

## **Report on Estimation of Imputed Rents**

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1. A critical step in the analysis of the 2008-09 HIES is the estimation of “imputed rents” – the estimated net value of owner-occupied dwellings- which need to be added to the incomes (and expenditures) of all households which do not pay rents on the dwellings occupied.
2. It is necessary to make adjustments for Imputed Rents if the incomes and expenditures of households with owned or rent-free dwelling are to be meaningfully compared with those of the other households which do pay rent, which is recorded as part of their expenditure.<sup>1</sup> Households which do not pay rent, do enjoy the value of the housing, and this is part of their “income”.
3. Comparisons of the incomes and expenditures of the 2008-2009 HIES with the 2002-03 HIES will be possible only if the adjustments for the imputed rents are made with similar and consistent methodology.
4. Gross Imputed Rents are usually estimated from actual rents paid data from the HIES.
5. As was done for the 2002-03 HIES, the Team estimated Net Imputed Values = Gross Imputed Values (estimated from the regressions using actual rent data) less the Imputed Cost of Owned Houses which is estimated as an aggregate percentage of aggregate (Actual Repairs and Maintenance plus Interest Component of Instalment payments<sup>2</sup> plus Property Rates).<sup>3</sup>
6. The nature of the rental market in Fiji in Fiji is such that there are systemic differences in rents paid between urban and rural areas, between Divisions (with the Central division usually being higher than Western, in turn higher than Northern and Eastern), and by the “Class” areas (with High Class usually being higher than Middle Class etc).
7. Any estimation of rent functions however depends on having an adequate number of observations for market rents paid by households, if statistically meaningful results are to be obtained. Rural households posed a particular problem in this regard, especially for the lower quality houses, very few of which were being rented.

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<sup>1</sup> The Net Imputed Rents are added to both the household income and expenditure sides.

<sup>2</sup> The interest component was estimated for the 2002-03 HIES on data supplied by Home Finance Company to be around 48.5% of total Instalment Payments over the lifetime of the loan.

<sup>3</sup> From the 2002-03 HIES data for households not paying rent, these deductions amounted on average to be 21.9% of Total Imputed Rent.

8. The overall 2008-09 HIES sample distribution of house types in the four divisions and by classes is as given by Table 1 (Appendix) and the number of households represented by the HIES sample is given by Table 2, and the number of households with actual rent data recorded is in Table 3. It will be noted that given that sample size for the 2008-09 HIES is much smaller than that for 2002-03 (with only 3573 households compared to 5245 in 2002-03), the number of households with Actual Rents paid is actually much lower than that for 2002-03 (only 456 compared to 812 in 2002-03). It will therefore be far more difficult to estimate disaggregated regressions for 2008-09 compared to the exercise for 2002-03.
9. Table 4 gives the Simple Averages for Rents Paid by the households in Table 3.
10. The Team concluded that it would be advisable to estimate separate Imputed Rent functions only if there were a large enough number of observations and the Actual Rent Paid averages were significantly different.
11. In Fiji, the rural households may be expected to have a significantly different rental market from the urban households – generally uncompetitive and thin, both from the point of view of supply and demand. Separate regressions were initially conducted for rural households, disaggregated by divisions but inconsistent results, largely due to very small numbers of observations, led to the Team aggregating all the rural observations together for all Divisions, but disaggregating the better quality houses (Wooden and Concrete with 3 or more rooms) from all others of iron, bures, Others, and 1 and 2 roomed Wooden and Concrete houses..
12. An examination of Table 3, and estimations of various options, led to the following final seven regressions being estimated, with the results generally consistently reflecting the nature of the rental markets throughout Fiji, for different types of houses:
  - (a) Central High Class areas with Concrete houses with 4 or more rooms
  - (b) Central Other Classes, Concrete 3,4+, Wooden 3+
  - (c) Central Other Classes, Concrete 1, 2, Wooden 1,2, Iron.
  - (d) Western, Northern, Eastern Concrete 3, 4+, Wooden 3+
  - (e) Western, Northern, Eastern Concrete 1,2, Wooden 1,2, Iron
  - (f) Rural Wooden 3+, Concrete 3+
  - (g) Rural All Others

13. It was decided that the regressions would exclude all observations where the Rent Paid as a Percentage of (Regular Income – Rent Paid) was more than 40% and less than 5%, with a lower limit of 3% for the Rural better quality households with Rent Paid data.

14. Linear functions were estimated, of the form:

$$\text{Gross Imputed Rent} = k + A * (\text{Regular Income} - \text{Rent Paid})^4.$$

15. The results are given in Table 1, and the associated Imputed Rents in Table 2.

16. Because of the very small number of observations for Rent Paid in the lower quality Rural households, it was decided that the regression equation would be 0.75 of the coefficients (both k and A) for the better quality Rural houses (Concrete 3+ and Wooden 3+).

Table 1 Imputed Rent Functions

	k	A	R squared	n	Discarded	Total Obs.
Rural Iron, W1,2, Other	580	0.0431				13
Rural W3, C3+	773	0.0575	0.1599	29	9	38
WNE AC (C1,2, W1,2, I)	604	0.0650	0.3065	55	7	62
WNE AC (C3,4+, W3+)	1716	0.0666	0.3138	54	25	79
Central OC (C1,2, W1,2, I)	1015	0.0739	0.3013	68	16	84
Central OC (C3,4+, W3+)	1769	0.1035	0.4158	102	27	129
Central HC (C4+)	2300	0.1150	0.3659	33	18	51
All				341	102	456

Key for above table:

WNE Western, Northern, Eastern

HC High Class

OC Other Classes (Middle, Settlement etc)

AC All classes

C4+ Concrete, with 4 or more rooms.

C3,4+ Concrete, with 3 or more rooms

C1,2 Concrete, with 1 or 2 rooms.

W3+ Wooden, with 3 or more rooms

W1,2 Wooden, with 1 or 2 rooms

I Iron walled houses (all sizes).

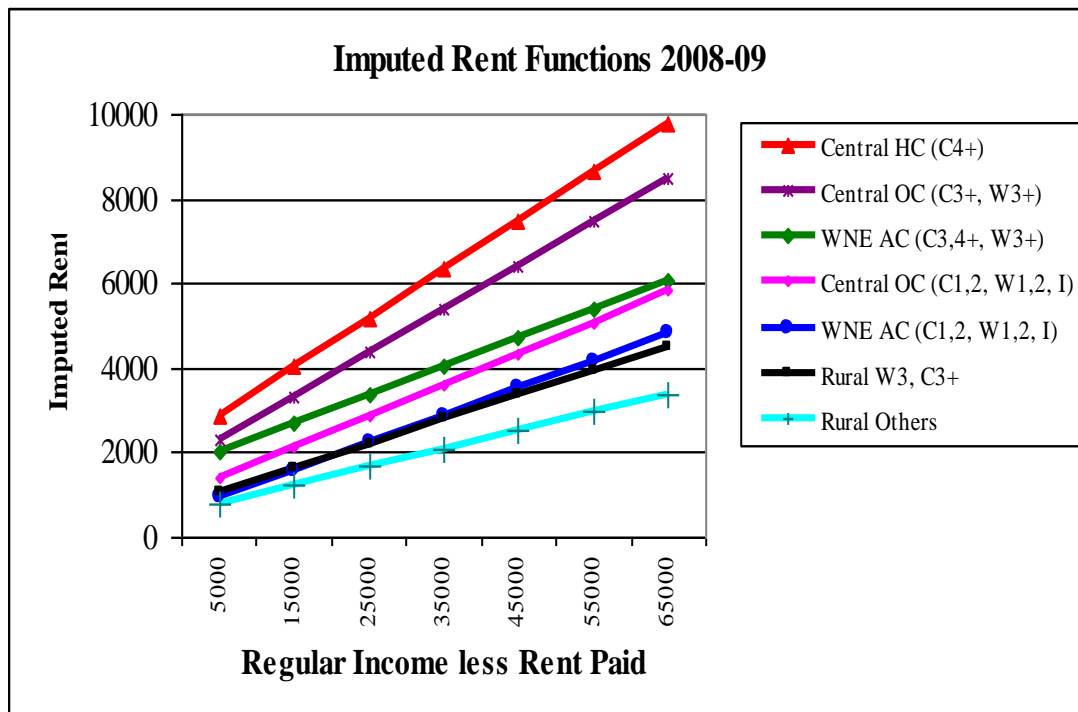
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<sup>4</sup> Regular income excludes loans received.

Table 2 Estimated Imputed Rents associated with Table 1.

	Regular Income less Rent Paid (\$)						
	5000	15000	25000	35000	45000	55000	65000
Rural Others	795	1226	1658	2089	2520	2951	3383
Rural W3+, C3+	1060	1635	2210	2785	3360	3935	4510
WNE AC (C1,2, W1,2, I)	929	1579	2229	2879	3529	4179	4829
WNE AC (C3,4+, W3+)	2049	2715	3381	4047	4713	5379	6045
Central OC (C1,2, W1,2, I)	1384	2123	2862	3601	4340	5079	5818
Central OC (C3+, W3+)	2286	3321	4356	5391	6426	7461	8496
Central HC (C4+)	2875	4025	5175	6325	7475	8625	9775

Graph 1 All Imputed Rent functions



### Substitution of Imputed Rent Values

17. The equations resulting from the constants and co-efficients in Table 1 have been used to generate a final set of values for Gross Imputed Rents according to the regression equations.

Net Imputed Rent adjustment then allows for an estimate of repairs and maintenance costs, and interest payments on home mortgages. It was decided by the Team that to maintain consistency with the estimation of Imputed Rents for the 2002-03 HIES, the same adjustment factor (0.219) would be used to allow for repairs and maintenance and interest payments on home mortgages for owner occupied dwellings..

$$\begin{aligned}\text{Net Imputed Rent} &= \text{Gross Imputed Rent} - 0.219 \text{ Gross Imputed Rent} \\ &= 0.781 * \text{Gross Imputed Rent}\end{aligned}$$

18. For households with extremely low incomes, a problem emerged from the fact that the regressions were estimated for households with middle incomes or higher, hence linear approximations tended to give NIR values which were quite high proportions of the Regular Incomes of these low income households. The Team decided to set a maximum of 40% for NIR as a percentage of Regular Incomes, and these values were set for some 57 households.

19. The adjustments required for households without Rent Paid data was as follows:

$$\text{Adjusted Income} = \text{Regular Income} + \text{Net Imputed Rent}$$

$$\text{Adjusted Expenditure} = \text{Regular Expenditure} + \text{Net Imputed Rent}.$$