A Brief Research Note on

Temasek Holdings

And Singapore:

Mr. Madoff Goes to Singapore

Christopher Balding
HSBC Business School
Peking University Graduate School
cbalding@phbs.pku.edu.cn

Short Abstract:

Temasek Holdings and Singapore, Inc. financial data is unreliable.

Long Abstract:

Financial data reported by Temasek Holdings and Singapore reveal problematic characteristics. First, Temasek reports an average annual return of 17% for 35 years despite Singaporean stock returns averaging less than 8% during this same time period. Given the range of stock market returns and its portfolio companies' returns, it is highly improbably that Temasek has earned the returns claimed in its annual reports. Second, Singapore has become one of the most indebted countries in the world despite supposedly running large and sustained government surpluses. Given publicly available economic data on Singaporean finances, there is a minimum of $350 billion SGD or $275 billion USD unaccounted for from historical surpluses and financing operations. Third, given these results I find that for every $1 SGD in public borrowing, Singapore has received only 25 cents of publicly held Singaporean assets. Either financial returns have been drastically overstated or there are large unreported Singaporean controlled holdings.

Introduction

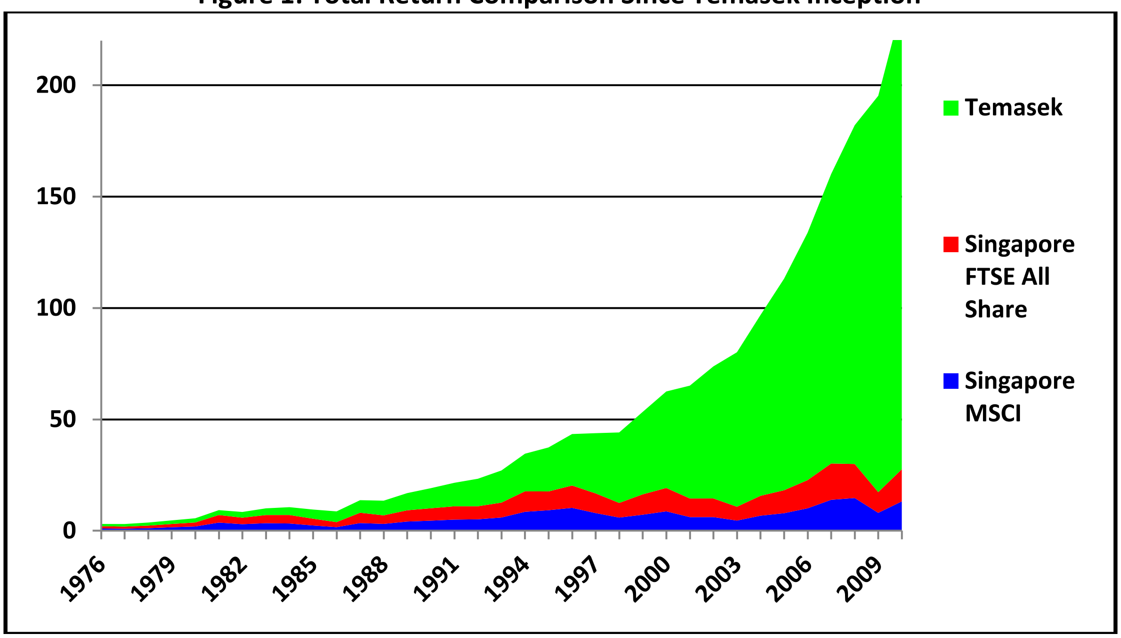
The Singaporean sovereign wealth fund Temasek Holdings states in its 2010 annual report that it has earned since inception an average annualized rate of return of 17%. This number, however, claims such a high level of sustained returns as to warrant closer examination. I conclude, based upon a review of all public financial and economic data, that it is highly unlikely Temasek earned a 17% rate of return on its holdings since inception.

This report proceeds with three sections. First, I begin by studying what other investors have earned over similar periods, making comparisons to what Temasek claims they have earned. Second, I study the Temasek portfolio to examine whether their portfolio is potentially unique enough to have earned the claimed amount. Third, I integrate data on Singaporean public finances, the original source of Temasek capital that provides evidence of how Temasek can claim such large returns.

Temasek vs. Other Investors

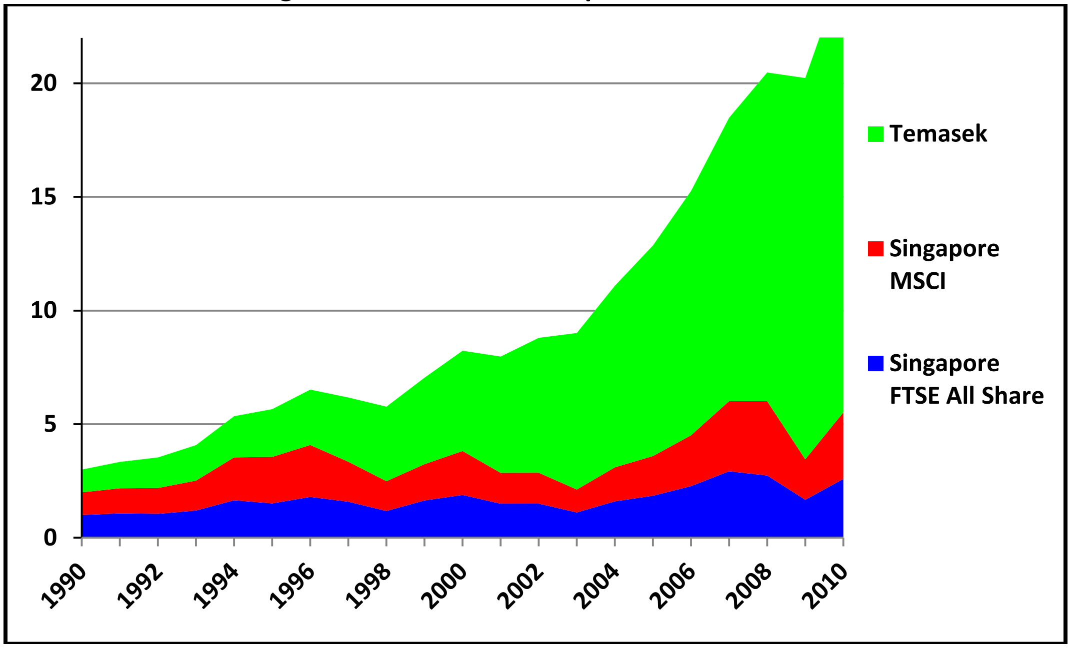
Temasek Holdings was created with the government budget surplus and began operating in 1974. Since its inception, it states that its average annualized return is 17%. Temasek focused its holdings on domestic Singaporean companies throughout its history. Despite its efforts to expand their holdings throughout southeast Asia in the past ten years, its holdings remain heavily concentrated in Singapore. I begin by comparing the returns from the Singapore stock market to the returns claimed by Temasek. The comparison between Temasek and Singaporean stock indexes returns since inception and the last 20 years can be found in Figures 1 and 2 respectively.

Figure 1: Total Return Comparison Since Temasek Inception



Source: Temasek 2010 Annual Report, MSCI, and FTSE. All returns normalized at 1 in 1976.

Figure 2: Total Return Comparison Since 1990

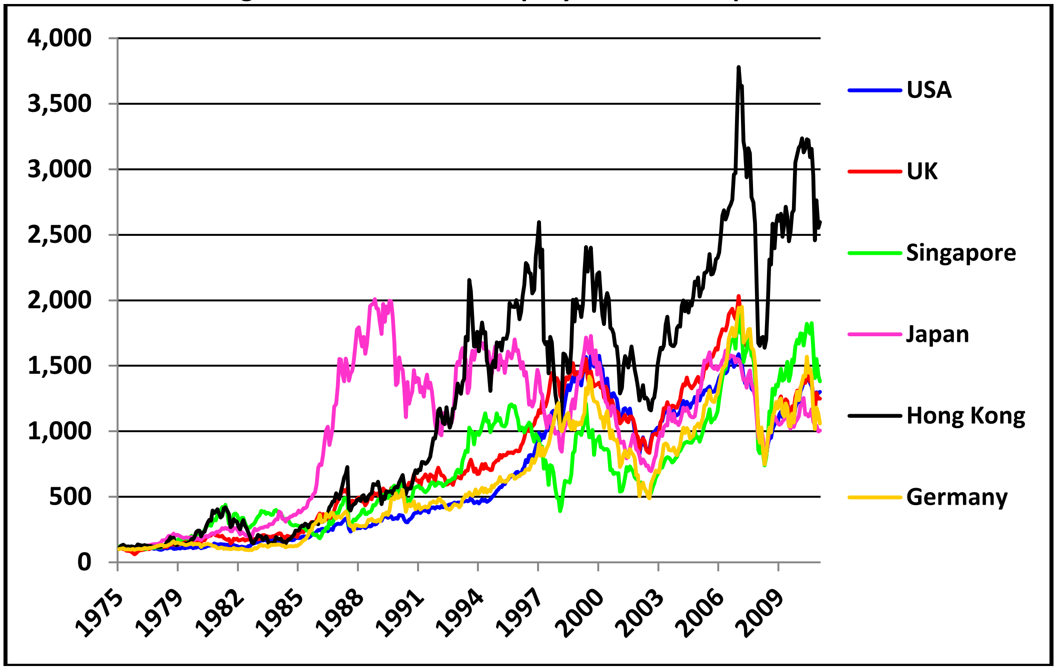


Source: Temasek 2010 Annual Report, MSCI, and FTSE. All returns normalized at 1 in 1990.

Based upon publicly available market data on Singaporean stock indexes, there appears to be a rather significant discrepancy between the returns claimed by Temasek and the returns produced by domestic equity markets.

While public Singaporean equity markets fail to support the returns claimed by Temasek, given the international nature of investment, it may have been possible to generate the earnings from foreign holdings. Figure 3 shows the returns from country specific MSCI indexes since 1974, the inception date for Temasek.

Figure 3: International Equity Market Comparisons



Source: MSCI and authors calculations. January 1, 1976 is equal to 100 for all countries.

There are two primary results of Figure 3. First, over the long run, Singapore produces average annualized stock market returns strikingly similar to other countries. Beginning at an equalized value of 100 in January 1, 1974, virtually every major stock market index, with the exclusion of Hong Kong, closed with near statistically identical returns. The average annualized returns for major stock markets from 1974 through 2011 is presented in Table 1.

Table 1: Average Annualized Stock Market Returns 1976-2011

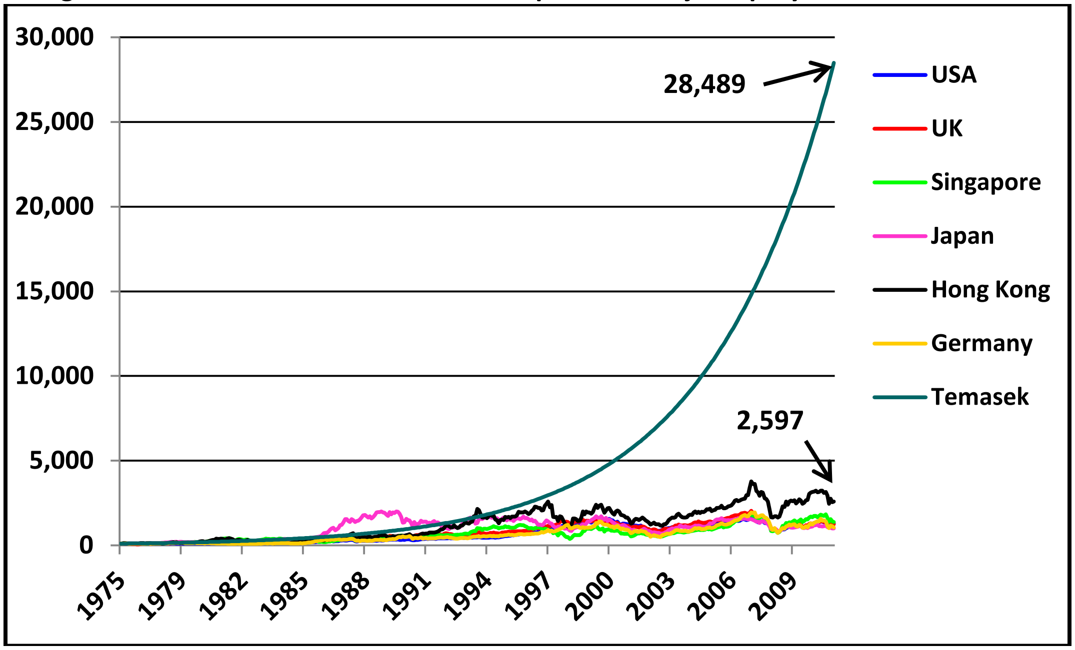
USA	UK	Singapore	Japan	Hong Kong	Germany	France	Australia
7.61%	**7.48%**	**7.79%**	**6.81%**	**9.75%**	**6.97%**	**7.18%**	**7.16%**

Source: MSCI and authors calculations

The second major result is that no major stock market index comes close to replicating the returns Temasek claims they have generated since 1976. In fact the Singapore index is actually slightly above average over the long run; however, Temasek claims to have earned more than *twice* the annual return of every major stock market index except Hong Kong. In that case, Temasek only beat the Hong Kong index by a less ostentatious 70% for 35 years straight. If Temasek returns can be verified, it will represent the greatest and most sustained period of investment brilliance in human history.

To provide some perspective on the numbers Temasek is claiming compared to the annualized returns of other major stock indexes, I reproduce Figure 3 with stock market data but now I include Temasek assuming they earned their stated average of 17% annually since inception. This is included below in Figure 4.

Figure 4: Temasek Claimed Returns Compared to Major Equity Market Since 1976



Source: Temasek and MSCI. January 1, 1976 is equal to 100 for all countries.

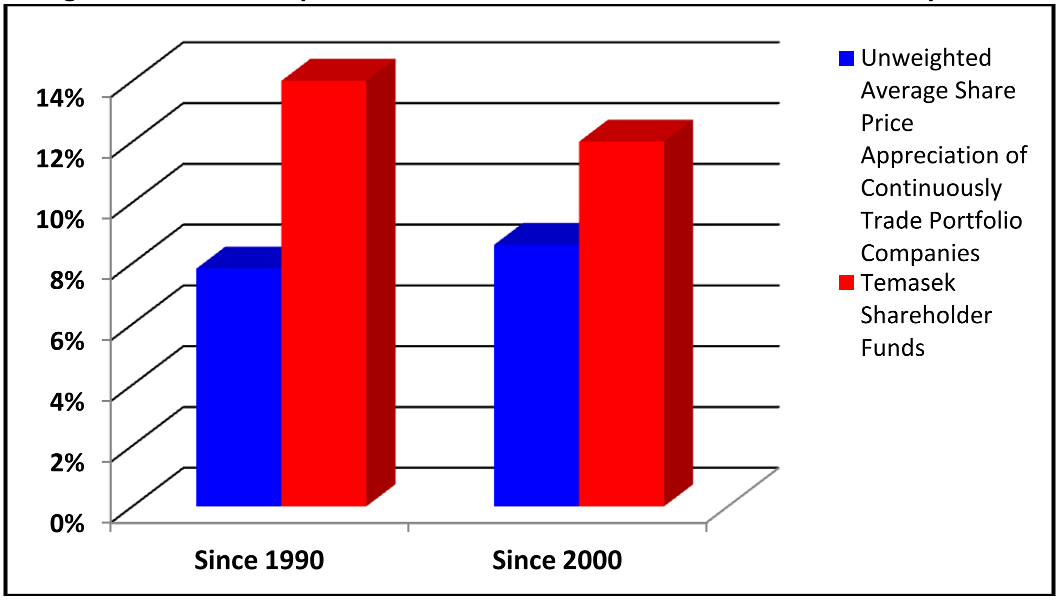
While Temasek does not break out its return each year since 1974, if it had earned an annualized average of 17% since 1974, it is fair to say it out performed its benchmark index. The difference Temasek is claiming to every other equity market is so enormous that its claims should not be taken seriously on its face.

The returns Temasek claims to have generated since its 1974 creation cannot be replicated relative to Singaporean or international equity markets. While investment funds may outperform equity markets for periods of time, it seems unlikely given the known returns of Singaporean and global equity markets that Temasek produced the returns it is claiming.

Major Temasek Holdings

Since its creation in 1974, Temasek has maintained a strong ownership presence in Singaporean industry and has only begun expanding into other markets since approximately 2000. Beginning in the late 1980's and early 1990's, Temasek began to publicly list some of its domestic holdings providing data on the finances of some of its companies. The comparison between the stated returns of Temasek and the share price of portfolio companies traded over the same period is provided below in Figure 5.

Figure 5: Return Comparison Between Temasek and Listed Portfolio Companies[1]

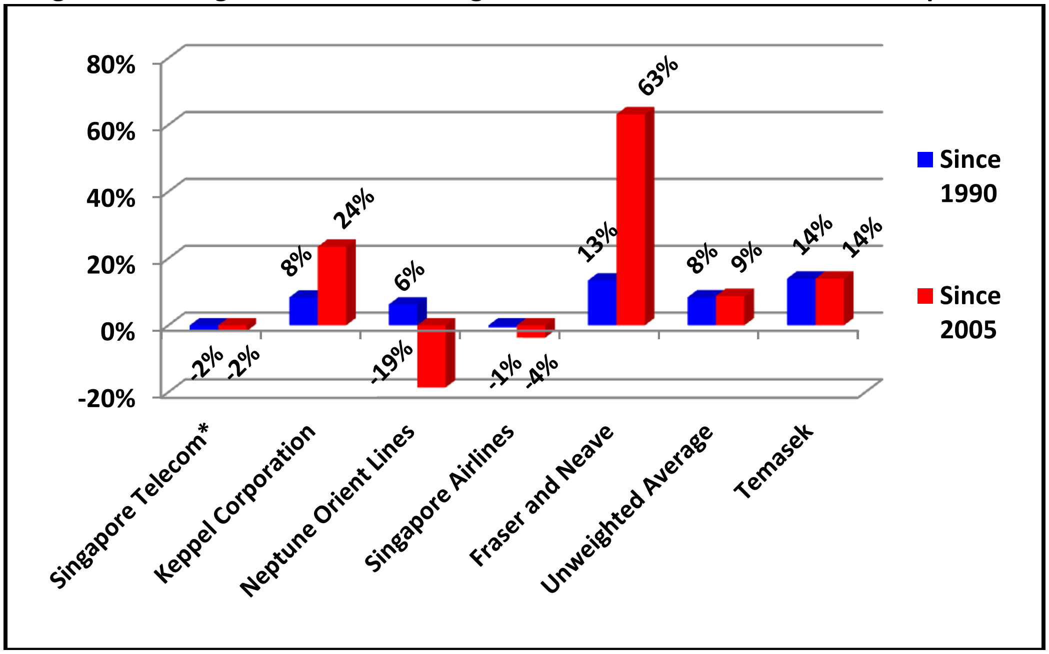


Source: Temasek Annual Report 2010 and Bloomberg

While the average returns produced by Temasek portfolio companies in each period were an internationally respectable 7.8% and 8.6% respectively, these are again quite different from the stated returns. Especially given their status as portfolio companies, share price when calculating total returns may not represent a complete and accurate picture of the financial returns that accrue to owners. The average annualized earnings per share growth is presented in Figure 6: portfolio companies with earnings per share data, the Temasek declared returns, and portfolio companies with the longest trading histories.

[1] I use the unweighted average share price appreciation of continuously traded companies measure for a couple of reasons. First, due to historical holding measurement problems, we do not know the amount of shares held at each moment in time. Second, due to timing issues, including only continuously traded companies for our post 1990 and 2000 index permitted simple distinctions.

Figure 6: Average Annualized Earnings Per Share Growth of Temasek Companies[2]



Source: Temasek Annual Report 2010 and Bloomberg

The final results are again strikingly different from the results presented by Temasek. The unweighted average of all listed companies within the Temasek portfolio is a respectable 8% and 9% respectively. This however is strikingly different from the 14-16% Temasek claims over the same periods of time. In short, there is no supporting evidence that the growth claimed by Temasek came from either share price appreciation or earnings per share growth.

While the analysis of the portfolio companies is clearly not exhaustive, as that data is not publicly available dating back to 1974, it further demonstrates that there exists a significant gulf between what Temasek is reporting and what supporting data suggests.

In Search of 17%

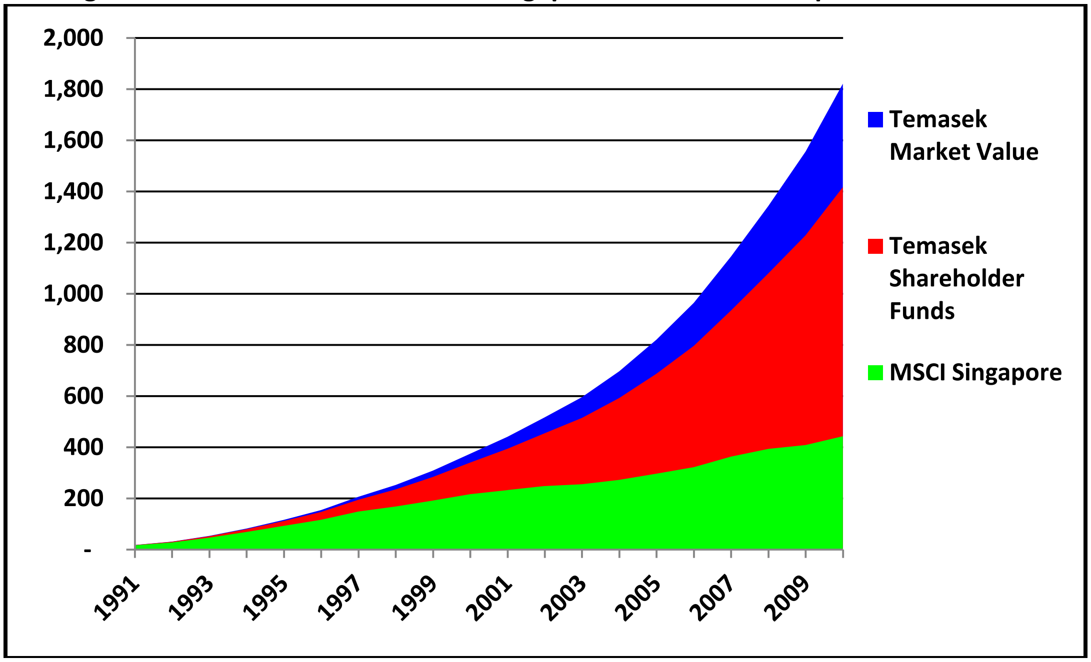
Given that there is no evidence of 17% annual returns from either Singaporean or global stock markets or from the portfolio companies owned by Temasek, I now turn to trying to reconcile the apparent discrepancy. Temasek was created with the Singaporean government surplus. Since 1990, the Singaporean government has run total accumulated local currency surpluses of $271 billion SGD averaging 8.64% of GDP. According to the International Monetary Fund, Singapore has only two non-consecutive years, 2003 and 2009, with public deficits during this period.

Given the returns claimed by Temasek, if it was created with a one-time initial capital endowment, given its current published assets under management, it would have started with between $750 million and

[*] Singapore Telecom only has EPS data dating back to 1992. Consequently, the estimate for them only goes back to 1992 rather than 1990 as with the other companies.

$1 billion SGD.[3] Consequently, any further government surpluses would have been accumulated elsewhere. Figure 7 shows the value of historical budget surpluses if invested in Temasek or the Singaporean stock market.

Figure 7: Theoretical Accumulated Singapore Government Surpluses Since 1990



Source: MSCI, Temasek, and the International Monetary Fund

According to Figure 7, if the Singaporean government had invested public surpluses with Temasek, today it would be holding between $1.4-1.8 *trillion* SGD. If it had done nothing else with public surpluses than purchase a Singaporean stock market index fund, it would hold approximately $450 billion SGD. The latest reported asset under management for Temasek is $200 billion SGD. Given that Temasek would only need a one-time capital endowment at inception of approximately $750 million due to its reported earnings, these are major discrepancies.

To compound matters, Singapore has become one of the most indebted countries in the world. According to recent IMF data, when taking a moving average of the 2008-2011 period, Singapore is the 13th most publicly indebted country in the world relative to GDP. Singapore has a higher debt to GDP than Iceland, Ireland, Portugal and Belgium and is only a little behind Iraq and Italy. As can be seen in Table 2 below, what makes this level of indebtedness even more concerning is that Singapore has managed to accumulate such high levels of debt while supposedly running constant surpluses.

[3] The range of the initial capital endowment stems from the uncertainty of decimals as Temasek only states that it has earned 17% since inception. Given a potential low of 16.50% to 17.49%, we cannot know for certain their original capital endowment.

Table 2: Select Countries Debt to GDP and Public Deficit/Surplus (-/+) as a Percentage of GDP

Country	Average Govt. Deficit to GDP 1990-2011	Average Govt. Deficit to GDP 2000-2011	Average Govt. Deficit to GDP 2005-2011	Average Govt. Deficit to GDP 2008-2011	Average Debt to GDP 2005-2011	Average Debt to GDP 2008-2011
Japan	-4.98	-6.78	-6.46	-8.50	205.0	216.1
Liberia		-2.11	-3.59	-8.75	407.7	150.1
Lebanon		-12.15	-8.92	-8.20	155.3	140.8
Greece	-7.83	-7.31	-8.83	-10.93	122.6	136.5
Italy	-5.18	-3.32	-3.67	-4.13	111.2	115.6
Iraq			-0.97	-10.29	167.8	104.1
Singapore	8.64	4.32	4.81	3.23	94.0	98.0
Belgium	-2.95	-1.48	-2.52	-3.69	91.6	94.3
Portugal	-3.45	-3.27	-4.96	-7.16	78.4	88.4
Iceland	-1.15	-0.53	-0.29	-4.65	62.4	88.0
United States			-6.76	-9.83	76.6	87.8
Canada	-2.30	-0.47	-1.41	-3.65	75.8	80.6
Democratic Republic of Congo		-3.83	-4.51	-3.96	107.5	80.5
Zimbabwe			-3.24	-1.73	70.6	79.4
France	-3.87	-3.85	-4.57	-5.97	73.0	79.1
Nicaragua			-0.36	-0.86	92.6	78.5
Ireland	-2.80	-4.38	-8.46	-15.96	55.8	78.4
Germany		-2.15	-1.81	-1.98	72.7	76.8
Hungary		-5.23	-4.65	-2.58	71.5	76.8
Sudan		-2.16	-3.52	-3.10	84.0	76.6

Source: International Monetary Fund

Singapore is the only country to have managed to average a surplus fiscal position *and* increase its overall indebtedness to nearly 100% of GDP. All other countries with high levels of debt such as the United States and western Europe, have long term public finance deficits which adds to total public indebtedness. There appears no valid reason for a country to incur large and sustained public surpluses *and* increase their total public indebtedness to such high levels.

The increase in overall indebtedness provides an additional source of unexplained cash flow. The Singaporean government was then utilizing the cash flow from yearly surpluses *and* increasing indebtedness. Put another way, Singapore was receiving cash from ongoing operations *and* financing operations. Table 3 shows the accumulated cash flow from operations *and* financing since 1991.

Table 3: Historical Free Cash Flow from Public Surplus and Increased Indebtedness

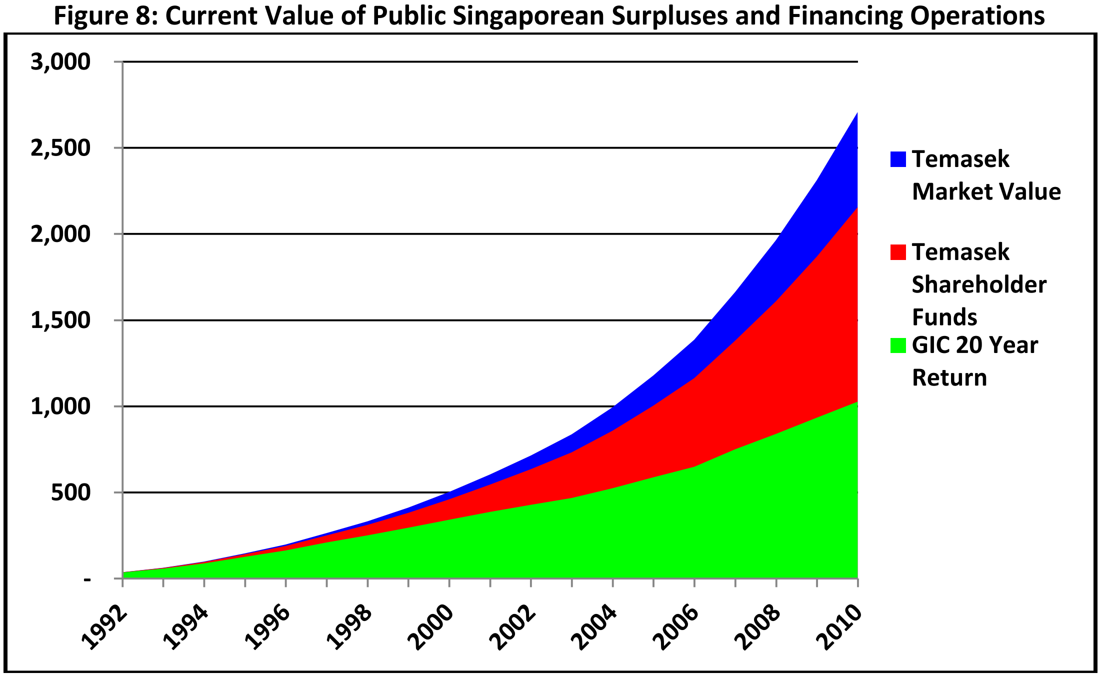
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Cashflow	15.92	18.64	19.92	25.73	31.97	28.02	34.58	25.94	26.33	25.08
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Cashflow	20.91	13.31	8.79	22.99	25.61	18.64	54.79	35.33	33.78	25.71
	Total Accumulated Free Cash Flow from Operations and Financing									**511.98**

Source: International Monetary Fund. In billions of Singaporean dollars.

Since 1991, Singapore, between government surpluses and increased government indebtedness, realized a total free cash flow of a little more than $500 billion SGD. Worryingly especially in light of the reported 17% earnings at Temasek, there is no evidence of how public surpluses and financing operations have been used. The reported public surpluses and cash flow from financing have to be deployed in some manner. $500 billion SGD does not just disappear. There is unfortunately only minimal evidence of how this free cash flow has been used. There is no record of it being held by Temasek or other government agencies, or recorded as an expenditure.

Given the time horizon of the free cash flow generated in Singapore and the returns claimed by Temasek, the current value of historical cash flow would be enormous. Figure 8 presents the present value of the free cash flow from budget surpluses and financing, with the returns claimed by Temasek and the Government Investment Corporation of Singapore (GIC).

Figure 8: Current Value of Public Singaporean Surpluses and Financing Operations



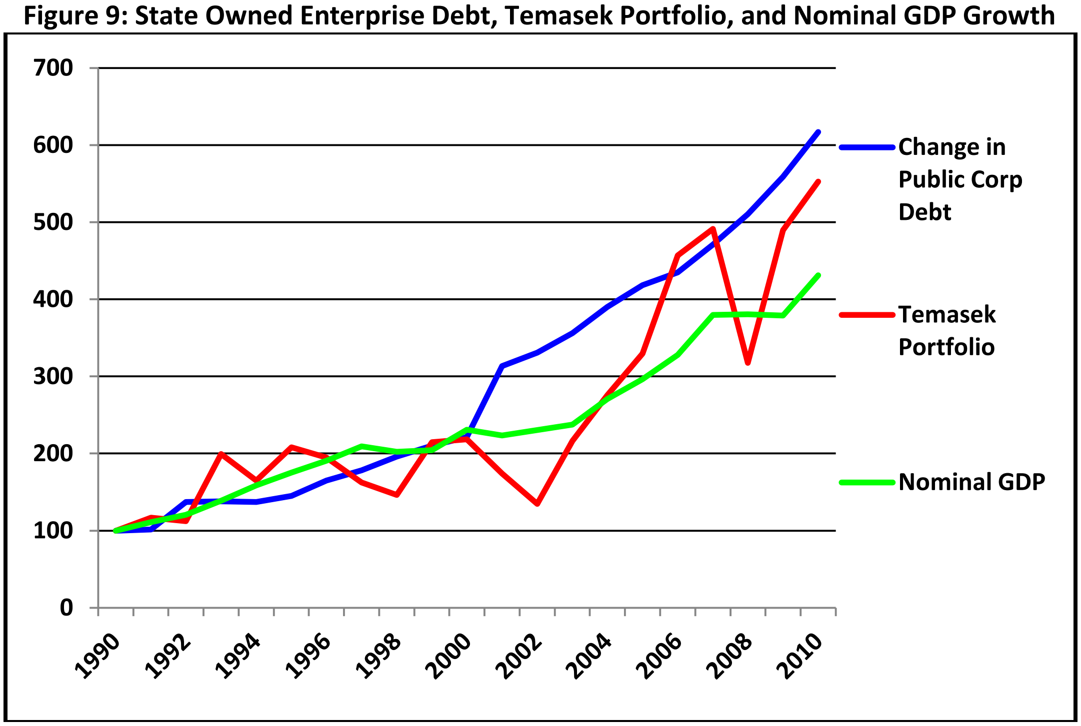
Source: IMF, Temasek, and GIC

If free cash flow from budget surpluses and financing operations had been invested in the GIC which claimed a lower and reasonable 20 year average of 7.2%, Singapore would currently stand on slightly more than $1 trillion SGD or nearly $800 billion USD at current exchange rates. If the free cash flow had been invested with Temasek, the value should range between approximately $2.1-2.7 *trillion* SGD or $1.6-2.1 *trillion* USD or nearly *nine times* current Singaporean GDP.

GIC is the other sovereign wealth fund in Singapore with an unofficial estimate of approximately $350 billion USD under management. The total assets under management between Temasek and the GIC, if the GIC estimate is reasonably accurate, should be approximately $650 billion SGD or $500 billion USD. Assuming the $650 billion of combined assets under management for Temasek and the GIC is reasonably accurate, if the combined $512 billion SGD from budget surpluses and financing operations since only 1990 was invested with these sovereign wealth funds, this would imply an average annual return of only 1.2%. This implies one of two scenarios: the return on investment is drastically different from the returns claimed by Temasek and GIC *or* there is a large unexplained difference in the asset value holdings of the Singaporean government and its controlled entities.

A unique component of Singapore public debt is the percentage attributable to state owned companies. Approximately 80% of publicly held debt in Singapore is attributable to state owned enterprises while only 18% is attributable to the government. The relationship between the growth in state owned enterprise debt, a simulated Temasek portfolio, and nominal local currency GDP growth is presented below in Figure 9.

Figure 9: State Owned Enterprise Debt, Temasek Portfolio, and Nominal GDP Growth



Source: Government of Singapore, Bloomberg, and IMF

There are a two notable points. First, over the long run, the simulated Temasek portfolio grows at a strikingly similar but slightly smaller rate as the growth of state owned enterprise debt in Singapore. Second, Singaporean GDP grows at similar but distinctly slower rate of growth as the increase in state owned enterprise debt. State owned enterprise debt, the Temasek simulated portfolio, and Singaporean nominal local currency GDP grew at an annualized rates of 9.5%, 8.9%, and 7.6% respectively. In other words, publicly guaranteed debt grew faster than Temasek portfolio companies, the companies with guaranteed debt, and GDP.

This has a profound implication: the growth of publicly guaranteed debt resulted in a net destruction of capital with regards to Singaporean GDP and Temasek portfolio companies. For every additional Singaporean dollar of debt Singapore accumulated in state owned enterprises, GDP only went up by 80 cents. The results with Temasek portfolio companies is just as bad. Companies should be able to increase corporate value by more than the additional amount of capital they receive if they are efficient allocators or users of capital. For every additional Singaporean dollar of capital publicly backed corporations received the value of the company only went up by 94 cents.

There are three final points about this use of public capital. First, this does not include the additional equity capital received by Temasek portfolio companies. Using the average yearly share price and the expansions of shares outstanding, I estimate the in addition to debt capital, Temasek portfolio received nearly $70 billion Singaporean dollars in additional paid in equity capital. Second, to provide some additional perspective on how poorly this capital has been deployed, the state of Singapore has guaranteed $250 billion SGD in loans but Temasek, the only domestic sovereign wealth fund holdings Singaporean assets, holds only $62 billion SGD in Singaporean assets. Put another way, every $1 SGD of state owned enterprise public debt has resulted in only 25 cents in publicly held Singaporean assets. To take this even further, while public state owned enterprise debt now stands at $250 billion SGD, the value of Temasek assets is only around $200 billion SGD. Third, even though I have partially explained the rapid growth of public debt in Singapore, there is still no viable explanation for the many years of large public surpluses. There is simply no available evidence of where these $300 billion SGD have found a home. Given any reasonable rate of return, as noted by this research note, these accumulated funds would today be quite large. There is however no available record on the location of these monies.

Given the level of level indebtedness accumulated by state owned enterprises and the amount of publicly held assets in these corporations, this represents either an enormous destruction of wealth or an enormous transfer of wealth via public liability into privately held wealth.

At some point, the ability to access additional state guaranteed debt to fund capital destroying ventures and GDP will end. Debt simply cannot continue to grow faster than assets and GDP.

Conclusion
Any rudimentary analysis of Temasek and Singapore finances should be struck by two glaring facts. First, Temasek claims of 17% annual returns for 35 years is so far outside the range of any ordinary investment return as to warrant skepticism. Second, Singapore is the only known country in human history to simultaneously run large and sustained budget surpluses *and* become one of the most indebted countries in the world today.

Scenario #1: Assuming Temasek Returns and Singapore Finances Are Perfectly Accurate

1. Temasek has established the greatest institutional track record of investment, possibly, in the history of human existence.
2. Singapore maintains large unreported asset holdings that by conservative estimates could top $1 trillion SGD or $800 billion USD from accumulated historical budget surpluses and financing operations.
3. Given the current estimate of $650 billion SGD of combined assets under management between Temasek and GIC, this results in an upward revision of assets under management by at least $350 billion SGD or $275 billion USD. Given numerous assumption parameters, this should be considered a very conservative estimate.

Scenario #2: Assuming Temasek Returns and Singapore Finances Are Not Perfectly Accurate

1. Temasek is reporting inflated returns by using methods that do not represent standard accounting practices.
2. Singapore has inaccurately reported public finance data on revenue, expenditures, surpluses, total outstanding indebtedness, and asset holdings to bolster its perceived credit risk and the state of its public finances.
3. Either by over reporting surpluses and the returns earned *or* underreporting its total assets, Singapore and the two sovereign wealth funds under its management have not accurately accounted for its finances to the public. The amount of the missing funds should conservatively be estimated $275 billion USD or $350 billion SGD. The missing funds may be located in a variety of places such as in poor investments returns or unreported asset holdings.

In short, due to the large government budget surpluses and the increased debt, it seems highly improbable that the current numbers published by the Singaporean government and markets can be reconciled either to external data or to each other. If investment returns and public finance data is accurate, there must be an enormous pool of unreported assets controlled by the Singaporean government. If investment returns and public finance data as currently published is inaccurate, this represents a serious problem.