香 港 特 別 行 政 區 政 府
The Government of the Hong Kong Special Administrative Region

房 屋 及 規 劃 地 政 局

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21 December 2006

Clerk to LegCo Panel on Housing
Legislative Council Secretariat
Legislative Council Building
8 Jackson Road
Central
Hong Kong
(Attn: Ms Sarah Yuen)

Dear Ms Yuen,

Legislative Council Panel on Housing
Meeting on 4 December 2006

Thank you for your letter of 6 December 2006.

As part of the public consultation on the review of domestic rent policy, the Housing Authority (HA) commissioned an independent consultancy firm to conduct a telephone opinion survey on the various proposals set out in the consultation paper. A summary of the survey findings has been set out at Appendix II to Annex B to the Report on the Review of Domestic Rent Policy (the Report). The relevant extracts from the Report are attached at **Annex A** for easy reference.

As regards Members' concern about possible manipulation of the outcome in compiling the income index, we wish to assure Members that the Administration and the HA are committed to developing a fair, objective and impartial framework for implementing the income-based rent adjustment mechanism, including the compilation of the income index. We are confident that the proposed implementation framework would stand up to the most rigorous public scrutiny, the reasons being that –

(a) the detailed computation methodology and operation of the proposed income index have been laid down at Annex C to the Report, the extracts from which are at **Annex B**. The main objective of compiling the income index is to track the "pure income change" of PRH tenants' household income between the first and second period relevant to a particular rent review that is free from the potential distortion brought about by the changes in household size distribution over these two periods. The established statistical method of doing this is to keep the household size distribution of PRH tenants constant in any one particular rent review cycle for the purpose of assessing the mean household income of all PRH tenants. In this respect, the Report has stated very clearly that when compiling the income index to reflect PRH tenants' income change between the first and second period of a rent review, the household size distribution in the first period will be used as the reference;

(b) how the HA compiles the income index and adjusts PRH rent according to the income index will be governed by statute. As noted in our last submission to the Panel (LC Paper No. CB(1) 394/06-07 (03)), the Administration will introduce new provisions to the Housing Ordinance prescribing the operation of the income-based rent adjustment mechanism. Subject to LegCo's enactment of the Amendment Bill which will be put to LegCo in end January 2007, the HA will be required by law to, inter alia, -

(i) vary PRH rent according to the rate of the increase or decrease of the income index;

(ii) compile the income index to reflect the change in the mean household income of PRH tenants on the basis of the distribution of the household size in the first period of a rent review; and

(iii) adopt the income data covering the respective 12 months immediately preceding the first and second period in a rent review for compiling the income index;

(c)   the Amendment Bill will specify which household size distribution is to be adopted for compiling the income index, i.e., the household size distribution in the first period of a rent review.   There is therefore no question of the HA or the Administration being able to "arbitrarily determine how and when to update the pattern of household size distribution to suit its needs"; and

(d)   to enhance the impartiality and objectivity in the compilation of the income index, the HA may entrust the task to a public body or tertiary institution.   In this connection, the Census and Statistics Department (C&SD) has agreed to undertake the computation on behalf of the HA.

        With such a transparent and tight legislative and administrative framework that we will put in place for compiling the income index, Members can rest assured that the major parameters are well-defined and there is little scope for the HA or the Administration to arbitrarily tamper with the computation.

        I should be grateful if you would relay the above information to Members of the Panel on Housing.

Yours sincerely,

(Carlson K.S. Chan)
for Secretary for Housing, Planning and Lands

Survey on Domestic Rent Policy Annex A

Introduction

1. As part of the public consultation, the Committee commissioned an independent consultancy firm to conduct a telephone survey to collect the opinions from the general public towards the various issues raised in the Consultation Paper. The survey was targeted at people aged 18 or above who were living in different types of housing (PRH, subsidized sale flats and private housing) and could be reached by domestic telephone lines. The data and information required by the survey was collected through telephone interviews during the period from late March to early May 2006.

2. A random sample of about 5 380 domestic telephone numbers were drawn from a telephone directory for the survey. Some 3 010 people were successfully interviewed, constituting a response rate of 56%.

Profile of Respondents

3. Of the 3 010 people taking part in the survey, 30.7% were living in PRH, 15.7% in subsidized sale flats (SSF) and 53.6% in private housing. The pattern of distribution of housing type of the respondents is largely in accord with that estimated by the C&SD. The corresponding statistics based on the C&SD's General Household Survey were 30.7%, 18.7% and 50.6% in the first quarter of 2006. For statistical purposes, the overall survey results have been weighted using the C&SD's statistics for reflecting more precisely the aggregate views of the respondents residing in different types of housing.

Main Survey Findings

Rent adjustment mechanism

4. On the question of whether a rent adjustment mechanism should be established to provide for both upward or downward adjustment with reference to some pointer index, some 65% of the people under the coverage of the survey were in favour of establishing such a mechanism; 17% of them held the opposite view and the remaining 18% had no comments. More people living in SSF and private housing than their counterparts in PRH tended to support the establishment of a rent adjustment mechanism. Some 71% - 72% of the residents in SSF and private housing were in support of such a mechanism and 11% - 12% against it. For the tenants in PRH, 52% of them were supportive of the proposal and 28% opposed it.

Opinions on establishment of a rent adjustment mechanism

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Supported	51.6	72.1	70.9	65.2
Not supported	27.7	11.2	11.6	16.5
No comment	20.7	16.7	17.5	18.3
Overall	100.0	100.0	100.0	100.0

Note: Percentage may not add up to 100% due to rounding.

5. The main reasons given by those who supported a rent adjustment mechanism were "it is a fair arrangement if the overall rent level can be adjusted upward or downward" (47%) and "the rent level can accord with the changes in economic situation" (35%).

Top three reasons for supporting a rent adjustment mechanism

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
It is a fair arrangement if the overall rent level can be adjusted upward or downward	49.2	45.2	47.4	**47.4**
It can accord with the changes in economic situation	29.0	39.0	36.0	**34.9**
It is a flexible system	2.9	5.0	6.6	**5.4**

Note: A respondent could give multiple answers.

6. Among those who opposed the setting up of a rent adjustment mechanism, they mainly cited such reasons as "it is useless as rent of PRH will definitely rise only", "the current adjustment system is alright", "objection to any rent increase for PRH" and "rent adjustments should take account of the circumstances of individual households".

Top five reasons for opposing a rent adjustment mechanism

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
It is useless as rent of PRH will definitely rise only	42.6	28.3	25.1	**34.6**
The current adjustment system is alright	16.8	15.1	15.5	**16.1**
Object to any rent increase for PRH	14.8	11.3	6.4	**11.4**
Rent adjustments should take into account the circumstances of individual households	5.9	15.1	15.0	**10.3**
The mechanism is not fair	3.9	9.4	12.3	**7.6**

Note: A respondent could give multiple answers.

7. The respondents supporting the establishment of a rent adjustment mechanism were further enquired about whether the CPI, income-based index of households in PRH or the cost of operating PRH should be adopted as a reference for rent adjustment. Of those in support of a rent adjustment mechanism, 58% opted for income-based index of households in PRH, 26% preferred CPI and 9% went for the operation cost of PRH.

Views on the preferred rent adjustment reference index

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Income-based Index	64.3	56.3	55.5	57.8
CPI	20.0	25.8	29.4	26.4
Operating cost of PRH	7.6	11.1	9.1	9.1
Others	7.4	6.5	5.7	6.2
No comment	0.8	0.3	0.3	0.4
Overall	100.0	100.0	100.0	100.0

Note: Percentage may not add up to 100% due to rounding.

8. The overall views from members of the public on whether a rent adjustment mechanism for PRH should be set up and, if so, the options of the reference index to be adopted, are summarized in the following table.

Views on the rent adjustment mechanism and the preferred reference index

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Supported a rent adjustment mechanism	51.6	72.1	70.9	65.2
Reference index to be adopted – Income-based Index	33.2	40.6	39.4	37.7
– CPI	10.3	18.6	20.9	17.2
– Operating cost of PRH	3.9	8.0	6.4	6.0
– Others	3.8	4.7	4.0	4.1
– No comment	0.4	0.2	0.2	0.3
– Total	51.6	72.1	70.9	65.2
Not supported a rent adjustment mechanism	27.7	11.2	11.6	16.5
No comment	20.7	16.7	17.5	18.3

Note: Percentage may not add up to total due to rounding.

Frequency of rent review

9. Opinions on the frequency of the rent review cycle for PRH were diverse. Some 33% of the members of the public considered that the rent of PRH should be reviewed every three years; 29% every two years; 19% every four years or even longer; and 13% every year. Detailed statistics are set out below.

Views on rent review cycles for PRH

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
1 year	8.3	12.3	15.9	12.9
2 years	23.5	33.8	31.2	29.3
3 years	32.5	33.8	32.9	33.0
4 years or longer	27.4	16.1	14.9	19.0
No comment	8.2	4.0	5.0	5.8
Overall	100.0	100.0	100.0	100.0

Note: Percentage may not add up to 100% due to rounding.

Monthly tenancy vs fixed-term tenancy

10. The views on whether PRH flats should be leased on a monthly tenancy (i.e. the current arrangement) or a fixed-term tenancy were mixed, with about 49% of the members of the public in support of maintaining the existing monthly tenancy system and 46% in favour of introducing fixed-term tenancy. In addition, there was a marked difference in the views on this issue amongst the residents living in different types of housing. An overwhelming 75% of the tenants in PRH opted for the current system of monthly tenancy. However, over half of the residents in SSF and private housing preferred fixed-term tenancy for PRH.

Preference on monthly tenancy or fixed-term tenancy

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Prefer monthly tenancy	74.8	41.9	35.7	48.8
Prefer fixed-term tenancy	19.8	51.2	58.9	45.5
Prefer neither of the above	1.0	3.2	2.4	2.1
Others	3.7	2.7	2.3	2.8
No comment	0.8	1.1	0.7	0.8
Overall	100.0	100.0	100.0	100.0

Note: Percentage may not add up to 100% due to rounding.

Differential rent

11. On the proposal of differential rent, about 60% of the public considered that the rent should take into consideration both the internal factors (such as floor level and proximity to unwelcome facilities, e.g. refuse chamber, pump generator) and external factors (such as views and orientation); another 14% said that either the external or internal factors should be considered; and 23% were opposed to any form of differential rent for PRH. In percentage terms, more tenants in SSF and private housing supported the proposal of differential rent.

Opinions on differential rent for PRH

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Both internal and external factors should be considered	45.3	64.3	66.4	**59.5**
Only internal factors should be considered	12.9	10.1	9.5	**10.7**
Only external factors should be considered	3.5	3.6	3.7	**3.6**
Object to any form of differential rent	32.6	20.3	18.1	**23.0**
Others	2.2	0.4	0.7	**1.1**
No comment	3.6	1.3	1.5	**2.1**
Overall	100.0	100.0	100.0	**100.0**

Note: Percentage may not add up to 100% due to rounding.

12. Regarding the allocation of PRH flats to CSSA recipients should differential rent be implemented, 57% of the public said that CSSA recipients should preferably be allocated PRH flats with relatively lower rent value and 33% considered that they should be provided with PRH flats in the same way as other potential PRH tenants.

Opinions on allocation of flats to CSSA recipients should the Authority introduce differential rent

Type of flats allocated to CSSA recipients	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Should allocate PRH flats with lower rent value	47.5	60.7	60.7	**56.7**
Should allocate PRH flats in the same way as other potential PRH tenants	38.7	31.5	30.1	**33.0**
Should allocate PRH flats with higher rent value	2.2	1.9	2.2	**2.1**
No comment	11.7	5.9	7.0	**8.2**
Overall	100.0	100.0	100.0	**100.0**

Note: Percentage may not add up to 100% due to rounding.

Whether affordability indicator should include CSSA recipients and "well-off" tenants

13. The views were quite diverse on whether CSSA recipients should be included when assessing the rental affordability of PRH tenants, with some 45% of the members of the public expressing support for their inclusion and about 42% disapproving of their inclusion. On the issue of "well-off" tenants in PRH, around 59% of the members of the public supported inclusion of these tenants in measuring rental affordability and around 29% objected to their inclusion. In addition, about 32% of the members of the public supported covering both the CSSA recipients and "well-off" tenants in measuring rental affordability of PRH tenants.

Opinions on the inclusion of CSSA recipients and "well-off" tenants in measuring PRH tenants' affordability

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
CSSA Recipients				
Include CSSA recipients	43.6	44.8	46.5	**45.3**
Exclude CSSA recipients	37.6	45.2	44.0	**42.2**
Well-off tenants				
Include "well-off" tenants	50.5	61.9	62.4	**58.7**
Exclude "well-off" tenants	29.4	29.2	28.5	**28.9**
CSSA recipients and well-off tenants				
Include both CSSA recipients and well-off tenants	27.1	33.0	34.6	**32.0**

Whether rent should include rates and management fees

14. The majority of the public (some 60%) thought that the rent of PRH should be inclusive of management fees and rates. The people living in different types of housing held similar views on this issue.

Opinions on whether rent should include management fees and rates

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Management fees				
Rent should include management fees	75.6	75.3	68.5	**72.0**
Rent should exclude management fees	20.7	21.6	27.2	**24.2**
Rates				
Rent should include rates	71.0	68.9	64.2	**67.2**
Rent should exclude rates	24.7	25.8	30.0	**27.6**
Management fees and rates				
Rent should include both management fees and rates	65.0	63.6	55.7	**60.1**

Method of collecting tenants' income data

15. On the method of collecting income information from PRH tenants, some 60% of the public considered that the Authority should operate its own system to collect income data from the PRH tenants on a mandatory basis. About 34% of the public said that the current method of deriving tenants' income data from a survey conducted by C&SD should continue to be adopted. It is of interest to note that views from respondents living in PRH differ quite substantially from those living in SSF and private housing. Over half (54%) of the tenants in PRH preferred to maintain the current method of collecting income data. However, some 67% - 72% of the residents living in SSF and private housing were in favour of the Authority operating its own system to obtain tenants' income data on a mandatory basis.

Opinions on the method of collecting PRH tenants' income data

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
The Authority should operate its own system on a mandatory basis	34.9	66.8	72.3	**59.8**
The Authority should use the existing data collection metod (i.e. based on a survey conducted by C&SD)	53.8	29.6	23.5	**33.9**
No comment	11.3	3.6	4.3	**6.3**
Overall	100.0	100.0	100.0	**100.0**

Note: Percentage may not add up to 100% due to rounding.

Current rent level of PRH

16. Some 65% of members of the public considered the rent level of PRH to be reasonable. About 13% regarded it as low and an equal percentage considered it high. A relatively higher proportion of the people living in PRH than those residing in SSF and private housing felt that the rent of PRH was high. For the PRH tenants, 26% of them said the rent of PRH was high. In comparison, only 7% - 12% of the residents living in SSF and private housing held that the rent level of PRH was on the high side. Relevant statistics are set out in the following table.

Opinions on current rent level of PRH

	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
High	25.7	11.8	6.6	**13.4**
Reasonable	62.8	67.0	65.3	**64.9**
Low	3.0	13.5	19.6	**13.4**
No comment	8.5	7.6	8.4	**8.3**
Overall	100.0	100.0	100.0	**100.0**

Note: Percentage may not add up to 100% due to rounding.

Proportion of income used for rent

17. On the issue of how much of the household income of PRH tenants should be used for paying rent, tenants in PRH tended to suggest a figure on the lower end of the spectrum than their counterparts in SSF and private housing. On the basis of the views from the residents in PRH, the MRIR so derived is around 12%. According to the opinions of the people residing in SSF and private housing, the MRIR so derived is about 20%.

Opinions on percentage of PRH tenants' income used for rent

Suggested % of income for paying rent	PRH (%)	SSF (%)	Private Housing (%)	Overall (%)
Below 5%	2.2	3.4	1.7	2.2
5% – 9.9%	6.0	2.3	1.8	3.2
10% – 14.9%	36.8	20.9	15.5	23.1
15% – 19.9%	13.1	12.9	11.8	12.4
20% – 24.9%	17.2	26.4	26.4	23.6
25% – 29.9%	2.8	5.5	6.7	5.3
30% and above	6.3	18.6	27.2	19.2
No comment	15.6	9.9	8.8	11.1
Overall	100.0	100.0	100.0	100.0
Mean (%)	14.7	18.9	21.3	18.9
Median (%)	12.0	20.0	20.0	20.0

Note: Percentage may not add up to 100% due to rounding.

Annex B

Explanatory Note on the Computation and Operation of the Proposed Income Index

Computation Methodology

1. The proposed income index is essentially an income-based rent adjustment mechanism which seeks to track the movement in the household income of PRH tenants for determining the extent of rent adjustments.

2. Changes in the average household income of PRH households between any two periods are affected by two main factors, namely, changes in individual households' income and changes in household size distribution. For an income-based rent adjustment mechanism to operate properly, the impact of the changes in the household size pattern on average household income should be eliminated to enable an assessment of the "pure income change" over time, the extent of which would be used to determine the rate of rent adjustments. The statistical process to assess the "pure income change" of PRH tenants can be expressed by way of an income index. Assuming a biennial rent review cycle, a pair of income indexes for the two years corresponding to a particular rent review cycle should be worked out for assessing the change in the income level of the PRH households during the two-year period in question. **Appendix I** gives hypothetical examples to illustrate the calculation and operation of the proposed income index. A technical note on the mathematical formulae for deriving the income index is set out at **Appendix II**.

Data Collection

Mandatory Declaration System

3. Hitherto the data on household income are based on the General Household Survey conducted by the C&SD. The existing data collection method has two major shortcomings –

    (a) the General Household Survey is a voluntary survey. The sampled households are free to decide whether to participate in it or not. Income information may be a sensitive issue to many people. As with other household surveys, some respondents to the General Household Survey may feel inhibited to disclose their true household income. The statistical imputation from such cases may not meet the requirements of the Authority; and

    (b) the General Household Survey is not specifically designed to suit the needs of the Authority. The statistical concepts adopted by the General Household Survey are not entirely in line with those used by the Authority. A case in point is the concept of household size. For the General Household Survey, household size refers to those household members who are usually living in the flat. As regards the Authority, it includes all the household members on the tenancy record.

4. To ensure the reliability and accuracy of the data for compiling the income index, the Authority should operate its own system of data collection. We propose to adopt a system similar to the "income declaration" under the Housing Subsidy Policy to make the reporting of household income by sampled households mandatory.

Sample Size

5. The income information of PRH tenants will be collected from a sample survey to be conducted by the Authority on a continuous basis throughout a year. The random sample of the survey should be representative of the profile of PRH tenants and comprise around 1 500 – 2 000 households per month. The cumulative sample size of the survey for any given year will therefore be about 18 000 – 24 000 households, which should be large enough for the purpose of compiling the proposed income index with reasonably good precision.

Mode of Data Collection

6. A self-administered questionnaire will be designed for the purpose of obtaining the essential information and data from PRH tenants. The questionnaires will be despatched to the sampled households in batches on a monthly basis. Households selected for participation in the survey are required to submit the duly completed forms to the Housing Department by a specified deadline under section 25 of the Housing Ordinance.

Computation Agent

7. To enhance the impartiality and objectivity of the income index, consideration can be given to engaging an independent party to undertake the computation on behalf of the Authority.

Coverage of the Income Index

8. CSSA and additional rent paying households should be excluded from the coverage of the income index. As the "income" of CSSA household is effectively social security allowance provided by Government, changes in the amount of CSSA allowance should not be included in the calculation of the income index for PRH tenants. As for tenants paying additional rents, they are substantially better off than other PRH households. Their inclusion in the coverage of the income index may distort the outcome of the computation.

9. To deal with the so-called "outliers" (i.e. those households with extremely high and low income levels), we may also consider excluding the top and bottom 1% of the household income in each household size category from the calculation of the index.

Compilation and Operation of the Proposed Income Index

Why Changes in Household Size Distribution Should be Discounted?

1. Movement in the overall household income of PRH tenants is attributable to, inter alia, two main factors –

   (a) changes in individual households' income; and

   (b) changes in the distribution of household size.

2. Income of small households is usually lower than that of large households[22]. Even if the income of individual households remains unchanged, the overall household income of all the PRH tenants (either measured in terms of median or average income) may drop simply due to a surge in the number of small households.

3. The following hypothetical examples illustrate how the median or average income of PRH households is affected by changes in household size distribution –

Example A : *Effects of Changes in Household Size Distribution on Median Household Income*
(assuming no change in the income of individual households)

Period (1)				Period (2)			
Household Number	Household Size	Household Income ($)	Median Household Income by Household Size ($)	Household Number	Household Size	Household Income ($)	Median Household Income by Household Size ($)
1	1-person (27.3%)	4,000		1	1-person (36.4%)	4,000	
2		5,000		2		5,000	
3		5,500	5,000	3		5,000	
4	2-person (27.3%)	6,500		4		5,500	5,000
5		7,500		5	2-person (36.4%)	6,500	
6		8,000	7,500	6		7,500	
7	3-person or above (45.5%)	8,500		7		7,500	
8		9,000		8		8,000	7,500
9		9,500		9	3-person or above (27.3%)	8,500	
10		10,000		10		9,500	
11		11,000	9,500	11		11,000	9,500
Median household income ($)			8,000	Median household income ($)			7,500

[22] As at the first quarter of 2006, the average household income of PRH tenants was $4,685 for 1-person households; $8,892 for 2-person households; $13,564 for 3-person households; $16,124 for 4-person households and $19,383 for 5-person or above households.

4. As can be seen from the above table, the median household income drops from $8,000 in Period 1 to $7,500 in Period 2 even though there is no change in the income of individual households. The decline in the median household income is primarily due to an increase in the number of 1-person and 2-person households in Period 2 rather than a drop in the income of individual households.

Example B : *Effects of Changes in Household Size Distribution on Median Household Income (assuming an increase of $300 in the monthly income of all households)*

Period (1)				Period (2)			
Household Number	Household Size	Household Income ($)	Median Household Income by Household Size ($)	Household Number	Household Size	Household Income ($)	Median Household Income by Household Size ($)
1	1-person (27.3%)	4,000		1	1-person (36.4%)	4,300	
2		5,000		2		5,300	
3		5,500	5,000	3		5,300	
4	2-person (27.3%)	6,500		4		5,800	5,300
5		7,500		5	2-person (36.4%)	6,800	
6		8,000	7,500	6		7,800	
7	3-person or above (45.5%)	8,500		7		7,800	
8		9,000		8		8,300	7,800
9		9,500		9	3-person or above (27.3%)	8,800	
10		10,000		10		9,800	
11		11,000	9,500	11		11,300	9,800
Median household income ($)			8,000	Median household income ($)			7,800

5. Notwithstanding an increase in the income of individual households, the median household income still registers a downward adjustment from $8,000 in Period 1 to $7,800 in Period 2. Again, this is mainly due to an upsurge in the number of small households over the same period.

Example C : *Effects of Changes in Household Size Distribution on Average Household Income*
(assuming an increase of $300 in the monthly income of all households)

Period (1)				Period (2)			
Household Number	Household Size	Household Income ($)	Average Household Income by Household Size ($)	Household Number	Household Size	Household Income ($)	Average Household Income by Household Size ($)
1	1-person (27.3%)	4,000		1	1-person (36.4%)	4,300	
2		5,000		2		5,300	
3		5,500	4,833	3		5,300	
4	2-person (27.3%)	6,500		4		5,800	5,175
5		7,500		5	2-person (36.4%)	6,800	
6		8,000	7,333	6		7,800	
7	3-person or above (45.5%)	8,500		7		7,800	
8		9,000		8		8,300	7,675
9		9,500		9	3-person or above (27.3%)	8,800	
10		10,000		10		9,800	
11		11,000	9,600	11		11,300	9,967
Average household income ($)			7,689	Average household income ($)			7,398

6. The potential distortion brought about by an increase in the number of small households would also be felt when assessing the average income of all the households. In spite of a rise in the income of individual households, the average household income drops from $7,689 in Period 1 to $7,398 in Period 2.

7. The above illustrations clearly show that the movement in both median or average household income could be affected by changes in household size distribution. It does not necessarily stem from any variations in individual households' income. Nor does it imply any changes in tenants' affordability. For rent adjustment purpose, a more objective and fairer income indicator should therefore discount the effects of the changes in household size distribution and embrace only the changes in the household income of the PRH tenants.

Compilation of the Income Index

8. To discount the effects of household size distribution and track the "pure income change" of the PRH tenants, the household size distribution of PRH tenants would be kept constant in any one particular rent review cycle for the purpose of assessing the weighted average household income of all PRH tenants, so that only the changes in the income of individual households are reflected in the calculation.

9. Based on the household size and income distribution in "Example C" above, the calculation of the respective income indexes for Period 1 and Period 2 is set out below –

	Household Distribution (%) (Period (1))	Average Household Income ($) (Period (1))	Average Household Income ($) (Period (2))
1-person	27.3%	4,833	5,175
2-person	27.3%	7,333	7,675
3-person or above	45.5%	9,600	9,967
Weighted average household income based on household size distribution in Period (1) ($)		7,689 (4,833 x 27.3% + 7,333 x 27.3% + 9,600 x 45.5%)	8,043 (5,175 x 27.3% + 7,675 x 27.3% + 9,967 x 45.5%)
Income index (Period (1) as base year)		100.0	104.6

$$\text{Income index for Period (1) (i.e. base year)} : \frac{\$7,689}{\$7,689} \times 100 = 100$$

$$\text{Income index for Period (2) (i.e. current period)} : \frac{\$8,043}{\$7,689} \times 100 = 104.6$$

10. The change in the income index between Period 1 and Period 2 can be computed as follows –

(104.6 -100.0) / 100.0 x 100% = 4.6% (change in income index = pure income effect)

11. Using the change in the income index as a guide, the rent of all PRH flats would need to be adjusted upwards by 4.6% should a rent review be conducted in Period 2.

Re-basing the Household Size Distribution

12. Instead of fixing the household size distribution perpetually at one particular period, we would make reference to the more updated pattern of household size distribution in PRH each time we conduct a rent review. Such regular "re-basing" could strike a balance between the need to exclude the undue impact of changes in household size distribution in assessing the income index within the two-year rent review cycle and the need to make reference to a more updated pattern of household size distribution in PRH for deriving the income index.

13. Assuming that another rent review exercise is to be conducted in the next period, i.e. Period 3, the household size distribution in Period 2 would be adopted to compile the respective income indexes for both Period 2 and Period 3 as follows –

Income and Household Size Distribution in Period 2 and Period 3

Household Number	Period (2)			Period (3)		
	Household Size	Household Income ($)	Average Household Income ($)	Household Size	Household Income ($)	Average Household Income ($)
1	1-person (36.4%)	4,300		1-person (45.5%)	3,800	
2		5,300			4,800	
3		5,300			4,800	
4		5,800	5,175		5,300	
5		6,800			5,300	4,800
6	2-person (36.4%)	7,800			6,300	
7		7,800		2-person (36.4%)	7,300	
8		8,300	7,675		7,300	
9	3-person or above (27.3%)	8,800			7,800	7,175
10		9,800		3-person or above (18.2%)	8,300	
11		11,300	9,967		10,800	9,550

Calculation of the Respective Income Indexes for Period 2 and Period 3

	Household Distribution (%) (Period (2))	Average Household Income ($) (Period (2))	Average Household Income ($) (Period (3))
1-person	36.4%	5,175	4,800
2-person	36.4%	7,675	7,175
3-person or above	27.3%	9,967	9,550
Weighted average household income based on household size distribution in Period (2) ($)		7,398 (5,175 x 36.4% + 7,675 x 36.4% + 9,967 x 27.3%)	6,966 (4,800 x 36.4% + 7,175 x 36.4% + 9,550 x 27.3%)
Income index (Period (2) as base year)		100.0	94.2

Income index for Period (2) (taking Period 2 as base year) : $\dfrac{\$7,398}{\$7,398} \times 100 = 100$

Income index for Period (3) : $\dfrac{\$6,966}{\$7,398} \times 100 = 94.2$

14. Compared to Period 2, the income index decreases by 5.8% in Period 3. Using this as a guide, the rent of all PRH flats would need to be adjusted downwards by 5.8% should a rent review be conducted in Period 3.

Technical Note on the Mathematical Formulae for Deriving the Income Index

Rate of Change in Average Household Income

1. Assuming that the average household income of the PRH tenants in a particular period, say year 0, is Y_0 and in another period, say year t, is Y_t, the rate of change in the average household income (ΔY) of PRH tenants between these two periods can be expressed by the following equation —

$$\Delta Y = \frac{Y_t - Y_0}{Y_0}$$

2. The average household income of PRH tenants in any period can be computed by aggregating the household incomes of individual tenants and dividing the total income sum by the number of households in PRH. Alternatively, it can be obtained by working out the weighted average household income of PRH tenants, i.e. the average household incomes of PRH tenants of different household sizes weighted by the household size distribution in terms of proportion. Mathematically, the weighted average household income of PRH tenants in year t (Y_t) can be expressed by the following formula —

$$Y_t = \Sigma H_{it} I_{it}$$

Where,

H_{it} = proportion of PRH tenants with household size i (i = 1,2,3,4, etc.) in year t (i.e. household size distribution in year t),

I_{it} = average household income of PRH tenants with household size i in year t (i.e. average income by household size in year t),

The average household income of PRH tenants in year 0 (Y_0) can be expressed as follows —

$$Y_0 = \Sigma H_{io} I_{io}$$

Where,

H_{io} = proportion of PRH tenants with household size i (i = 1,2,3,4, etc.) in year 0 (i.e. household size distribution in year 0),

I_{io} = average household income of PRH tenants with household size i in year 0 (i.e. average income by household size in year 0)

3. The rate of change in the average household income discussed in paragraph 1 can be expressed as follows —

$$\Delta Y = \frac{Y_t - Y_0}{Y_0}$$

$$\Delta Y = \frac{\sum H_{it} I_{it} - \sum H_{io} I_{io}}{\sum H_{io} I_{io}}$$

$$\Delta Y = \frac{\sum H_{io}(I_{it} - I_{io})}{\sum H_{io} I_{io}} + \frac{\sum (H_{it} - H_{io}) I_{io}}{\sum H_{io} I_{io}} + \frac{\sum (H_{it} - H_{io})(I_{it} - I_{io})}{\sum H_{io} I_{io}}$$

For PRH, it is found that the value of $\dfrac{\sum (H_{it} - H_{io})(I_{it} - I_{io})}{\sum H_{io} I_{io}}$

is small if the time interval between 0 and t is not too far apart from each other and can be ignored.

Thus, the above equation can be approximately expressed as follows —

$$\Delta Y \cong \begin{array}{c}\text{Income change} \\ \text{due to pure} \\ \text{Income effect}\end{array} \left(\frac{\sum H_{io}(I_{it} - I_{io})}{\sum H_{io} I_{io}}\right) + \begin{array}{c}\text{Income change} \\ \text{due to household} \\ \text{size effect}\end{array} \left(\frac{\sum (H_{it} - H_{io}) I_{io}}{\sum H_{io} I_{io}}\right)$$

Income index

4. According to the above equation, the income component of any change in the average household income between two periods is given by the following formula —

$$\frac{\sum H_{io}(I_{it} - I_{io})}{\sum H_{io} I_{io}} \quad \text{or} \quad \frac{\sum H_{io} I_{it}}{\sum H_{io} I_{io}} - \frac{\sum H_{io} I_{io}}{\sum H_{io} I_{io}}$$

5. The above statistical formula can be expressed by way of an income index (ID) for the purpose of guiding rent adjustments between two periods, say, every t years (the time interval corresponding to a rent review cycle of t years apart). The income index for year 0 (ID_0) can be compiled by using the following formula —

$$ID_0 = \frac{\sum H_{io} I_{io}}{\sum H_{io} I_{io}} \times 100$$

The income index for year t (ID_t) is —

$$ID_t = \frac{\sum H_{io} I_{it}}{\sum H_{io} I_{io}} \times 100$$

6. It can be seen from the above formulae that there are two parameters we have to work out for compiling the income indexes for each cycle of rent adjustment, namely $\sum H_{i0} I_{i0}$ and $\sum H_{i0} I_{it}$. In specific terms,

$\sum H_{i0} I_{i0}$ = weighted average household income of PRH tenants in year 0

$\sum H_{i0} I_{it}$ = weighted average household income of PRH tenants in year t calculated by adopting the household size distribution in year 0 (instead of the household size distribution in year t)

Extent of Rent Adjustments Calculated Using the Income Index

7. The extent of rent adjustments calculated using the income index would be equivalent to the extent of the changes in household income between year 0 and year t. In percentage terms, this can be computed using the following formula —

$$\frac{ID_t - ID_0}{ID_0} \times 100\%$$