



# 香港地產建設商會

## THE REAL ESTATE DEVELOPERS ASSOCIATION OF HONG KONG

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27 October 2017

Clerk to Bills Committee on  
Stamp Duty (Amendment) Bill 2017  
& Stamp Duty (Amendment) (No.2) Bill 2017  
Legislative Council Complex  
1 Legislative Council Road  
Central, Hong Kong

**Attention: Ms. Connie Ho**

Dear Madam,

### **Stamp Duty (Amendment) (No. 2) Bill 2017**

We thank you for your letter of 12 October.

In April this year, we wrote to the Bills Committee with our comments regarding the introduction of a new flat rate of 15% of AVD as another round of Demand Management Measures. At that time, we said, "... should any one of those extraordinary measures under exceptional circumstances be effective in any way, there should be no need for a second round, then a third round and now this fourth round!" Our view remains the same today. This current Bill is part and parcel of a policy which has certainly outlived its "use by" date.

We are aware that Professor Ho Lok-sang has recently completed a study in which he has uncovered the many undesirable effects of the various "extraordinary measures under exceptional circumstances". We trust the Honourable Members may be interested in this study and are pleased to enclose a copy of Professor Ho's paper for their reference.

Yours sincerely

Louis Loong  
Secretary General

## **Housing Policy in Urgent Need of Revamp**

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### **Summary**

*The current use of extraordinary stamp duties for “demand management” has produced many undesirable effects and is certainly defeating the purpose of helping Hong Kong people live in better housing. Many homeowners, deterred by the Special Stamp Duty, prefer to stay put rather than trading up to better homes. In so doing they are holding back the supply of existing homes in the second-hand market. A similar effect is caused by the Double Stamp Duty (later amended as the uniform 15% ad valorem tax) applicable when a property owner buys another property. Fearing that if they should sell any unit, they will have to incur the punitive 15% tax when they want to buy again, many investors would not sell their holdings. This is behind the surge of starter home prices which have incentivized developers into building more “nano-homes” for higher profit. As more people live in substandard housing, the demand for public housing also surges. These special stamp duties were introduced as extraordinary measures under exceptional circumstances. The evidence shows that they are now causing more harm than good. Thus they really should be abolished, but if Government wished to take intermediate steps, the harm may be alleviated by (1) exempting the principal residence from the SSD, regardless of the time held before resale, and (2) allowing investors exemption from the 15% ad valorem tax as long as they do not increase the number of properties held. Some evidence of the counterproductive effects of the extraordinary stamp duties is presented. Some other housing policy initiatives are explored.*

## **1. Introduction: The Enigma of Hong Kong as the Freest Economy Yet Levying the World's heaviest transaction taxes on properties**

It is an enigma that while Hong Kong has been named as the world's freest economy, it has also imposed extraordinary and highly distortionary taxes on real estate transactions. Since November 2010 Hong Kong has introduced, by stages, the Special Stamp Duty, then the enhanced Special Stamp Duty and the Buyer's Stamp Duty, then the Double Stamp Duty. This last *ad valorem* tax was later enhanced and unified to become the 15% tax levied on all residential properties newly purchased if one already owns one. All of these stamp duties were part of a "demand management" strategy aimed at curtailing demand. They will be called "extraordinary stamp duties" in the following, and they all belong to the category of taxes called transactions taxes, which are acknowledged by economists to be highly distortionary and inefficient.<sup>1</sup>

Among all extraordinary stamp duties<sup>2</sup>, the Buyer's Stamp Duty is the only one that may make sense in Hong Kong's context today, but it should be levied only on foreign buyers who do not reside in Hong Kong. Foreigners who do not reside in Hong Kong naturally have less need than those who do. When supply is short, it is ostensibly justifiable to ask these foreigners to pay an extra tax. But being a cosmopolitan city, Hong Kong really should treat expatriates who work in Hong Kong like Hong Kongers, and allow them to buy their homes just as other Hong Kongers do—without the punitive stamp duty. They are not taking any welfare benefit and are paying the market price to buy their homes. Today's Buyer's Stamp Duty is not only levied on foreigners including expatriates who work in Hong Kong, but also on Hong Kong companies in order to combat tax avoidance. Unfortunately, the cost is huge. Genuine Hong Kong companies are hit. One collateral damage from the BSD is that all property investment activities for the purpose of preservation and renovation have stopped completely. Unlike the case of buying for demolition and redevelopment, there is no provision for BSD refund in the case of preservation and renovation.

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<sup>1</sup> "It is always less distortionary to tax the income and services provided by assets than the transaction involved in acquiring or disposing of them." Tax Reform and Economic Growth, OECD Tax Policy Studies: OECD 2010, p. 119.

<sup>2</sup> A chronology of the extraordinary stamp duties can be found in the Appendix.

## 2. The Heavy Cost of Transaction Taxes

As for the other extraordinary stamp duties, social costs are all higher than benefit. Apart from the regular or normal stamp duty, they do not have a place in Hong Kong.

What are these social costs?

### *The Special Stamp Duty Hurts the Welfare of Potential Buyers and Sellers and Prevent Them from Improving Their Living Conditions*

The most obvious one, of course, is that all these transaction taxes take a toll on transactions.<sup>3</sup> When a transaction is lost, both the potential buyer and the potential seller have lost the gains that could have been realized. When the Special Stamp Duty prevails, the seller who would have liked to sell and trade up to a better unit is likely to stick to the unit that he had wanted to sell. Trading up would have allowed them to live in a more spacious flat and would have released their homes to entry-level buyers. As existing owners stay put instead of trading up to better housing, they have given up an opportunity to improve their living conditions. Since a transaction involves a buyer and a seller, just as the seller gives up a benefit, so the potential buyer also gives up a benefit: the benefit of buying the unit in the existing homes market, and thus improving their living conditions.

The Special Stamp Duty has dramatically reduced the supply of entry level homes, directly causing a run-up in their prices. This is making buying the first home more difficult and more precarious for first time buyers, since many of them are not rich and cannot afford price declines, and they are paying very high prices.

### *Fewer Transactions Drag down Overall Economic Performance*

The relationship between the housing market and the macroeconomy has been studied using Hong Kong data by Ho and Wong (2008). There it was found that housing market booms and busts produce a huge effect on domestic demand. A recent paper

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<sup>3</sup> See Hu(2017) and Best and Kleven(2016)



by two top economists using UK data<sup>4</sup> found that “temporary transaction tax cuts are an enormously effective form of fiscal stimulus.” A corollary of this is that the imposition of transaction tax that is expected to be temporary is an enormously strong form of fiscal cooling, implying significant negative effect on the economy. The positive effects of property price increases on the economy have been demonstrated repeatedly, and they largely consist of a wealth effect that boosts consumption, and a credit bolstering effect that encourages borrowing and investment. A statistical exercise, presented in the Appendix, shows that the SSD and associated extraordinary stamp duties has reduced the positive effects of housing prices on domestic demand.

Declines in the volume of transactions also have more direct effects on the economy, because many economic activities are directly associated with housing transactions. Taking the brunt of the blow is the property brokers, who have to rely on transactions to earn a commission. Related is the lawyers who specialize in property conveyancing. Because fewer homeowners trade up, the demand for home moving services also falls, and there will also be a decline in retail sales as typically moving to a new home would entail replacement of some home furnishings.

It is no accident that Hong Kong’s economic growth has been subdued since 2010.

#### *Extraordinary Stamp Duties Actually Boosted Housing Prices Esp. for Smaller Flats*

Evidence that the Special Stamp Duty actually drives up home prices, especially for starter homes is not difficult to come by. Before the SSD was introduced, the housing market was operating smoothly, and in such normal times the price increases of starter homes typically lag behind those of larger homes when the market is on an upward trend. **Figure 1** shows how the housing price index for Class A compares with that for the combined Class D and Class E, where A refers to the smallest units with salable area less than 40m<sup>2</sup> and D and E refer to those at or bigger than 100m<sup>2</sup>. They started off at 100 in 1999. Through 2008, the biggest flats had enjoyed price

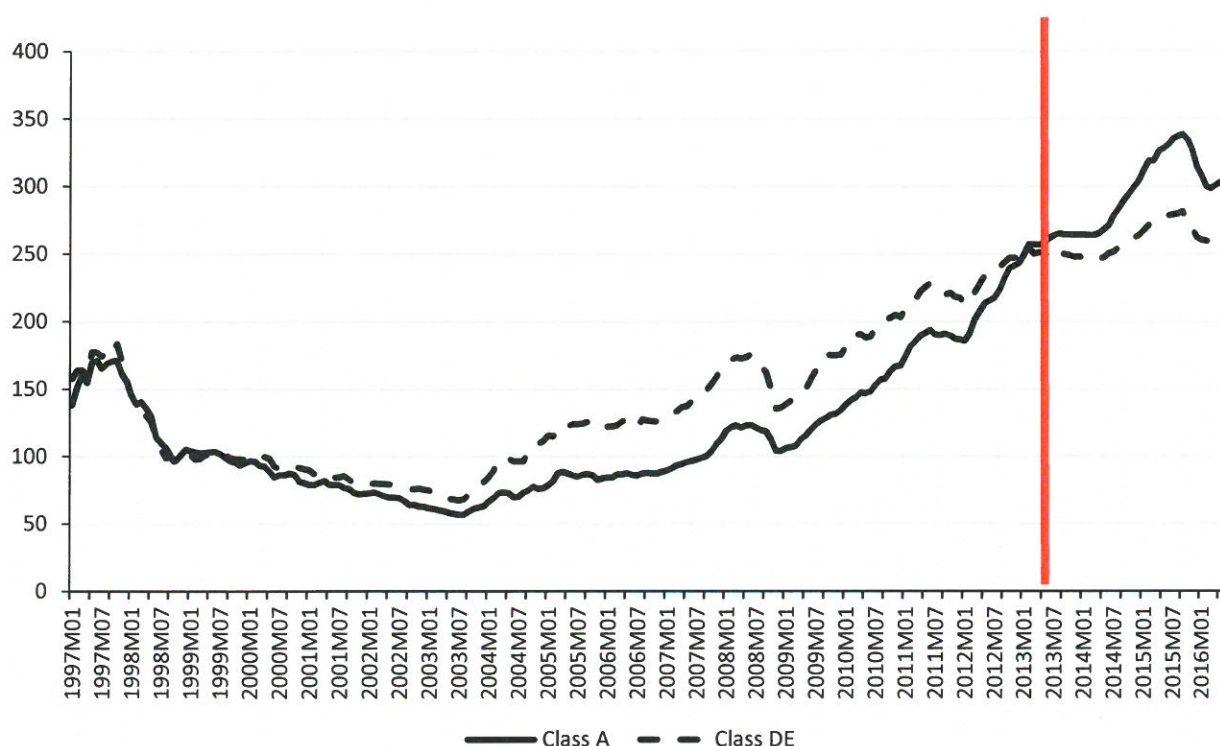
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<sup>4</sup> Michael Carlos Best & Henrik Jacobsen Kleven of Stanford University and the London School of Economics respectively, in a paper had two important findings. They found that transaction taxes are highly distortionary across a range of margins, causing large distortions to the price, volume and timing of property transactions. They also found that temporary transaction tax cuts are an enormously effective form of fiscal stimulus. See “Housing Market Responses to Transaction Taxes: Evidence From Notches and Stimulus in the UK” available from:

[https://stanford.edu/~mbest/best-kleven\\_landnotches\\_sep2016.pdf](https://stanford.edu/~mbest/best-kleven_landnotches_sep2016.pdf)

increases far bigger than those of the smallest flats. From 2008 to 2009 the gap narrowed as the Global Financial Tsunami hit the biggest flats the hardest. But when housing prices rose again, the gap widened as before—until the end of 2010. Following the introduction of the SSD, and throughout the period after, the gap between the two indices shrank, eventually ending up in a dramatic reversal, as the price index for the smallest flats overtook that for the biggest flats.

**Figure 1: Historical movement of house price index of Class A versus Class DE (1997M1-2016M6)**



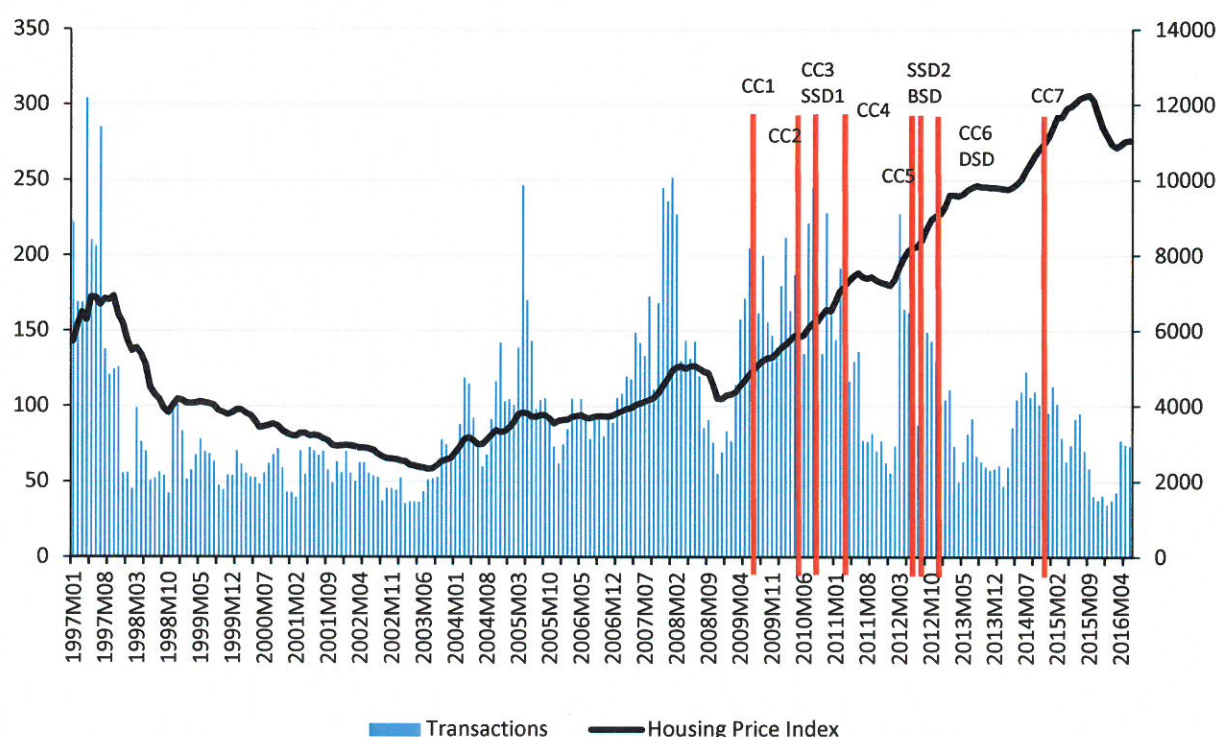
Notes: The solid line represents the house price index of Class A. The dash line represents the house price index of Class D&E. The vertical line refers to the start of counter-cyclical measures in October 2009.

From this perspective, the Special Stamp Duty not only hurts potential sellers and buyers, but also produces spillover effects that hurt other homeowners and buyers as well. The Double Stamp Duty has aggravated the situation, because a homeowner who wants to trade up normally would firm up a purchase before selling his current home. Because this would make them liable to pay the double stamp duty, they may refrain from trading up, unless they can be exempted. The SAR Government eventually allowed homeowners who trade up to have half a year to sell their own



homes and still be exempt from the double stamp duty and later the 15% ad valorem tax that replaced it.

**Figure 2: Aggregate house price index (1999=100), transaction volumes and the timeline of cooling measures (1997M1-2016M6)**



Notes: The house price index (LHS) and transaction volumes (RHS) are at monthly frequency. The house price index is quality adjusted and refers to the house price in the private secondary residential housing market. The vertical lines indicate the time when each round of cooling measures is introduced. CC1 and CC2 refer to the first and second round of counter-cyclical HKMA measures in Oct 2009 and Aug 2010 respectively. CC3 to CC7 refers to the subsequent rounds of counter-cyclical HKMA measures. SSD1 and SSD2 refer to the special stamp duty and its enhancement in Nov 2010 and Oct 2012 respectively.

Source: Hu Mengna(2017) using data from Rating and Valuation Department; Midland Realty database

Although the rate of price inflation for the bigger flats fell behind that for the smallest flats, they were nevertheless positive. Thus the aggregate house price index continued to rise notwithstanding the various “demand management measures” including the SSD, the Buyer Stamp Duty, and the Double Stamp Duty. **Figure 2**

shows that apparently the demand management measures not only did not slow down the price inflation of dwelling units in Hong Kong, but also might have exacerbated the inflation.

*SSD and Related Stamp Duties Helped Motivate Development of Ultra-small Flats and Subdivided Flats, Contributing to a Sharp Demand for Public Rental Housing*

In recent years, developers have become prone to producing very tiny flats—whose size had been unheard of in the past. These flats had been dubbed “nano flats.” There was a report that flats no more than the size of a parking space were sold as self-contained flats. According to the SCMP, “nano flats” with sizes starting from 128 square feet (12 square meters) – are now under construction at TPlus in Tuen Mun and will be leased for HK\$4,000 per month, or HK\$31 per sq ft.<sup>5</sup> This is a market response to the increase in the square foot prices of smaller flats, which in turn is due to a decline in supply because the upward movement of households to bigger flats has stalled thanks to the SSD and other stamp duties that raise transaction costs. Another related development is the sharp rise in the rentals of rooms subdivided from a regular flat. Because the supply of flats for starter homes is so low on account of the SSD, many people cannot afford them and have to make do with partitions from flats. As the population of those living in substandard housing goes up, so does the demand for public housing. According to the Housing Authority, at the end of March 2017, there were roughly 147 300 general applications for Public Rental Housing, and about 128 600 non-elderly one-person applications under the Quota and Points System. The average waiting time for general applicants had risen to 4.6 years, while that for elderly one-person applicants was 2.6 years.<sup>6</sup>

### **3. Policy Recommendations**

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<sup>5</sup> “Tuen Mun’s ‘nano flats’, smaller than standard car parking lots, command outsize rents,” SCMP July 13 2017. See <http://www.scmp.com/property/hong-kong-china/article/2102556/nano-flats-tuen-mun-command-outsize-rental-rates-agents-say>

<sup>6</sup> <https://www.housingauthority.gov.hk/en/about-us/publications-and-statistics/prh-applications-average-waiting-time/>



It is possible to make small changes to the existing measures to reduce the negative impacts.

To minimize the negative effects of the SSD, we can allow the owner occupier to be exempt from the SSD if he sells his currently occupied unit, whether or not it is resold within three years after he first purchased it. This would immediately take away the worry that in the event circumstances require the resale of the unit which the household had traded up to, it would be liable to a heavy tax. This change is very small, but it would immediately free households from that worry and may trigger much trading-up activity. As I have explained, this will increase the supply of starter homes, and will allow many households to improve their living conditions. This change is much better than extending the tax-exempt period from 6 months to 12 months. The household may just sell, and wait for an opportune time to buy again. The freedom to sell and buy at any time and still be exempt from the SSD as long as the unit concerned is for owner-occupancy will be a great relief for households, and will not benefit any speculators.

Another initiative, which is consistent with minimal change of the existing measures and yet may help increase transaction activities, is to allow investors who already have more than one housing unit to register with the Land Registry. After registration, they can dispose a unit of their properties and are eligible to buy another one any time without incurring the 15% ad valorem tax. This policy means that only additions to existing holdings will become taxable. With this change, investors will be better prepared to sell their units without the fear that should they buy again they would have to pay an extra 15%. I believe the proposed change will encourage investors to sell some of their holdings in the near future, thus helping to alleviate upward pressures on prices. Although they may buy again to replenish their stocks, supply will be greater in the future, and in any case any net increase in holdings will still be taxable.

In addition, changing the pricing formula and resale restrictions of new HOS housing may be appropriate. The key to stemming panicky buying lies in changing people's expectations. If HOS prices are no longer tied to those of private flats buyers can wait. It is proposed that the government announce that Hong Kong permanent residents who are married are eligible to buy one starter home in their life time at a price that is tied to the median household income, such as 10 times annual household income. The units as starter homes are relatively small in size, with a usable area of

400 square feet, so that the buyers will have the incentive to move out if their financial conditions allow.<sup>7</sup> The units can only be used as owner occupied housing and owners are not allowed to own other properties in Hong Kong. They can only be resold to other couples who are eligible for the new HOS housing without having to repay a land premium. Of course location and other factors that affect property values mean that the pricing formula applies in an “average sense” only, allowing upward or downward deviations depending on location. This revised formula of pricing for new, for-couple-only, HOS housing will immediately alleviate the urge to buy, because the government’s commitment to allow eligible households to buy at a price that will not rise faster than incomes will prove a strong incentive not to rush in, lest prices might rise beyond their means later.

To recapitulate: we recommend:

- (1) That the SSD be changed so that principal residences are exempt from it. A homeowner on reselling his own home can register with the Land Registry that he has done so, and then a new unit purchased for the purpose of principal residence will not be subject to the SSD, regardless of when it is resold.
- (2) That investors can register with the Land Registry the number of units held. After registration, they are allowed to sell and buy without incurring the *ad valorem* tax of 15%, as long as the total holdings do not increase beyond the number registered.
- (3) For subsidized homeownership housing, it will be highly desirable to require owners not to own private homes, and to restrict resale only to those who are eligible to buy subsidized homeownership housing. If these rules are in force, then no land price premium should be payable. These rules will take away the investment motive to buy HOS housing, and reduce the prices of HOS housing in the second hand market.
- (4) In the future, the average price of HOS housing can be set at some multiple of median household income—with variations upward or downward depending on

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<sup>7</sup> Ho(1995) argues that since higher income people prefer better housing, a modest home that meets only basic needs will be given up in favour of better homes as incomes go up. He recommends that subsidized owner occupied housing should be resalable only to those within the target group for the subsidized housing.

floor, location, and other factors. This will take away the fear that housing price increases will outpace income increases.

- (5) It is important to keep public housing modest or relatively basic, so that those with sufficient savings will move out to improve their housing conditions. This way public housing will be more likely to help the most needy people. Public housing with its very low rent should be considered as the first step in the housing ladder, since public housing tenants are in the position to accumulate savings for a home purchase.(Ho and Wong, 2009)



#### **4. Concluding Remarks**

The big transformation of Hong Kong's housing market, from one in which second-hand transactions dominate, to one in which new home transactions dominate, is a sad story that spells troubles down the road.

First, with first time buyers now largely bypassing the second hand market, because there is very little supply in that market, a crisis is in the making. Entry level homes are getting pricier and pricier and smaller and smaller. With developers targeting mainly first time buyers, they are providing high loan-to-value ratio mortgages and supplying smaller and smaller units. First time buyers are exposed to very high risks and their purchasing power will eventually reach some limit—since there is a lower bound to the size of a flat. A crash that devastate the buyers of smaller new homes will be socially disruptive.

Second, the developers of new homes may be seen to be benefiting at the expense of the weak buyers and existing home sellers, and the government may be seen to be benefiting the big developers, wittingly or unwittingly. This undermines the image of the SAR Government, and generates social discontent.

It is important that we restore the health of the housing market by reviving transactions in the second hand market. This will benefit everybody: homebuyers as well as existing homeowners. Even developers and the wider economy will benefit, because a housing market with more vibrant second hand transactions is a more sustainable market.

It is high time for the various special stamp duties to be corrected.

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[https://stanford.edu/~mbest/best-kleven\\_landnotches\\_sep2016.pdf](https://stanford.edu/~mbest/best-kleven_landnotches_sep2016.pdf)

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**Table 1: Extraordinary Stamp Duty Measures Since November 2010**

|                                     | <b>Special Stamp Duty (SSD)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Buyer's Stamp Duty (BSD)</b>                                                                                                                                                                                                                                                                                                | <b>New Ad Valorem Stamp Duty (New AVSD)</b>                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Nature of property affected:</b> | Residential [1]                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Residential                                                                                                                                                                                                                                                                                                                    | Residential and Non-Residential                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Summary:</b>                     | <p>SSD is payable on any residential property acquired, either by an individual or a company, and resold within (i) 24 months if the property was acquired between 20 November 2010 and 26 October 2012; or (ii) 36 months if the property was acquired on or after 27 October 2012. SSD is assessed at rates varying from 5% to 20% (depending on the period the property was held for) and is payable in addition to Original AVSD or New AVSD and BSD (as applicable). There</p> | <p>BSD of 15% payable (in addition to New AVSD and SSD, where applicable, which may be payable) on the acquisition of residential property by persons who are not HKPR who are acting on their own behalf, and the acquisition of residential property by companies. There are certain other exemptions, as set out below.</p> | <p>New AVSD at flat rate of 15% is payable on the acquisition of any residential or non-residential property except by a HKPR acting on his own behalf who does not own any other residential property in Hong Kong at the time of the acquisition. Such HKPR will pay Original AVSD. There are certain other exemptions, as set out below. If an exemption applies, either Original AVSD will be payable, or no stamp duty will be payable/relief will be available.</p> |



|                        |                                                                                                                                        |                  |                   |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|
|                        | are certain exemptions, as set out below.                                                                                              |                  |                   |
| <b>Effective Date:</b> | <p>Introduced with effect from 20 November 2010.</p> <p>Application extended and rates increased with effect from 27 October 2012.</p> | 27 October 2012. | 23 February 2013. |

## Appendix

Statistical proof of the effect of the extraordinary stamp duties on the GDP can be obtained using a “Vector Autoregressive Model” with “Cointegration” involving Real Domestic Demand (comprising Real Consumption plus Real Investment, Real Exports, Real Interest Rate as Measured by (Prime Rate Minus Inflation or Expected Inflation), and the SSD Dummy, which takes on the value of 0 at and prior to 2010, and the value of unity thereafter, and lagged variables of the real housing price index and the real prime rate. Real housing price index is obtained by dividing the housing price index with the CPI.

Key preliminary results of the “cointegration tests” using time series data from 2004 to the second quarter of 2016 will be presented as follows. We have two “cointegration equations” which show how key variables are related among themselves in a long run relationship. The first one shows the Real Housing Price as positively driven by Real Total Exports, and negatively driven by Real Interest Rate. The second one shows Real Domestic Demand as positively driven by Real Exports, Real Housing Price Index, Real Interest Rate, and an interactive variable defined as the multiplicative product between Real Housing Price Index and the Special Stamp Duty Dummy. All the variables herein other than the dummy variable that indicate the application of the extraordinary stamp duties and the real interest rates are in logarithmic form. It was found that the extraordinary stamp duties do have a negative and statistically significant impact on Real Domestic Demand. The key results of the statistical exercise are the following, which are obtained by using an advanced econometric technique called VAR model and cointegration<sup>8</sup>:

$$\text{LRPPI}(-1) = - 25.405452 + .358902 \text{LTXSA}(-1) - 0.009076 \text{RPMRATE}(-1) \quad [\text{eqn. 1}]$$

$$\text{LDDSA}(-1) = 11.46010 + 0.456916 \text{LRPPI}(-1) - 0.006648 \text{RPRE}(-1) - 0.011225 \text{SSD}(-1) * \text{LRPPI}(-1) \quad [\text{eqn. 2}]$$

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<sup>8</sup> The models are greatly simplified to highlight the effects of the extraordinary stamp duties on domestic demand. For an introduction to VAR and cointegration techniques, see:

[http://statmath.wu.ac.at/~hauser/LVs/FinEtricsQF/FEtrics\\_Chp4.pdf](http://statmath.wu.ac.at/~hauser/LVs/FinEtricsQF/FEtrics_Chp4.pdf) and  
[http://pages.stern.nyu.edu/~dbackus/Identification/VARs/Watson\\_VARs\\_handbook\\_94.pdf](http://pages.stern.nyu.edu/~dbackus/Identification/VARs/Watson_VARs_handbook_94.pdf)

The first equation says that real home prices (RPPI) (real means that the price indices have been adjusted for inflation so that a rise is a rise in real price) are positively related to Hong Kong's total exports TXSA (seasonally adjusted as well as deflated by the consumer price index), and negatively related to the mortgage rate(prime rate based, and expressed as real interest rate by deducting an estimated expected inflation rate).

The second equation says that domestic demand (comprising consumption and investment, and expressed in real terms by deflating with the consumer price index) is positively related to the real residential price index RPPI, negatively related to the real prime rate RPRE, and more importantly, negatively related to an interactive variable that is the product of the Special Stamp Duty dummy and the real housing price index.

The second equation suggests that a one per cent rise in the real housing price index(i.e., after subtracting the expected rate of inflation), would lead to a 0.4569% rise in real domestic demand, yet the introduction of the SSD and other related measures reduces this positive impact by 0.011 percentage point, to 0.4457%. Although the magnitude of decline is numerically not very big, it is statistically significant with a t statistic of 3.23.

**Table 2: Cointegration Equations VAR Model Showing Negative Impacts of the Extraordinary Stamp Duties on Real Domestic Demand(Investment plus Consumption)**

| Vector Error Correction Estimates |          |            | Chi-square(3) | 16.87607 |
|-----------------------------------|----------|------------|---------------|----------|
| Date: 07/25/17 Time: 17:47        |          |            | Probability   | 0.000749 |
| Sample (adjusted): 2004Q3 2016Q2  |          |            |               |          |
| Cointegrating Eq:                 | CointEq1 | CointEq2   |               |          |
| LRPPI(-1)                         | 1.000000 | -0.456916  |               |          |
|                                   |          | (0.03647)  |               |          |
|                                   |          | [-12.5269] |               |          |
|                                   |          |            |               |          |
| LDDSA(-1)                         | 0.000000 | 1.000000   |               |          |

|                   |            |            |            |            |            |              |
|-------------------|------------|------------|------------|------------|------------|--------------|
|                   |            |            |            |            |            |              |
| LTXSA(-1)         | -2.358902  | 0.000000   |            |            |            |              |
|                   | (0.13982)  |            |            |            |            |              |
|                   | [-16.8707] |            |            |            |            |              |
|                   |            |            |            |            |            |              |
| RPMRATE(-1)       | 0.009076   | 0.000000   |            |            |            |              |
|                   | (0.00749)  |            |            |            |            |              |
|                   | [ 1.21093] |            |            |            |            |              |
|                   |            |            |            |            |            |              |
| RPRE(-1)          | 0.000000   | 0.006648   |            |            |            |              |
|                   |            | (0.00363)  |            |            |            |              |
|                   |            | [ 1.83385] |            |            |            |              |
|                   |            |            |            |            |            |              |
| SSD(-1)*LRPPI(-1) | 0.000000   | 0.011225   |            |            |            |              |
|                   |            | (0.00348)  |            |            |            |              |
|                   |            | [ 3.22672] |            |            |            |              |
|                   |            |            |            |            |            |              |
| C                 | 25.40545   | -11.46010  |            |            |            |              |
| Error Correction: | D(LRPPI)   | D(LDDSA)   | D(LTXSA)   | D(RPMRATE) | D(RPRE)    | D(SSD*LRPPI) |
| CointEq1          | -0.603907  | 0.042605   | 0.078720   | 0.887284   | -1.103869  | 3.438318     |
|                   | (0.21375)  | (0.12549)  | (0.06478)  | (2.15507)  | (1.96261)  | (3.65218)    |
|                   | [-2.82533] | [ 0.33952] | [ 1.21522] | [ 0.41172] | [-0.56245] | [ 0.94144]   |
|                   |            |            |            |            |            |              |
| CointEq2          | 0.095575   | -0.875338  | 0.240279   | -4.833865  | -2.984478  | 3.688674     |



|  |            |            |            |            |            |            |
|--|------------|------------|------------|------------|------------|------------|
|  | (0.37841)  | (0.22215)  | (0.11468)  | (3.81524)  | (3.47452)  | (6.46567)  |
|  | [ 0.25257] | [-3.94024] | [ 2.09520] | [-1.26699] | [-0.85896] | [ 0.57050] |