers	230,552	140,480	139,451	1,030	90,071	91,101	0.6093	0.6049	0.0045	0.3907	0.3951
Others	66,091	65,729	63,232	2,497	362	2,860	0.9945	0.9567	0.0378	0.0055	0.0433
1980											
Total	1,077,090	997,815	957,607	40,208	79,275	119,483	0.9264	0.8891	0.0373	0.0736	0.1109
Professional & Technical	95,145	87,329	83,448	3,881	7,816	11,697	0.9179	0.8771	0.0408	0.0821	0.1229
Administrative & Managerial	52,175	45,395	42,456	2,939	6,780	9,719	0.8701	0.8137	0.0563	0.1299	0.1863
Clerical	167,473	166,052	163,645	2,407	1,421	3,828	0.9915	0.9771	0.0144	0.0085	0.0229
Sales	131,977	129,168	123,882	5,286	2,809	8,095	0.9787	0.9387	0.0401	0.0213	0.0613
Services	112,196	104,000	98,090	5,910	8,196	14,106	0.9269	0.8743	0.0527	0.0731	0.1257
Agricultural Workers& Fishermen	20,954	20,342	19,470	872	612	1,484	0.9708	0.9292	0.0416	0.0292	0.0708
Production & Related Workers	434,996	383,867	365,585	18,282	51,129	69,411	0.8825	0.8404	0.0420	0.1175	0.1596
Not Classifiable	62,174	61,662	61,031	631	512	1,143	0.9918	0.9816	0.0101	0.0082	0.0184

Table 4 Occupational projection using 1990 occupational distribution and actual total employment and industry employment change

Predicted occupation-industry distribution in 2000 (on basis of 1990 data)

	Total	Senior Officials & Managers	Professionals	Associate Professionals & Technicians	Clerical Workers	Service & Sales Workers	Agricultural & Fishery Workers	Production & Craftmen & Related Workers	Plant & Machine Operators & Assemblers	Cleaners, Labourers & Related Workers	Workers Not Classifiable by Occupation
	2,094,813	178,867	96,419	252,215	287,934	272,613	4,691	263,097	316,815	330,616	91,547
Manufacturing	434,901	25,847	10,406	38,860	35,596	8,289	30	93,510	194,760	27,590	13
Construction	274,015	23,144	4,097	9,569	11,238	1,649	70	116,655	11,633	95,947	13
Other Goods Industries*	12,866	610	630	1,786	1,410	294	3,349	2,563	931	1,292	0
Commerce	401,269	72,941	5,216	27,639	60,533	173,730	222	15,430	21,230	24,315	13
Transport & Communications	196,541	10,821	3,251	24,354	41,531	13,985	9	8,875	71,630	22,070	13
Financial & Business	322,518	34,790	30,867	75,674	100,428	24,888	135	9,863	8,004	37,839	31
Other Services Industries	452,703	10,713	41,953	74,333	37,199	49,779	875	16,200	8,626	121,563	91,463

Actual occupation-industry distribution in 2000

Total	2,094,814	249,290	186,599	313,060	231,472	211,929	1,450	266,443	245,234	336,030	53,305
Manufacturing	434,901	49,427	34,360	67,308	37,665	6,166		84,797	131,707	23,471	
Construction	274,015	22,112	8,590	11,902	9,619	627		135,599	7,789	77,777	
Other Goods Industries*	12,866	1,444	982	2,947	1,344	594	1,105	1,490	1,032	1,929	
Commerce	401,269	84,434	10,973	43,594	55,956	131,695	225	14,921	21,858	37,613	0
Transport & Communications	196,541	20,374	8,902	29,880	34,823	15,213		5,393	69,896	12,060	
Financial & Business	322,518	56,855	63,308	85,934	57,637	16,038	0	11,741	7,398	23,591	19
Other Services Industries	452,703	14,644	59,484	71,496	34,429	41,597	120	12,503	5,555	159,588	53,286

Surplus over predicted

Total	1	70,423	90,180	60,845	(56,462)	(60,684)	(3,241)	3,346	(71,581)	5,414	(38,242)
Manufacturing	0	23,580	23,954	28,448	2,069	(2,123)	(30)	(8,713)	(63,053)	(4,119)	(13)
Construction	0	(1,032)	4,493	2,333	(1,619)	(1,022)	(70)	18,944	(3,844)	(18,170)	(13)
Other Goods Industries*	0	834	352	1,161	(66)	300	(2,244)	(1,073)	101	637	0
Commerce	0	11,493	5,757	15,955	(4,577)	(42,035)	3	(509)	628	13,298	(13)
Transport & Communications	0	9,553	5,651	5,526	(6,708)	1,228	(9)	(3,482)	(1,734)	(10,010)	(13)
Financial & Business	0	22,065	32,441	10,260	(42,791)	(8,850)	(135)	1,878	(606)	(14,248)	(12)
Other Services Industries	0	3,931	17,531	(2,837)	(2,770)	(8,182)	(755)	(3,697)	(3,071)	38,025	(38,177)

Table 5 Highest Educational Qualification Received by Residential Status
Part A

Qualification	Non-students aged 5 and over						Working persons aged 10 and over					
	1980 Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen
Total	1,660,944	1,555,759	1,479,484	76,275	105,185	181,460	1,077,090	997,815	957,607	40,208	79,275	119,483
No Qualification	586,656	581,168	527,844	33,324	25,488	58,812	242,111	225,478	212,691	12,787	16,633	29,420
Primary	730,162	678,576	648,475	30,101	51,586	81,687	538,815	496,243	477,779	18,464	42,572	61,036
Secondary	205,536	196,198	190,729	5,469	9,338	14,807	174,892	168,553	165,121	3,432	6,339	9,771
Upper Secondary	94,588	86,447	83,200	3,247	8,141	11,388	83,013	77,790	75,616	2,174	5,223	7,397
Tertiary	44,002	33,370	29,236	4,134	10,632	14,766	38,259	29,751	26,400	3,351	8,508	11,859
No Qualification	0.3532	0.3736	0.3568	0.4369	0.2423	0.3241	0.2248	0.2260	0.2221	0.3180	0.2098	0.2462
Primary	0.4396	0.4362	0.4383	0.3946	0.4904	0.4502	0.5003	0.4973	0.4989	0.4592	0.5370	0.5108
Secondary	0.1237	0.1261	0.1289	0.0717	0.0888	0.0816	0.1624	0.1689	0.1724	0.0854	0.0800	0.0818
Upper Secondary	0.0569	0.0556	0.0562	0.0426	0.0774	0.0628	0.0771	0.0780	0.0790	0.0541	0.0659	0.0619
Tertiary	0.0265	0.0214	0.0198	0.0542	0.1011	0.0814	0.0355	0.0298	0.0276	0.0833	0.1073	0.0993

Resident non-student population aged 10 and over

Working persons aged 15 and over

	Resident non-student population aged 10 and over						Working persons aged 15 and over					
	1990 Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen
Total	2,185,659	1,910,015	1,827,888	82,127	275,644	357,771	1,537,011	1,290,082	1,233,171	56,911	246,929	303,840
No Formal Educatuion	325,577	301,116	575,785	22,338	24,461	46,799	101,119	256,520	246,940	9,580	30,443	40,023
Incomplete Primary	320,111	298,020			22,091	22,091	185,844					
Completed Primary	311,148	248,306	489,874	25,377	62,842	88,219	230,539	379,697	360,996	18,701	153,008	171,709
Incomplete Secondary	386,436	317,837			68,599	68,599	302,166					
Secondary	523,981	471,418	493,530	13,715	52,563	66,278	438,104	409,267	398,201	11,066	28,837	39,903
Upper Secondary	145,390	123,085	133,436	5,831	22,305	28,136	123,072	113,763	109,000	4,763	9,309	14,072
Polytechnic	69,216	65,314	62,148	3,121	3,902	7,023	63,641	57,912	55,142	2,769	5,729	8,499
University	103,800	84,919	73,116	11,662	18,881	30,543	92,526	72,925	62,893	10,032	19,601	29,633
No Formal Educatuion	0.1490	0.1577	0.3150	0.272	0.0887	0.1308	0.0658	0.1988	0.2002	0.1683	0.1233	0.1317
Incomplete Primary	0.1465	0.1560			0.0801	0.0617	0.1209					
Completed Primary	0.1424	0.1300	0.2680	0.309	0.2280	0.2466	0.1500	0.2943	0.2927	0.3286	0.6196	0.5651
Incomplete Secondary	0.1768	0.1664			0.2489	0.1917	0.1966					
Secondary	0.2397	0.2468	0.27	0.167	0.1907	0.1853	0.2850	0.3172	0.3229	0.1944	0.1168	0.1313
Upper Secondary	0.0665	0.0644	0.073	0.071	0.0809	0.0786	0.0801	0.0882	0.0884	0.0837	0.0377	0.0463
Polytechnic	0.0317	0.0342	0.034	0.038	0.0142	0.0196	0.0414	0.0449	0.0447	0.0487	0.0232	0.0280
University	0.0475	0.0445	0.04	0.142	0.0685	0.0854	0.0602	0.0565	0.0510	0.1763	0.0794	0.0975

Resident Non-Students Aged 15 Years and Over

Persons Aged 15 Years and Over

	Resident Non-Students Aged 15 Years and Over						Persons Aged 15 Years and Over					
	2000 Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen
Total	2,958,732	2,277,400	2,056,969	220,431	681,332	901,763	2,094,814	1,482,579			612,235	
No Qualification	590,794	445,444	428,901	16,543	145,350	161,893	273,217	141,973			131,244	
Primary	388,827	276,542	260,327	16,214	112,285	128,499	249,131	144,106			105,025	
Lower Secondary	364,337	248,598	225,907	22,691	115,739	138,430	270,884	160,567			110,317	
Secondary	694,908	560,570	519,760	40,811	134,338	175,149	529,285	405,838			123,447	
Upper Secondary	266,729	226,275	203,801	22,473	40,454	62,927	207,173	175,492			31,681	
Polytechnic	146,757	140,970	129,533	11,437	5,787	17,224	129,396	125,087			4,309	
Other Diploma	141,613	112,371	94,184	18,186	29,242	47,428	119,680	94,636			25,044	
University	364,768	266,631	194,556	72,075	98,137	170,212	316,047	234,880			81,167	
No Qualification	0.1997	0.1956	0.2085	0.0750	0.2133	0.1795	0.1304	0.0958			0.2144	
Primary	0.1314	0.1214	0.1266	0.0736	0.1648	0.1425	0.1189	0.0972			0.1715	
Lower Secondary	0.1231	0.1092	0.1098	0.1029	0.1699	0.1535	0.1293	0.1083			0.1802	
Secondary	0.2349	0.2461	0.2527	0.1851	0.1972	0.1942	0.2527	0.2737			0.2016	
Upper Secondary	0.0901	0.0994	0.0991	0.1020	0.0594	0.0698	0.0989	0.1184			0.0517	
Polytechnic	0.0496	0.0619	0.0630	0.0519	0.0085	0.0191	0.0618	0.0844			0.0070	
Other Diploma	0.0479	0.0493	0.0458	0.0825	0.0429	0.0526	0.0571	0.0638			0.0409	
University	0.1233	0.1171	0.0946	0.3270	0.1440	0.1888	0.1509	0.1584			0.1326	

Table 5 Highest Educational Qualification Received by Residential Status
Part B

Qualification	Labor Force Participation Rate						Proportion of those working				
	1980 Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen
Total	0.6485	0.6414	0.6473	0.5271	0.7537	0.6585	0.9264	0.8891	0.0373	0.0736	0.1109
No Qualification	0.4127	0.3880	0.4029	0.3837	0.6526	0.5002	0.9313	0.8785	0.0528	0.0687	0.1215
Primary	0.7379	0.7313	0.7368	0.6134	0.8253	0.7472	0.9210	0.8867	0.0343	0.0790	0.1133
Secondary	0.8509	0.8591	0.8657	0.6275	0.6788	0.6599	0.9638	0.9441	0.0196	0.0362	0.0559
Upper Secondary	0.8776	0.8999	0.9088	0.6695	0.6416	0.6495	0.9371	0.9109	0.0262	0.0629	0.0891
Tertiary	0.8695	0.8915	0.9030	0.8106	0.8002	0.8031	0.7776	0.6900	0.0876	0.2224	0.3100

Qualification	Labor Force Participation Rate						Proportion of those working				
	1990 Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen
Total	0.7032	0.6754	0.6746	0.6930	0.8958	0.8493	0.8393	0.8023	0.0370	0.1607	0.1977
No Formal Educatuion	0.3106	0.4281	0.4289	0.4289	0.6540	0.5810	0.8939	0.8605	0.0334	0.1061	0.1395
Incomplete Primary	0.5806										
Completed Primary	0.7409	0.6707	0.7369	0.7369	1.1641	1.0950	0.7128	0.6777	0.0351	0.2872	0.3223
Incomplete Secondary	0.7819										
Secondary	0.8361	0.8682	0.8068	0.8068	0.5486	0.6021	0.9342	0.9089	0.0253	0.0658	0.0911
Upper Secondary	0.8465	0.9243	0.8169	0.8169	0.4174	0.5002	0.9244	0.8857	0.0387	0.0756	0.1143
Polytechnic	0.9195	0.8867	0.8873	0.8873	1.4683	1.2101	0.9100	0.8665	0.0435	0.0900	0.1335
University	0.8914	0.8588	0.8602	0.8602	1.0382	0.9702	0.7882	0.6797	0.1084	0.2118	0.3203

Qualification	Labor Force Participation Rate						Proportion of those working				
	2000 Total	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen	Residents	Citizens	Permanent Residents	Non-Residents	Non-Citizen
Total	0.7080	0.6510			0.8986		0.7077			0.2923	
No Qualification	0.4625	0.3187			0.9030		0.5196			0.4804	
Primary	0.6407	0.5211			0.9353		0.5784			0.4216	
Lower Secondary	0.7435	0.6459			0.9532		0.5928			0.4072	
Secondary	0.7617	0.7240			0.9189		0.7668			0.2332	
Upper Secondary	0.7767	0.7756			0.7831		0.8471			0.1529	
Polytechnic	0.8817	0.8873			0.7446		0.9667			0.0333	
Other Diploma	0.8451	0.8422			0.8564		0.7907			0.2093	
University	0.8664	0.8809			0.8271		0.7432			0.2568	

Table 6 Singapore population by age and year

Resident population by age group

	1990		2000			projected 2000		Chnages in age distrib	
	persons	percentage	persons	increase within cohort 0.2063	percentage increase within cohort	persons	percentage	1990-2000 0	2000 actual v.predicted
TOTAL	2,705,115		3,263,209	558,094		2,861,998			
0-4	223,403	8.3%	213,278		6.5%	203,549	7.1	1.7%	-0.6%
5-9	204,978	7.6%	252,082		7.7%	221,952	7.8	-0.1%	-0.1%
10-14	197,892	7.3%	235,438	12,035	5.39%	217,973	7.6	0.1%	-0.4%
15-19	221,412	8.2%	211,320	6,342	3.09%	197,451	6.9	1.7%	-0.4%
20-24	232,281	8.6%	212,609	14,717	7.44%	190,561	6.7	2.1%	-0.2%
25 -29	283,681	10.5%	267,582	46,170	20.85%	214,872	7.5	2.3%	0.7%
30-34	293,032	10.8%	290,880	58,599	25.23%	222,424	7.8	1.9%	1.1%
35-39	252,725	9.3%	323,064	39,383	13.88%	266,217	9.3	-0.6%	0.6%
40 -44	203,975	7.5%	313,048	20,016	6.83%	275,533	9.6	-2.1%	-0.0%
45 -49	127,556	4.7%	262,626	9,901	3.92%	235,601	8.2	-3.3%	-0.2%
50-54	117,512	4.3%	207,082	3,107	1.52%	187,995	6.6	-2.0%	-0.3%
55 - 59	99,801	3.7%	125,471	(2,085)	-1.63%	113,001	3.9	-0.2%	-0.1%
60 - 64	82,810	3.1%	111,103	(6,409)	-5.45%	100,786	3.5	-0.3%	-0.1%
65 -69	59,729	2.2%	89,182	(10,619)	-10.64%	81,797	2.9	-0.5%	-0.2%
70 -74	44,960	1.7%	68,001	(14,809)	-17.88%	61,561	2.2	-0.4%	-0.1%
75 - 79	32,269	1.2%	40,053	(19,676)	-32.94%	37,373	1.3	-0.0%	-0.1%
80 & OVER	27,099	1.0%	40,390	(4,570)	-10.16%	33,352	1.2	-0.2%	0.0%
				152,102	Total gain within complete cohorts				
				210,270	Gain within cohorts aged 10-54				

Singapore Citizens

	1990		2000			projected 2000		Chnages in age distrib	
	persons	percentage	persons	increase within cohort 0.1456	percentage increase within cohort	persons	percentage	1990-2000 0	2000 actual v.predicted
TOTAL	2,595,243		2,973,091	377,848		2,723,056	100		
0-4	218,453	8.4%	196,994		6.6%	185,689	6.8	1.8%	-0.2%
5-9	197,951	7.6%	235,174		7.9%	201,365	7.4	-0.3%	0.5%
10-14	191,313	7.4%	222,603	4,150	1.90%	206,475	7.6	-0.1%	-0.1%
15-19	216,097	8.3%	202,730	4,779	2.41%	191,788	7	1.5%	-0.2%
20-24	224,002	8.6%	195,909	4,596	2.40%	182,087	6.7	2.0%	-0.1%
25 -29	268,574	10.3%	222,343	6,246	2.89%	212,023	7.8	2.9%	-0.3%
30-34	279,006	10.8%	237,063	13,061	5.83%	221,664	8.1	2.8%	-0.1%
35-39	240,425	9.3%	281,886	13,312	4.96%	261,110	9.6	-0.2%	-0.1%
40 -44	194,613	7.5%	287,758	8,752	3.14%	259,240	9.5	-2.2%	0.2%
45 -49	119,906	4.6%	245,664	5,239	2.18%	215,903	7.9	-3.6%	0.4%
50-54	111,609	4.3%	195,986	1,373	0.71%	174,837	6.9	-2.3%	0.2%
55 - 59	96,279	3.7%	117,707	(2,199)	-1.83%	105,222	3.9	-0.2%	0.1%
60 - 64	79,694	3.1%	104,910	(6,699)	-6.00%	99,983	3.7	-0.5%	-0.2%
65 -69	57,319	2.2%	84,936	(11,343)	-11.78%	78,032	2.9	-0.6%	-0.0%
70 -74	43,342	1.7%	64,267	(15,427)	-19.36%	59,480	2.2	-0.5%	-0.0%
75 - 79	31,063	1.2%	38,212	(19,107)	-33.33%	36,316	1.3	-0.1%	-0.0%
80 & OVER	25,597	1.0%	38,949	(4,393)	-10.14%	31,842	1.2	-0.3%	0.1%
				2,340	Total gain within complete cohorts				
				61,508	Gain within cohorts aged 10-54				

Permanent Residents

	1990		2000			projected 2000		Chnages in age distrib	
	persons	percentage	persons	increase within cohort 1.6405	percentage increase within cohort	persons	percentage	1990-2000 0	2000 actual v.predicted
TOTAL	109,872	TOTAL	290,118	180,246					
0-4	4,950	4.5%	16,284		5.6%			-1.1%	
5-9	7,027	6.4%	16,908		5.8%			0.6%	
10-14	6,579	6.0%	12,835	7,885	159.29%			1.6%	
15-19	5,315	4.8%	8,590	1,563	22.24%			1.9%	
20-24	8,279	7.5%	16,700	10,121	153.84%			1.8%	
25 -29	15,107	13.7%	45,239	39,924	751.16%			-1.8%	
30-34	14,026	12.8%	53,817	45,538	550.04%			-5.8%	
35-39	12,300	11.2%	41,178	26,071	172.58%			-3.0%	
40 -44	9,362	8.5%	25,290	11,264	80.31%			-0.2%	
45 -49	7,650	7.0%	16,962	4,662	37.90%			1.1%	
50-54	5,903	5.4%	11,096	1,734	18.52%			1.5%	
55 - 59	3,522	3.2%	7,764	114	1.49%			0.5%	
60 - 64	3,116	2.8%	6,193	290	4.91%			0.7%	
65 -69	2,410	2.2%	4,246	724	20.56%			0.7%	
70 -74	1,618	1.5%	3,734	618	19.83%			0.2%	
75 - 79	1,206	1.1%	1,841	(569)	-23.61%			0.5%	
80 & OVER	1,502	1.4%	1,441	(177)	-10.94%			0.9%	
				149,762	Total gain within complete cohorts				
				148,762	Gain within cohorts aged 10-54				

Table 7 Resident university graduates by age, 1990 and 2000

Cohort-based comparisons

1990		2000		increase within cohort	proportional increase within cohort
persons		persons			
		Total	266631	2.1398	
TOTAL	84919	15-19	7	181712	
10-14		20-24	16703		
15-19		25-29	66793		
20-24	7917	30-34	62522		
25 -29	22740	35-39	46940	24200	2.0642
30-34	18388	40-44	29618	11230	1.6107
35-39	13891	45-49	19041	5150	1.3707
40 -44	9833	50-54	12093	2260	1.2298
45 -49	5051	55-59	5883	832	1.1647
50-54	3469	60-64	3686	217	1.0626
55 - 59	1655	65-69	1836	181	1.1094
60 - 64	846	70-74	843	-3	0.9965
65 -69	522	75-80	376	-146	0.7203
70 -74	268	80 plus	291	23	1.0858
25-44	64852		107692	42840	1.6606

Age-based comparisons

1990		2000		increase within age group	proportional increase within age group	projected need on basis of GDP growth	surplus	surplus/ projected
persons		persons						
TOTAL	84919	Total	266631	181712	3.1398	170,687	95,944	0.5621
15-19		15-19	7					
20-24	7,917	20-24	16,703					
25 -29	22,740	25-29	66,793	44,053	2.9372	45,707	21,086	0.4613
30-34	18,388	30-34	62,522	44,134	3.4002	36,960	25,562	0.6916
35-39	13,891	35-39	46,940	33,049	3.3792	27,921	19,019	0.6812
40 -44	9,833	40-44	29,618	19,785	3.0121	19,764	9,854	0.4986
45 -49	5,051	45-49	19,041	13,990	3.7697	10,153	8,888	0.8755
50-54	3,469	50-54	12,093	8,624	3.4860	6,973	5,120	0.7343
55 - 59	1,655	55-59	5,883	4,228	3.5547	3,327	2,556	0.7685
60 - 64	846	60-64	3,686	2,840	4.3570	1,700	1,986	1.1676
65 -69	522	65-69	1,836	1,314	3.5172	1,049	787	0.7499
70 -74	268	70-74	843	575	3.1455	539	304	0.5649
75 - 79	201	75-80	376	175	1.8706	404	(28)	-0.0693
80 & OVER	138	80 plus	291	153	2.1087	277	14	0.0491
25-54	84,919		266,631			25+	95,148	
	73,372		237,007	163,635	3.2302	25-54	89,529	
							89,529	0.6071

Table 8 Mean Age of Selected Sub-Populations, 1990 and 2000

	1990	2000	difference
Resident Population	31.17	34.01	2.84
	31.17	33.78	2.61
Singapore Citizens	31.05	34.13	3.08
projected from 1990		0.00	
projected from 1980		0.00	
Permanent Residents	33.90	32.77	-1.13
born in Singapore	27.48	31.20	3.72
Working Persosn Aged 15 and Over	34.75	36.60	1.85
Legislators, Senior Officials, and Managers	41.45	41.45	-0.00
Professionals	35.27	35.13	-0.14
Technicians and Associate Professionals	33.34	35.53	2.19
Clerical Workers	31.47	35.83	4.36
Service Workers, Shop and Market Sales Workers	37.56	38.83	1.27
Production Craftsmen and Related Workers	34.23	35.13	0.89
Plant and Machine Operators and Assemblers	33.71	39.23	5.51
Cleaners, Labourers and Related Workers	36.83	34.80	-2.03
Manufacturing	32.38	36.04	3.66
Construction	34.15	34.30	0.15
Commerce	37.53	39.30	1.77
Transport, Storage	38.07	39.99	1.91
Business, Financial Services	35.43	36.98	1.55
Community, Social	33.18	34.24	1.06
Resident Non-Students Aged 15 Years and Over	40.15	43.42	3.27
No Qualification	52.41	58.37	5.96
Primary	36.63	48.04	11.40
Secondary	32.98	39.60	6.62
Upper Secondary	33.09	37.06	3.97
Polytechnic	29.94	31.51	1.57
University	35.23	36.04	0.81