

## Section 4

### PILOT SURVEY RESULTS AND LIMITATIONS OF METHODOLOGY

#### 4.1 The Case study in Coimbatore

- 4.1.1 In Coimbatore, 1421 permits were issued during the calendar year 2003 (January - December), of which 42 (3.0 per cent) permits did not specify the type of the building. Of the remaining 1379 permits, 838 (60.8 per cent) were for Single Housing Units (SHU) and 541 (39.2 per cent) were for Multiple Housing Units (MHU).
- 4.1.2 During 2004, 1625 permits were issued, of which 7 (0.4 per cent) permits did not carry the information regarding the type of the building. Of the remaining, 804 (49.7 per cent) were for Single Housing Units (SHU) and 814 (50.3 per cent) were for Multiple Housing Units (MHU).
- 4.1.3 The quarter wise permits issued in Coimbatore during 2003 and 2004 are given in Table 4.1.1.

**Table 4.1.1 - Total Number of Permits Issued in Coimbatore**

Year	Quarter	Type		Total
		SHU	MHU	
2003	1Q	216 71.1%	88 28.9%	304 100.0%
	2Q	191 59.0%	133 41.0%	324 100.0%
	3Q	184 56.6%	141 43.4%	325 100.0%
	4Q	247 58.0%	179 42.0%	426 100.0%
	<b>Total</b>	<b>838</b> <b>60.8%</b>	<b>541</b> <b>39.2%</b>	<b>1,379</b> <b>100.0%</b>
2004	1Q	245 57.6%	180 42.4%	425 100.0%
	2Q	178 47.0%	201 53.0%	379 100.0%
	3Q	197 47.8%	215 52.2%	412 100.0%
	4Q	184 45.8%	218 54.2%	402 100.0%
	<b>Total</b>	<b>804</b> <b>49.7%</b>	<b>814</b> <b>50.3%</b>	<b>1,618</b> <b>100.0%</b>

- 4.1.4 Based on the sampling design discussed above, a total of 608 permit sites were selected. Of which 320 sites correspond to permits issued in 2003 and

288 sites to the following year. The zone wise sample permit sites visited are given in Table 4.1.2.

**Table 4.1.2- Sample Number of Buildings covered in Coimbatore**

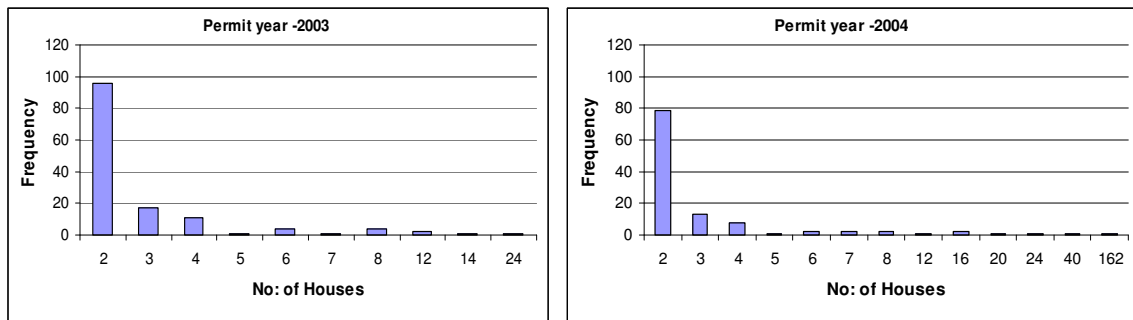
Permits issued in	2003	2004	Total
East Zone	80	80	160
West Zone	80	80	160
North Zone	80	80	160
South Zone	80	48	128
<b>Total</b>	<b>320</b>	<b>288</b>	<b>608</b>

4.1.5 Of the 320 permit site visits corresponding to 2003, 182 were for SHU and 138 for MHU. Of the 288 permits given during the year 2004, 174 were for SHU and 114 for MHU.

4.1.6 Of the 182 building sanctions given in 2003 for SHU, 8 (4.4 per cent) had not started construction till the date of visit. Of the 138 permits given for MHU, 3 (2.2 per cent) were yet to start their construction. Similarly, out of 174 and 114 permits issued to SHU and MHU respectively during the calendar year 2004, 9 (5.2 per cent) and 1 (0.9 per cent) had not started their construction.

4.1.7 The frequency distribution of the number of houses in the MHU is given below in Graph 4.1.1. One permit issued in the year 2004 consisted of a MHU with 162 housing units, which was revealed during the sample survey. This was removed from the sample while constructing the start rate matrix because of its large size affecting the macro results.

**Graph 4.1.1 - Distribution of Number of Houses in MHU in Coimbatore**



4.1.8 Table 4.1.3 provides the average Floor Space Area (FSA) in Sq.ft in the 4 zones for SHU and MHU. The average FSA did not vary much across the zones. However, the SHU were found to have higher average FSA than MHU.

**Table 4.1.3 - Average Floor Space Area in Coimbatore**

Zone	Average Area (Sq.ft)	
	SHU	MHU
East	1219	673
West	1112	871
North	1353	612
South	1488	889
<b>Total</b>	<b>1270</b>	<b>785</b>

4.1.9 The per cent distribution of the housing starts for SHU and MHU are given in Table 4.1.4 and Table 4.1.5 respectively. From these tables it would be seen that about 90 per cent of permits issued during 2003 and 2004 got started within 2 quarters.

**Table 4.1.4 - Distribution of Housing Starts (SHU) in Coimbatore (per cent)**

Started Issued	1Q2003	2Q2003	3Q2003	4Q2003	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	Not Started
	1Q2003	74.5	10.6	6.4	--	--	2.1	--	--	--	--	--
2Q2003	x	83.0	10.6	2.1	--	--	--	--	--	2.1	--	2.1
3Q2003	x	x	61.5	28.8	--	1.9	--	--	--	--	--	7.7
4Q2003	x	x	x	66.7	27.8	--	--	--	5.6	--	--	--
Started Issued	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	4Q2005	1Q2006	2Q2006	3Q2006	Not Started
	1Q2004	63.6	31.8	2.3	2.3	--	--	--	--	--	--	--
2Q2004	x	60.0	20.0	8.9	2.2	--	--	--	--	--	--	8.9
3Q2004	x	x	57.5	27.5	5.0	--	--	7.5	--	--	--	2.5
4Q2004	x	x	x	57.8	24.4	4.4	2.2	2.2	--	--	--	8.9

x: Not computable --: Nil/Negligible

**Table 4.1.5- Distribution of Housing Starts (MHU) in Coimbatore (per cent)**

Started Issued	1Q2003	2Q2003	3Q2003	4Q2003	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	Not Started
1Q2003	52.1	35.3	10.5	2.1	--	--	--	--	--	--	--	--
2Q2003	x	66.3	29.1	--	--	--	--	--	--	--	--	4.7
3Q2003	x	x	82.6	15.2	--	--	--	--	--	--	--	2.2
4Q2003	x	x	x	91.7	5.6	--	--	1.4	1.4	--	--	--
	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	4Q2005	1Q2006	2Q2006	3Q2006	Not Started
1Q2004	57.6	39.0	--	1.7	--	--	--	--	--	1.7	--	--
2Q2004	x	62.5	25.0	2.8	4.2	2.8	--	--	--	--	--	2.8
3Q2004	x	x	60.4	27.1	8.3	2.1	--	2.1	--	--	--	--
4Q2004	x	x	x	85.6	14.4	--	--	--	--	--	--	--

x: Not computable --: Nil/Negligible

4.1.10 As described in the methodology in section 3.4, start rate matrices were obtained separately for SHU and MHU for the permit years 2003 and 2004.

These are given in Tables 4.1.6 to 4.1.9.

**Table 4.1.6 Start Rate Matrix in Coimbatore for MHU for 2003**

1Q	0.52	0.06	--	--	--	0.01	--	--	--
2Q	0.66	0.35	--	--	--	--	--	--	--
3Q	0.83	0.29	0.11	--	--	--	--	--	--
4Q	0.92	0.15	--	0.02	0.01	--	--	--	--

--: Nil/Negligible

**Table 4.1.7 Start Rate Matrix in Coimbatore for MHU for 2004**

1Q	0.58	0.14	0.08	0.04	--	--	--	--	0.02
2Q	0.63	0.39	--	0.02	0.03	--	--	--	--
3Q	0.60	0.25	--	--	--	--	--	--	--
4Q	0.86	0.27	0.03	0.02	--	0.02	--	--	--

--: Nil/Negligible

**Table 4.1.8 Start Rate Matrix in Coimbatore for SHU for 2003**

1Q	0.75	0.28	--	--	--	0.06	--	--	--
2Q	0.83	0.11	--	0.02	--	0.02	--	--	0.02
3Q	0.62	0.11	0.06	--	--	--	--	--	--
4Q	0.67	0.29	0.02	--	--	--	--	--	--

--: Nil/Negligible

**Table 4.1.9 Start Rate Matrix in Coimbatore for SHU for 2004**

1Q	0.64	0.24	0.05	0.02	--	--	--	--	--
2Q	0.60	0.32	0.04	--	--	--	--	--	--
3Q	0.58	0.20	0.02	0.02	--	--	--	--	--
4Q	0.58	0.28	0.09	0.02	0.02	0.08	--	--	--

--: Nil/Negligible

4.1.11 The absolute difference between the matrices obtained through the permit issued in 2003 and 2004 for the MHU and SHU are given in Table 4.1.10 and 4.1.11 respectively. The standard errors<sup>s</sup> of these differences are reported in Table 4.1.12 to 4.1.13. The statistical significance in the difference was tested using the asymptotic test of equality of proportions. The start rates based on

permits issued in 2003 and 2004 were found to be not statistically different at 1 per cent level of significance, except for 3 cells for MHU (Table 4.1.10, 4.1.11).

**Table 4.1.10 Absolute Difference in 2003 and 2004 Start Rates in Coimbatore for MHU**

1Q	0.06	0.09	0.08 *	0.04	--	0.01	--	--	0.02
2Q	0.04	0.04	--	0.02	0.03	--	--	--	--
3Q	0.22 *	0.04	0.11 *	--	--	--	--	--	--
4Q	0.06	0.12	0.03	--	0.01	0.02	--	--	--

\* Significantly different at 1 per level of significance --: Nil/Negligible

**Table 4.1.11 Absolute Difference in 2003 and 2004 Start Rates in Coimbatore for SHU**

1Q	0.11	0.03	0.05	0.02	--	0.06	--	--	--
2Q	0.23	0.21	0.04	0.02	--	0.02	--	--	0.02
3Q	0.04	0.09	0.04	0.02	--	--	--	--	--
4Q	0.09	0.01	0.07	0.02	0.02	0.08	--	--	--

**Table 4.1.12 SE<sup>s</sup> of Difference of 2003 and 2004 Start Rates in Coimbatore for MHU**

1Q	0.07	0.04	0.03	0.02	--	0.01	--	--	0.01
2Q	0.08	0.08	--	0.02	0.02	--	--	--	--
3Q	0.06	0.06	0.03	--	--	--	--	--	--
4Q	0.04	0.05	0.02	0.02	0.01	0.01	--	--	--

--: Nil/Negligible

**Table 4.1.13 SE<sup>s</sup> in Difference of 2003 and 2004 Start Rates in Coimbatore for SHU**

1Q	0.10	0.09	0.03	0.02	--	0.03	--	--	--
2Q	0.09	0.08	0.03	0.02	--	0.02	--	--	0.02
3Q	0.10	0.08	0.04	0.02	--	--	--	--	--
4Q	0.11	0.10	0.05	0.02	0.02	0.04	--	--	--

--: Nil/Negligible

4.1.12 Given the fact that the indices for the two years are not at variance with each other, it is decided to combine them. The start rate matrices obtained by combining the matrices for 2003 and 2004 for SHU and MHU are given in Table 4.1.14 and 4.1.15 respectively.

**Table 4.1.14 Start Rate Matrix<sup>@</sup> in Coimbatore for MHU**

1Q	0.55	0.10	0.04	0.02	--	0.01	--	--	0.01
2Q	0.65	0.37	--	0.01	0.01	--	--	--	--
3Q	0.71	0.27	0.05	--	--	--	--	--	--
4Q	0.89	0.21	0.01	0.02	0.01	0.01	--	--	--

--: Nil/Negligible

**Table 4.1.15 Start Rate Matrix<sup>@</sup> in Coimbatore for SHU**

1Q	0.69	0.26	0.02	0.01	--	0.02	--	--	--
2Q	0.72	0.21	0.02	0.01	--	0.01	--	--	0.01
3Q	0.60	0.15	0.04	0.01	--	--	--	--	--
4Q	0.62	0.28	0.05	0.01	0.01	0.03	--	--	--

--: Nil/Negligible

## 4.2 Case Study of Villupuram

4.2.1 In Villupuram, 35 permits were issued in 2003 of which, 19 (54.3 per cent) were for SHU and 16 (45.7 per cent) were for MHU. Among the 30 permits issued in 2004, 24 (80 per cent) were for SHU, while only 6 (20 per cent) for

MHU. The numbers of permits disaggregated by different quarters of the year are given in Table 4.2.1.

4.2.2 All the permit sites were visited for the housing start survey (Schedule Part-II) as the number of permits was small. It was found that construction had begun for all the permits given during 2003 for SHU, except just one case. It was also found that all the MHU for which permits were given in 2003 and 2004 had exactly 2 housing units.

**Table 4.2.1 - Total Number of Permits Issued in Villupuram**

Year	Quarter	Type		Total
		SHU	MHU	
2003	1Q	2 40.0%	3 60.0%	5 100.0%
	2Q	10 58.8%	7 42.2%	17 100.0%
	3Q	3 50.0%	3 50.0%	6 100.0%
	4Q	4 57.1%	3 42.9%	7 100.0%
	<b>Total</b>	19 54.3%	16 45.7%	35 100.0%
2004	1Q	8 80.0%	2 20.0%	10 100.0%
	2Q	5 62.5%	3 37.5%	8 100.0%
	3Q	4 100.0%	0 0.0%	4 100.0%
	4Q	7 87.5%	1 12.5%	8 100.0%
	<b>Total</b>	24 80.0%	6 20.0%	30 100.0%

4.2.3 Villupuram being a small centre, the number of permits issued in each quarter was noted as very small. Consequently, the SHU and MHU units were combined to obtain a single start rate matrix for the town. The per cent distribution of the housing starts is given in Table 4.2.2. It is important that almost 80 per cent of the constructions got started in the same quarter in which permits were issued.

4.2.4 The average FSA of SHU was found to be 935 sq.ft. MHU were noted to have a lower average FSA of 381 sq.ft. only.

**Table 4.2.2- Distribution of Housing Starts in Villupuram** (per cent)

Started Issued												
	1Q2003	2Q2003	3Q2003	4Q2003	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	Not Started
1Q2003	100.0	--	--	--	--	--	--	--	--	--	--	--
2Q2003	x	96.2	--	--	--	--	--	--	--	--	--	3.8
3Q2003	x	x	77.8	22.2	--	--	--	--	--	--	--	--
4Q2003	x	x	x	90.0	10.0	--	--	--	--	--	--	--
Started Issued												
	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	4Q2005	1Q2006	2Q2006	3Q2006	Not Started
1Q2004	75.0	16.7	18.3	--	--	--	--	--	--	--	--	--
2Q2004	x	81.8	9.1	9.1	--	--	--	--	--	--	--	--
3Q2004	x	x	100.0	--	--	--	--	--	--	--	--	--
4Q2004	x	x	x	88.9	11.1	--	--	--	--	--	--	--

x: Not computable --: Nil/Negligible

4.2.5 Start rate matrices were obtained separately for 2003 and 2004 using the methodology described in section 3.4. The results are given in Tables 4.2.3 and 4.2.4.

**Table 4.2.3 Start Rate Matrix in Villupuram for 2003**

1Q	1.00	0.10	--	--	--	--	--	--	--
2Q	0.96	--	--	--	--	--	--	--	--
3Q	0.78	--	--	--	--	--	--	--	--
4Q	0.90	0.22	--	--	--	--	--	--	--

--: Nil/Negligible

**Table 4.2.4 Start Rate Matrix in Villupuram for 2004**

1Q	0.75	0.11	--	--	--	--	--	--	--
2Q	0.82	0.17	--	--	--	--	--	--	--
3Q	1.00	0.09	0.18	--	--	--	--	--	--
4Q	0.89	--	0.09	--	--	--	--	--	--

--: Nil/Negligible

4.2.6 The absolute differences between the coefficients in the two matrices were computed as reported in Table 4.2.5. The values of the corresponding standard errors of the differences are given in 4.2.6. The statistical significance in the differences was tested using asymptotic test of equality of proportions<sup>5</sup>. The analysis suggests that the start rates based on permits issued during 2003 and the following year are not significantly different. (Table 4.2.5). The stability in these coefficients over time thus increases the confidence level in using these coefficients for making projections for housing starts for future years.

4.2.7 The start rate matrix obtained by combining the matrices for 2003 and 2004 is given in Table 4.2.7.

**Table 4.2.5 Absolute Difference in 2003 and 2004 Start Rates in Villupuram**

1Q	0.25	0.01	--	--	--	--	--	--	--
2Q	0.14	0.17	--	--	--	--	--	--	--
3Q	0.22	0.09	0.18	--	--	--	--	--	--
4Q	0.01	0.22	0.09	--	--	--	--	--	--

**Table 4.2.6 SE<sup>s</sup> in Difference of 2003 and 2004 Start Rates in Villupuram**

1Q	0.13	0.15	--	--	--	--	--	--	--
2Q	0.12	0.11	--	--	--	--	--	--	--
3Q	0.14	0.14	0.19	--	--	--	--	--	--
4Q	0.14	0.13	0.10	--	--	--	--	--	--

\* Significantly different at 1 per level of significance  
 --: Nil/Negligible

**Table 4.2.7 Start Rate Matrix<sup>@</sup> in Villupuram**

1Q	0.83	0.11	--	--	--	--	--	--	--
2Q	0.92	0.11	--	--	--	--	--	--	--
3Q	0.85	0.03	0.12	--	--	--	--	--	--
4Q	0.89	0.15	0.03	--	--	--	--	--	--

--: Nil/Negligible

### 4.3 Case Study of Delhi (South Zone)

4.3.1 Owing to the time and manpower constraints, DES-Government of Delhi, could conduct the survey only in Delhi-south zone and not in the entire city. In the selected area- Delhi South Zone, - as many as 147 and 163 permits were issued during the calendar years of 2003 and 2004 respectively. The quarter wise details of the permits issued are given in Table 4.3.1.

**Table 4.3.1 - Total Number of Permits Issued in Delhi (South)**

Year	Quarter	Frequency	Percent
2003	1Q	36	24.5
	2Q	63	42.9
	3Q	30	20.4
	4Q	18	12.2
	<b>Total</b>	<b>147</b>	<b>100.0</b>
2004	1Q	33	20.2
	2Q	40	24.5
	3Q	43	26.4
	4Q	47	28.8
	<b>Total</b>	<b>163</b>	<b>100.0</b>

4.3.2 Of the 310 permits issued, 93 were surveyed through Schedule Part II. Of these, 4 permits were excluded from the tabulation as there were insufficient data. Of the remaining 89 permit sites, 47 permit sites correspond to the year



2003 and 42 permit sites to 2004. These were visited for collection of information pertaining to housing starts.

4.3.3 Of the 47 permits issued in 2003, construction had not started in just 1 (2.1 per cent) case till the date of the present survey. Similarly, for 2004 too, only one (2.4 per cent) holder of the permit had not started construction. The distribution of the housing starts is given in Table 4.3.2. From these tables it could be argued that about 80 per cent of permit holders in both the years started their work within two quarters of getting their permit.

**Table 4.3.2- Distribution of Housing Starts in Delhi (South) (per cent)**

Started Issued \	1Q2003	2Q2003	3Q2003	4Q2003	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	Not Started
1Q2003	47.4	23.7	15.8	--	5.3	--	7.9	--	--	--	--	--
2Q2003	x	68.8	12.5	--	9.4	--	--	9.4	--	--	--	--
3Q2003	x	x	43.8	37.5	9.4	9.4	--	--	--	--	--	--
4Q2003	x	x	x	73.1	3.8	11.5	--	--	--	--	--	11.5
Started Issued \	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	4Q2005	1Q2006	2Q2006	3Q2006	Not Started
1Q2004	48.6	42.9	--	--	8.6	--	--	--	--	--	--	--
2Q2004	x	66.7	22.2	11.1	--	--	--	--	--	--	--	--
3Q2004	x	x	66.7	25.0	8.3	--	--	--	--	--	--	--
4Q2004	x	x	x	42.4	39.4	--	9.1	--	--	--	--	9.1

x: Not computable --: Nil/Negligible

4.3.4 Start rate matrices obtained separately for 2003 and 2004 using the methodology described in section 3.4 are given in Tables 4.3.3 and 4.3.4

**Table 4.3.3 Start Rate Matrix in Delhi (South) for 2003**

1Q	0.47	0.04	0.09	0.09	0.05	--	--	--	--
2Q	0.69	0.24	0.12	0.09	--	--	--	--	--
3Q	0.44	0.13	0.16	--	--	--	0.08	--	--
4Q	0.73	0.38	0.00	--	--	--	0.09	--	--

--: Nil/Negligible

**Table 4.3.4 Start Rate Matrix in Delhi (South) for 2004**

1Q	0.49	0.39	0.08	--	0.09	--	--	--	--
2Q	0.67	0.43	--	--	--	--	--	--	--
3Q	0.67	0.22	--	0.09	--	--	--	--	--
4Q	0.42	0.25	0.11	--	--	--	--	--	--

--: Nil/Negligible

4.3.5 The absolute difference between the elements of the matrices for the year 2003 and 2004 and the corresponding standard errors are reported in Table 4.3.5 and 4.3.6 respectively. The statistical significance of the difference is tested

using asymptotic test of equality of proportions<sup>§</sup>. The start rates based on permits issued in 2003 and 2004 are found to be not different at 1 per cent level of significance. Only in case of 2 cell values, the difference turns Out to be significant. (Table 4.3.5).

4.3.6 The start rate matrix obtained by combining the matrices for 2003 and 2004 is given in Table 4.3.7.

**Table 4.3.5 Absolute Difference in 2003 and 2004 Start Rates in Delhi (South)**

1Q	0.01	0.36*	0.01	0.09	0.03	--	--	--	--
2Q	0.02	0.19	0.12*	0.09	--	--	--	--	--
3Q	0.23	0.10	0.16	0.09	--	--	0.08	--	--
4Q	0.31	0.13	0.11	--	--	--	--	--	--

\* Significantly different at 1 per level of significance

--: Nil/Negligible

**Table 4.3.6 SE<sup>s</sup> in Difference of 2003 and 2004 Start Rates in Delhi (South)**

1Q	0.12	0.09	0.07	0.05	0.06	--	--	--	--
2Q	0.12	0.12	0.05	0.05	--	--	--	--	--
3Q	0.11	0.09	0.06	0.05	--	--	0.04	--	--
4Q	0.13	0.13	0.06	--	--	--	0.06	--	--

**Table 4.3.7 Start Rate Matrix@ in Delhi (South)**

1Q	0.48	0.24	0.09	0.06	0.07	--	--	--	--
2Q	0.68	0.33	0.05	0.05	--	--	--	--	--
3Q	0.54	0.16	0.08	0.05	--	--	0.04	--	--
4Q	0.56	0.32	0.05	--	--	--	0.06	--	--

#### 4.4 Case Study of Saswad

4.4.1 In Saswad, of the 44 permits issued in 2003, 38 (86.4 per cent) were for SHU while 6 (13.6 per cent) were for MHU. Among the 48 permits issued in 2004, 29 (60.4 per cent) were for SHU while 19 (39.6 per cent) were for MHU. The quarter wise breakup of the permits issued is given in Table 4.4.1. It is found that in the second quarter in 2003, only one permit was issued.

4.4.2 As the number of permits was small, all the permit sites were covered in the survey. One permit issued in 2004 was found to be providing no information on type of the building in the permit document as well as in the sample survey. Hence this permit was excluded from the analysis.

4.4.3 12.1 per cent of the SHU and 18.2 per cent of MHU for which permits issued in 2003 had not started the construction till the date of survey. Similarly, in case of the permits issued in 2004, for 10.3 per cent of the SHU and 16.7 per cent of MHU, construction has not started till the date of the survey.

**Table 4.4.1 - Total Number of Permits Issued in Saswad**

Year	Quarter	Type		Total
		SHU	MHU	
2003	1Q	10 83.3%	2 16.7%	12 100%
	2Q	1 100%	0 0%	1 100%
	3Q	11 84.6%	2 15.4%	13 100%
	4Q	16 88.9%	2 11.1%	18 100%
	<b>Total</b>	38 88.6%	6 11.4%	44 100%
2004	1Q	7 43.8%	9 56.3%	16 100%
	2Q	8 88.9%	1 11.1%	9 100%
	3Q	8 50.0%	8 50.0%	16 100%
	4Q	6 85.7%	1 14.3%	7 100%
	<b>Total</b>	29 60.4%	19 39.6%	48 100%

4.4.4 Saswad being a small centre, the number of permits issued in each quarter was found to be low. Hence the SHU and MHU were combined together and a single start rate matrix is compiled. The distribution of the housing starts is given in Table 4.4.2.

4.4.5 Start rate matrices are obtained separately for 2003 and 2004 using the methodology described in section 3.4. The results are given in Tables 4.4.3 and 4.4.4

**Table 4.4.2- Distribution of Housing Starts in Saswad (per cent)**

Started Issued	1Q2003	2Q2003	3Q2003	4Q2003	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	Not Started
	1Q2003	84.6	15.4	--	--	--	--	--	--	--	--	--
2Q2003	x	100.0	--	--	--	--	--	--	--	--	--	--
3Q2003	x	x	35.3	29.4	--	--	--	--	--	--	10.8	23.5
4Q2003	x	x	x	66.7	9.5	--	--	4.8	--	--	--	19.0
Started Issued	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	4Q2005	1Q2006	2Q2006	3Q2006	Not Started
	1Q2004	45.8	--	12.5	8.3	--	--	--	--	--	4.2	29.2
2Q2004	x	33.3	44.4	22.2	--	--	--	--	--	--	--	--
3Q2004	x	x	71.9	8.8	18.4	--	--	0.9	--	--	--	--
4Q2004	x	x	x	71.4	--	--	--	--	--	--	--	28.6

x: Not computable --: Nil/Negligible

**Table 4.4.3 Start Rate Matrix in Saswad for 2003**

1Q	0.85	0.10	--	--	--	--	--	--	--
2Q	1.00	0.15	--	--	--	--	--	--	--
3Q	0.35	--	--	--	--	--	--	--	0.11
4Q	0.67	0.29	--	--	0.05	--	--	--	--

--: Nil/Negligible

**Table 4.4.4 Start Rate Matrix in Saswad for 2004**

1Q	0.46	--	0.18	--	--	--	--	--	0.04
2Q	0.33	--	--	--	--	--	--	--	--
3Q	0.72	0.44	0.13	--	--	--	--	--	--
4Q	0.71	0.09	0.22	0.08	--	0.01	--	--	--

--: Nil/Negligible

4.4.6 The absolute difference between the matrices constructed by following the permits issued in 2003 and 2004 and the corresponding standard errors of the differences are reported in Table 4.4.5 and 4.4.6 respectively. The statistical significance in the difference was tested using the asymptotic test of equality of proportions<sup>§</sup>. At 1 per cent level of significance, the start rates for 2003 and 2004 are found to be significantly different in 5 cells. Also, the extent of difference is found to be high here (Table 4.4.5).

**Table 4.4.5 Absolute Difference in 2003 and 2004 Start Rates in Saswad**

1Q	0.39*	0.10	0.18	--	--	--	--	--	0.04
2Q	0.67*	0.15	--	--	--	--	--	--	--
3Q	0.37*	0.44*	0.13*	--	--	--	--	--	0.11
4Q	0.05	0.21	0.22	0.08	0.05	0.01	--	--	--

\* Significantly different at 1 per level of significance

--: Nil/Negligible

**Table 4.4.6 SE<sup>§</sup> in Difference of 2003 and 2004 Start Rates in Saswad**

1Q	0.14	0.08	0.08	--	--	--	--	--	0.04
2Q	0.16	0.36	--	--	--	--	--	--	--
3Q	0.12	0.05	0.03	--	--	--	--	--	0.08
4Q	0.20	0.15	0.16	0.10	0.05	0.04	--	--	--

4.4.7 The start rate matrix obtained by combining the matrices for 2003 and 2004 is given in Table 4.4.7.

**Table 4.4.7 Start Rate Matrix@ in Saswad**

1Q	0.59	0.07	0.16	--	--	--	--	--	0.03
2Q	0.40	0.05	--	--	--	--	--	--	--
3Q	0.67	0.40	0.08	--	--	--	--	--	0.01
4Q	0.68	0.11	0.20	0.05	0.04	0.01	--	--	--

--: Nil/Negligible

#### 4.5 Case Study of Mumbai

4.5.1 Owing to the time and manpower constraints, DES of Maharashtra, could complete the survey in Mumbai in 8 months. In Mumbai, as many as 381 and 503 permits were issued during the calendar years of 2003 and 2004 respectively. The quarter-wise details of the permits issued are given in Table 4.5.1.

**Table 4.5.1 - Total Number of Permits Issued in Mumbai**

Quarter	Zone 1 (City)	Zone 2 (Western)	Zone 3 (Eastern)	Total No: of Permits Issued in Mumbai
1Q2003	5	22	18	45
2Q2003	17	64	18	99
3Q2003	23	72	29	124
4Q2003	19	69	25	113
1Q2004	17	59	35	111
2Q2004	30	84	19	133
3Q2004	32	60	27	119
4Q2004	17	93	30	140
<b>Total</b>	160	523	201	<b>884</b>

4.5.2 Of the 884 permits issued, 307 were surveyed through Schedule Part II. Of these, 122 permit sites pertain to 2003, and 185 sites to the year 2004. These were visited for collection of information pertaining to housing starts.

4.5.3 Average number of houses in a permit is estimated to be 43.8 in 2003 and 56.7 in 2004.

4.5.4 Of the 122 sites visited corresponding to permits issued in 2003, construction had not started in 8 (6.6 per cent) cases. Out of 185 permit sites in 2004, 9 (4.9 per cent) had not started the construction. The profile of housing starts

reveals that as compared to other cities where the pilot survey was conducted, the start rate in Mumbai is relatively low in first few quarters (Table 4.5.2)

**Table 4.5.2- Distribution of Housing Starts in Mumbai** (per cent)

Started Issued \	1Q2003	2Q2003	3Q2003	4Q2003	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	Not Started
1Q2003	6.3	41.8	14.8	6.6	9.0	6.9	1.2	--	--	--	3.4	10.0
2Q2003	x	20.9	27.7	7.3	3.8	6.5	9.2	0.6	12.7	--	7.5	3.7
3Q2003	x	x	21.1	17.4	23.9	3.4	--	9.7	5.5	--	13.3	5.6
4Q2003	x	x	x	12.1	27.7	30.1	--	0.9	--	6.3	13.9	9.0
Started Issued \	1Q2004	2Q2004	3Q2004	4Q2004	1Q2005	2Q2005	3Q2005	4Q2005	1Q2006	2Q2006	3Q2006	Not Started
1Q2004	10.6	39.3	1.5	2.1	5.9	20.1	0.1	--	--	--	2.4	18
2Q2004	x	45.7	12.4	24.9	2.6	5.9	4.3	1.2	--	--	0.9	2.2
3Q2004	x	x	33.3	50.1	0.8	5.2	1	4.4	--	--	5.2	--
4Q2004	x	x	x	48.9	25.9	12.8	6.1	0.7	--	--	0.6	5.0

x: Not computable --: Nil/Negligible

4.5.5 Start rate matrices obtained separately for 2003 and 2004 are given in Tables 4.5.3 and 4.5.4

**Table 4.5.3 Start Rate Matrix in Mumbai for 2003**

1Q	0.06	0.28	0.24	0.04	0.09	--	0.06	0.13	0.03
2Q	0.21	0.42	0.30	0.03	0.07	0.07	0.06	0.00	0.08
3Q	0.21	0.28	0.15	0.00	0.00	0.09	--	0.14	0.13
4Q	0.12	0.17	0.07	0.07	0.01	0.10	--	--	--

--: Nil/Negligible

**Table 4.5.4 Start Rate Matrix in Mumbai for 2004**

1Q	0.11	0.26	0.01	0.03	0.06	--	--	--	0.02
2Q	0.46	0.39	0.13	0.05	0.06	0.20	--	--	0.01
3Q	0.33	0.12	0.02	0.06	0.01	0.04	--	0.01	0.05
4Q	0.49	0.50	0.25	0.02	0.01	0.04	0.01	--	--

--: Nil/Negligible

4.5.6 The absolute differences between the matrices obtained through the permit issued in 2003 and 2004 and the corresponding standard errors<sup>§</sup> of these differences are reported in Table 5 and 6 respectively. The statistical significance in the difference was tested using the asymptotic test of equality of proportions<sup>§</sup>. At 1 per cent level of significance, the start rates based on permits issued in 2003 and 2004 were found to be different in quite a few cells. (Table 4.5.5).

4.5.7 The matrix obtained by combining the start rate matrices for 2003 and 2004 is given in Table 4.5.7.

**Table 4.5.5 Absolute Difference in 2003 and 2004 Start Rates in Mumbai**

1Q	0.05*	0.02	0.23*	--	0.03*	--	0.06*	0.13*	--
2Q	0.25*	0.03	0.17*	0.02	--	0.13*	0.06*	--	0.07*
3Q	0.12*	0.15*	0.13*	0.06*	--	0.05*	--	0.13*	0.08*
4Q	0.37*	0.33*	0.18*	0.05*	--	0.05*	--	--	--

**Table 4.5.6 SE<sup>s</sup> of Difference of 2003 and 2004 Start Rates in Mumbai**

1Q	0.01	0.02	0.01	0.01	0.01	--	0.01	0.01	0.01
2Q	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01
3Q	0.02	0.02	0.01	0.01	--	0.01	0.00	0.01	0.01
4Q	0.01	0.01	0.01	0.01	--	0.01	--	--	--

\* Significantly different at 1 per level of significance  
 --: Nil/Negligible

**Table 4.5.7 Start Rate Matrix<sup>@</sup> in Mumbai**

1Q	0.10	0.27	0.09	0.03	0.07	--	0.02	0.05	0.03
2Q	0.36	0.40	0.20	0.05	0.06	0.17	0.02	--	0.03
3Q	0.29	0.18	0.05	0.04	--	0.06	--	0.06	0.08
4Q	0.35	0.39	0.18	0.03	--	0.06	--	--	--

--: Nil/Negligible

**4.6 Compilation of HSUI – An Illustration of the Methodology**

4.6.1 The Housing Starts figure for the quarters corresponding to recent year say 2008 can be obtained based on the methodology given in Section 3.4. For example if the housing starts figure corresponding to Delhi (South) (C) for the 4<sup>th</sup> Quarter of 2008 can be obtained as illustrated below. Let  $P_{4Q2008}, P_{3Q2008}, \dots, P_{1Q2007}$  be the permits issued in Delhi(South)(C) for the 4<sup>th</sup> Quarter of 2008 and the previous 7 quarters i.e corresponding to 4<sup>th</sup> Quarter of 2008, 3<sup>rd</sup> Quarter 2008.....up to 1st Quarter 2007. All the permits issued in Delhi(South) (C) during 4<sup>th</sup> Quarter of 2006 to 1<sup>st</sup> Quarter 2005 will be cumulated together to obtain the ninth value  $P_9$ . As we are interested in obtaining the housing starts corresponding to 4<sup>th</sup> Quarter 2008 of Delhi (South) the start rates are obtained from the 4<sup>th</sup> row of Start Rate Matrix corresponding to Delhi (South) (C) (Table 4.3.7). Using the methodology

suggested in Section 3.4 the housing starts for 4<sup>th</sup> Quarter 2008 of Delhi (South) (C) can be obtained as:

$$S_{4Q2008C} = 0.56 * P_{4Q2008} + 0.32 * P_{3Q2008} + 0.05 * P_{2Q2008} + 0 * P_{1Q2008} + 0 * P_{4Q2007} + 0 * P_{3Q2007} + 0.06 * P_{2Q2007} + 0 * P_{1Q2007} + 0 * P_9$$

Similarly the housing starts corresponding to other centers can also be worked out.

4.6.2 The present section presents the methodology for the compilation of HSUI within the analytical framework as discussed in the section 3.5. Let there be n centers. The objective of the exercise is simply to elaborate the steps involved and understand the empirical difficulties in this effort.

4.6.3 Let HSUI be calculated with 2003 as the base year. The average number of houses started in 2003 for the n centres say C1, C2, ...Cn be  $S_{2003C1}, S_{2003C2}, \dots, S_{2003Cn}$ . The average FSAs pertaining to the year 2003, for n centres be  $A_{2003C1}, A_{2003C2}, \dots, A_{2003Cn}$ .

4.6.4 Let  $S_{4Q2008C1}, S_{4Q2008C2}, \dots, S_{4Q2008Cn}$  be the Housing Starts compiled for the 4<sup>th</sup> Quarter 2008 for the n centres C1, C2, ...Cn respectively. Then the HSUI for the 4<sup>th</sup> Quarter 2008 based on the description given in Section 3.5 can be calculated based on the formulae:

$$HSUI_{4Q2008} = \frac{S_{4Q2008C1} * A_{2003C1} + S_{4Q2008C2} * A_{2003C2} + \dots + S_{4Q2008Cn} * A_{2003Cn}}{S_{2003C1} * A_{2003C1} + S_{2003C2} * A_{2003C2} + \dots + S_{2003Cn} * A_{2003Cn}}$$

#### 4.7 Difficulties and Limitations of the Exercise

4.7.1 All requisite information sought to be collected through Schedule Part I are available with the permit issuing authorities. Unfortunately, these are not



- available in the computerised form in many cases. It therefore became necessary to cull out the information from the registers and files maintained mostly in hand written form.
- 4.7.2 In the permit data, collected through Schedule Part-I (Survey of Building Permits), the data corresponding to some variables, for example number of housing units in the building, plinth area of the building and height of the building are not available even in the registers maintained by the concerned authorities. Hence the field staff had to go through the individual files for collecting the requisite information. In some centers (for example, Delhi), even the files did not contain the required information in several cases.
- 4.7.3 The information on the number of units in a Multiple Housing Unit (MHU), for which permission has been given, have been collected through Schedule Part-I but not very satisfactorily. This is a very important piece of information for working out housing starts. Importantly, this information was captured in the survey through Schedule Part-II (Sample Survey of Housing Starts) which was used for estimating the total number of housing units in the permits.
- 4.7.4 In case of MHU, it is difficult to ascertain the exact date by which construction can be taken to have started for each individual housing units. Hence all the housing units in an MHU are assumed to be started when the excavation or footing was laid for the building.
- 4.7.5 Some of the sites for which permits to construct houses were issued were found to be not occupied at the time of the survey and consequently the Part II schedule could not be canvassed. In some cases, the builder after handing over the building to the owner had shifted to a new address. In these cases, too, certain vital information like time of the building start could not be collected.
- 4.7.6 Some divergence was noted in the type of the permit issued as per the official records and the actual permit document, during the field survey. Some of the SHU permits were found to be of MHU and vice versa. However, for the

compilation of the start rate matrices, the data from the field survey (Schedule Part II) were used.

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**Notes:**

§ Test statistics for testing the equality of proportions is given by  $[(s_1-s_2)/SE]$  which follows  $N(0,1)$  asymptotically, where  $s_1$  and  $s_2$  corresponds to the start rates obtained in 2003 and 2004.

\$ The SE in the difference of start rates is obtained by  $SQRT (s_1(1-s_1)/n_1+s_2(1-s_2)/n_2)$

@ The combined start rate  $s = (n_1s_1+n_2s_2)/(n_1+n_2)$ .