Effect of Statutory Corporate Profits Tax Rates

on DI Flows to and from Hong Kong

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SUMMARY

An analysis of the effect of changes in statutory corporate profits tax rates on flows of external direct investment (DI) to and from Hong Kong yields an estimated semi-elasticity of 0.049 lower log flows per one percentage point increase in the difference between the profits tax rates in the receiving and sending countries / territories. The result is similar to that of a 2005 study which found an effect of 0.042 among OECD countries.

2. Using Hong Kong's balance of payments in 2013 as a starting point, the estimate implies that a one percentage point increase in the profits tax rate would increase the capital account outflow by about 2.7% of GDP.

DATA

Statutory Profits Tax Rates and DI Flows

3. The data for the analysis were compiled from three sources. First, information on Hong Kong's bilateral investment flows were obtained from the Census and Statistics Department. Bilateral investment flow data are available from 1998 to 2013. These investment flow data are available by source or destination for major countries or territories. In total, there are 11 major countries or territories for which bilateral investment flow data are available for the entirety of the period.

4. Of these 11 countries or territories, information on investment flows both to and from Hong Kong is available for seven (Bermuda, the British Virgin Islands, the Cayman Islands, mainland China, Singapore, the United Kingdom, and the United States of America); information on investment flows to Hong Kong is available for two (Japan and the Netherlands); and information on investment flows from Hong Kong is available for two (Australia and Canada). The bilateral data set thus consists of 288 observations (16 years x [(7 countries with data in both directions x 2) + 4 countries with data in one direction]). However, as one data point is not released due to confidentiality reasons (outward flows to Canada in 1998), the final data set for analysis consists of 287 observations.

5. GDP data (including Hong Kong's), measured in current USD, were obtained from the World Bank's World Development Indicators (WDI) database, or, where data were not available from the WDI database, from the United Nations National Accounts Main Aggregates database.

6.   Finally, data on corporate profits tax rates were compiled from various sources, including the OECD Tax Database, the KPMG Corporate Tax Rate Survey, and government tax authorities.

MODEL

7.   The model used to analyse Hong Kong's bilateral investment flow data is a gravity model. Gravity models are well-established in terms of modelling trade flows between countries and territories and have more recently been applied to investment flows.

8.   Gravity models seek to predict bilateral trade flows based on two main factors: "mass," or the size (GDP) of the economies concerned, and "distance," which can mean physical distance but more broadly represents the cost of trade between the two economies. For instance, a model specification may include a common language indicator variable as one of the distance variables, as countries or territories that share a common language and culture find it easier to trade with one another. In Hong Kong's case, because there is no variation in these factors over time with its major investment partners (in terms of physical distance, a shared common language, or otherwise), the distance factors are captured by fixed effects for each bilateral investment flow.

9.   The bilateral investment flow model has the following functional form:

$$\ln\big(FLOW_{ijt}\big) = \alpha_{ij} + \alpha_{GDP}\ln\big(GDP_{i,t-1}\big) + \alpha_{HKOGAP}HKOGAP_t + \alpha_{DIF}DIF_{ijt}$$

$$+\alpha_{WTO}WTO_t + \alpha_{DF}DODDFRANK_{ijt} + \alpha_{DFUSA}DFUSA_{ijt} + \varepsilon_{ijt}$$

where $FLOW_{ijt}$ is the flow of direct investment from economy i to economy j in year t (measured in billions of current USD); α_{ij} is a fixed effect for the flow from economy i to economy j (note that the fixed effect for the flow from economy j to economy i is a different parameter, α_{ji}); $GDP_{i,t-1}$ is the GDP of economy i in year $t-1$ (also measured in billions of current USD); $HKOGAP_t$ is Hong Kong's output gap in year t; DIF_{ijt} is the statutory profits tax rate in country j minus the statutory profits tax rate in country i in year t; WTO_t is a binary variable equal to one in 2000 and zero otherwise; $DODDFRANK_{ijt}$ is a variable equal to zero until 2009, 0.5 in 2010, and 1 in 2011 and thereafter for flows into Hong Kong (i.e., where j = Hong Kong), and zero for all flows out of Hong Kong; and $DFUSA_{ijt}$ is a variable equal to zero until 2009, 0.5 in 2010, and 1 in 2011 and thereafter for flows from Hong Kong to the United States, and zero for all other flows.

10.   As noted earlier, the parameter α_{ij} captures fixed effects that influence investment flows between each pair of economies, such as language, culture, and physical distance. It is not necessary to measure these characteristics separately as, being fixed over time, their effects are included in this parameter by construction.

The next two variables are quite straightforward. $GDP_{i,t-1}$ is the GDP of the source economy in the preceding year; one would naturally expect that larger countries would send more investment to others, simply because of their size. As such, α_{GDP} should be positive.[1] Similarly, α_{HKOGAP} should also be positive because, when Hong Kong's economy is in an upswing, it is expected to invest more overseas as well as attract more investment itself.[2]

11.   A variable which may potentially matter, but which was not included in the model, is the strength of economy i's currency relative to economy j. This is because, if economy i's currency is stronger, it would find assets in economy j relatively inexpensive. A specification including this variable was examined, but the effects of exchange rate differences were not statistically significant. However, it should be noted that, due to the Hong Kong's peg to the U.S. dollar, $GDP_{i,t-1}$—which is measured in current USD—also reflects the effects of exchange rate movements between Hong Kong and other economies.

12.   The parameter α_{DIF} is of the greatest interest because it measures the effects of the statutory profits tax rate. For instance, consider investment flows into Hong Kong (so Hong Kong is country j). If Hong Kong raises its profits tax rate by one percentage point, DIF_{ijt} will increase by one unit. If, as theory would suggest, α_{DIF} is negative, it means that raising the profits tax rate would reduce investment flows into Hong Kong. For instance, if α_{DIF} is equal to −0.05, then it would mean that raising the profits tax rate by one percentage point would reduce investment flows into Hong Kong by 5%. Similarly, investment flows from Hong Kong to other countries would increase by 5%, because, when Hong Kong is the sending country (country i), raising the profits tax rate by one percentage point would decrease DIF_{ijt} by one unit.

13.   Other tax-related variables which were explored, but which were not statistically significant, were the tax rates of Hong Kong's major trading partners that are not major sources or destinations of investment flows (e.g., South Korea and Taiwan). Adding tax rates of "third party" countries (e.g., allowing Singapore's tax rate to influence flows of investment between Hong Kong and mainland China) also did not yield any statistically significant results.

14.   The remaining three variables in the model are institutional variables. The first, WTO_t, captures the fact that, in 2000, investment flows both to and from Hong Kong rose sharply in anticipation of mainland China's accession to the World Trade Organization. The next two variables, $DODDFRANK_{ijt}$ and $DFUSA_{ijt}$, reflect the effects of the U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act,

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[1] The GDP of the receiving country / territory is also a potentially relevant factor, but it was not found to be significant in the analysis. This may be because the GDPs of Hong Kong and its major investment partners tended to move together over the relevant time frame.
[2] In an alternative version of the model, Hong Kong's output gap was allowed to have separate effects on investment flows to and from Hong Kong. However, the estimated coefficients were statistically indistinguishable from one another and so they were combined into one parameter.

which imposed significant new restrictions and reporting requirements on financial institutions operating in the U.S. After the Act was passed, foreign direct investment flows from Hong Kong to the U.S. dropped substantially, while external investment flows from other economies to Hong Kong increased.

15.   Other institutional variables were examined, but no statistically robust relationships were found. These included variables reflecting Hong Kong's Closer Economic Partnership Agreements with other jurisdictions and measures of the regulatory environment (e.g., from the World Bank's Doing Business project or the Heritage Foundation's Index of Economic Freedom). In the latter case, this may be due to the subjective nature of the information collected, limited data availability for certain years and/or jurisdictions, or both.

16.   Finally, a complication that arises in the modelling is that some of the investment flows are negative (46 out of 287 observations). In these cases, $\ln(FLOW_{ijt})$ is not defined. As such, the model is estimated using Heckman's method of correcting for sample selection. The selection equation for whether or not $\ln(FLOW_{ijt})$ is observed is the following:

$$\Pr\big(\ln(FLOW_{ijt})\ is\ observed\big) = \Phi\big(\pi_0 + \pi_1 TOHK_{ij} + \pi_2 POSITION_{ij,t-1}\big)$$

where $\Phi(.)$ is the cumulative density function of a standard normal random variable, $TOHK_{ij}$ is an indicator variable for whether the flow is to or from Hong Kong (i.e., it is equal to one when j is equal to Hong Kong and zero otherwise), and $POSITION_{ij,t-1}$ is economy i's total investment position (in billions of current USD) in economy j at the end of year $t-1$. The intuition is that (a) Hong Kong investors may be more (or less) likely to invest overseas than investors in other economies, and (b) if investors in economy i are more familiar with economy j (as measured by their investment position at the beginning of year t), they are more likely to continue making investments in country j.

RESULTS

17.   The results from estimating the model of bilateral investment flows are given in Annex I. Abstracting from the distance factors (which remained constant over the time period), the most important predictor of investment flows is the GDP of the sending country / territory. The estimated elasticity of inward investment flows with respect to the GDP of the sending country / territory is 1.16 (i.e., if a country's GDP increases by 1%, its external investments increase by 1.16%). This result also applies to outward investment flows, in which case Hong Kong is the sending territory and its own GDP influences the amount of investment. 76.9% of the model's predicted changes in log investment flows were due to this factor.

18.   Apart from GDP, 19.6% of the model's predicted changes were attributable to indicator variables relating to either mainland China's accession to the WTO or the

implementation of the Dodd-Frank Act in the U.S. The WTO variable is highly statistically significant ($p < 0.001$), as are the Dodd-Frank indicators ($p = 0.002$ for the joint significance of both). All have the expected signs. In particular, in anticipation of mainland China's accession to the WTO, external direct investment flows both to and from Hong Kong rose by 78.3% (exp(0.578) – 1). Similarly, after the U.S. enacted the Dodd-Frank Act, flows to Hong Kong rose by 36.5%, while flows from Hong Kong to the U.S. fell by 74.7%. The results indicate that these institutional factors were a major determinant of bilateral investment flows.

19.   The next most important factor in the model is Hong Kong's output gap, which explains a further 2.3% of the model's predicted changes. The coefficient of 0.057 means that, if Hong Kong's output gap increases by one percentage point (i.e., if Hong Kong's GDP rises by an amount equal to one percent of potential output), investment flows to and from Hong Kong will increase by about 5.9% (exp(0.057) – 1). The result is highly statistically significant ($p = 0.001$).

20.   Finally, the remaining 1.2% of the model's predicted changes in log investment flows were due to changes in the statutory profits tax rate. The estimated semi-elasticity of log investment flows with respect to the difference in corporate profits tax rates between the receiving and sending countries / territories was -0.049. For instance, if Hong Kong is the receiving territory, and it increases its corporate profits tax rate by 1 percentage point, inward investment from the sending country / territory would fall by 0.049 log points, or 4.8%. Similarly, if Hong Kong is the sending territory, and it increases its corporate profits tax rate by 1 percentage point, outward investment to the receiving country / territory would increase by 0.049 log points, or 5.0%. The result is statistically significant ($p = 0.020$).

21.   Information about the fit of the model may be obtained from the R-squared statistic in Annex I (0.747) and the figures in Annex II. From Annex II, it can be seen that the model fits the data for external investment flows into Hong Kong reasonably well. For external investment flows out of Hong Kong, actual outflows were noticeably higher than the model's predictions from 2008 to 2012. Nevertheless, the model's prediction for outflows in 2013 was quite close to the actual figure.

DISCUSSION

22.   The relationship between foreign direct investment (FDI) and corporate tax rates has been the subject of numerous studies, though most of these have focused on OECD countries for which detailed and standardized data are readily available. Most of these studies have produced estimated semi-elasticities between 0 and 0.05. The result of the current study also fell within this range.

23.   As Hong Kong is also a developed, market-oriented economy, it is reasonable to expect that the relationship between its bilateral investment flows and profits tax rate would be similar. Indeed, the result for Hong Kong (0.049) is quite similar to

that of the most directly comparable study of OECD countries (0.042), which is listed as a reference.

24.	It is quite straightforward to apply the estimated semi-elasticity to current data on Hong Kong's investment flows. The implications of a one percentage point increase in the profits tax rate for Hong Kong's capital account, based on 2013 statistics, would be the following:

	Actual Value in 2013	Hypothetical Value in 2013 if Profits Tax were Raised
In billions of HKD		
Inward DI flows	576.2	548.8
Outward DI flows	626.5	657.8
Net DI flows	-50.3	-109.0
As percentage of 2013 GDP		
Inward DI flows	27.1	25.8
Outward DI flows	29.5	30.9
Net DI flows	-2.4	-5.1

25.	In other words, the capital account net outflow would worsen by about 2.7 percent of GDP as Hong Kong attracts less external investment and sends more of its savings overseas.

26.	The relationship between FDI and long-term economic growth has also been the subject of numerous studies (see the list of references for a review). In general, the most positive effects of FDI on long-term economic growth tend to be found in economies that have developed financial markets, an educated labour force, and a high degree of openness to trade. As Hong Kong possesses these characteristics, and as Hong Kong is also very externally-oriented and a favoured location for corporate headquarters, an increase in the profit tax rate would inevitably reduce Hong Kong's attractiveness as a place of doing business, with further ramifications on future growth prospects.

REFERENCES

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Annex I: Estimates of a Model of Bilateral Investment Flows with 1998-2013 Data

Variable	Estimated Coefficient	Robust Standard Error	p value
Main Equation			
Intercept: Hong Kong to Bermuda	4.314	0.533	<0.001
Intercept: Hong Kong to British Virgin Islands	3.328	0.573	<0.001
Intercept: Hong Kong to Cayman Islands	-0.614	0.274	0.025
Intercept: Hong Kong to Japan	-10.599	2.786	<0.001
Intercept: Hong Kong to Mainland China	-7.562	2.409	0.002
Intercept: Hong Kong to the Netherlands	-7.176	1.972	<0.001
Intercept: Hong Kong to Singapore	-5.512	1.441	<0.001
Intercept: Hong Kong to the United Kingdom	-9.303	2.486	<0.001
Intercept: Hong Kong to the United States of America	-10.925	3.117	<0.001
Intercept: Bermuda to Hong Kong	-6.251	1.735	<0.001
Intercept: British Virgin Islands to Hong Kong	-4.536	1.763	0.010
Intercept: Cayman Islands to Hong Kong	-6.580	1.837	<0.001
Intercept: Mainland China to Hong Kong	-2.481	1.423	0.081
Intercept: Singapore to Hong Kong	-6.272	1.502	<0.001
Intercept: United Kingdom to Hong Kong	-5.673	1.502	<0.001
Intercept: United States of America to Hong Kong	-4.764	1.352	<0.001
Intercept: Australia to Hong Kong	-6.086	1.508	<0.001
Intercept: Canada to Hong Kong	-4.889	1.380	<0.001
Lag Log GDP of Source Economy	1.155	0.356	0.001
Hong Kong Output Gap (as % of potential GDP)	0.057	0.017	0.001
Statutory Profit Tax Rate in Destination Economy Minus Statutory Profit Tax Rate in Source Economy	-0.049	0.020	0.013
WTO Indicator (=1 in 2000)	0.578	0.118	<0.001
Dodd-Frank Indicator (=0.5 in 2010 and =1 after 2010 for flows to Hong Kong)	0.311	0.163	0.055
Dodd-Frank USA Indicator (=0.5 in 2010 and =1 after 2010 for flows from Hong Kong to the USA)	-1.373	0.433	<0.001
Selection Equation			
Intercept	0.671	0.133	<0.001
Inflow Indicator (=1 for flows to Hong Kong)	0.401	0.165	0.015
Lag Investment Position of Source Economy	3.38×10^{-5}	3.01×10^{-5}	0.261
Observations	287		
R-Squared	0.747		

External Direct Investment Flows to Hong Kong

External Direct Investment Flows from Hong Kong