An Assessment of the Decision to Extend Government-built Houses in Developing Countries

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Abstract

In an international comparative study of self-help transformations (alterations and extensions) to government-built housing in developing countries, sponsored by the Overseas Development Administration, data were collected on household and housing characteristics of about 400 households in each of four case studies (in Dhaka, Bangladesh; Cairo, Egypt; Kumasi, Ghana, and Harare, Zimbabwe). The data for each country have been used in a two step econometric analysis of the decision to transform. The first step examines the factors which influence the decision to make an extension in the period 1991-93 (the three years before our survey) and the second step examines how much is spent on the extension. The data from all four case studies are also combined in a joint model.

In general, it seems that characteristics of the house are very influential in the decision to transform and in the decision on how much to spend once the transformation has been undertaken. Thus, the frequency and scale of extension activity by low income households in developing countries could be influenced by physical planning policy.

[1] The country case studies were carried out by Md. Shahidul Ameen, Magda Metwally and Hala Kardash, Stephen E. Owusu, and Columbus Pritchard. Their contribution to the work is acknowledged with gratitude.

Introduction

Most observers of housing in developing countries will have noticed the phenomenon of self-help extensions to government-built housing. The (mostly small) single household dwellings provided to the fortunate few, supposedly low income, households are being extensively altered and extended. A recent ODA-sponsored international comparative study has examined transformations in four cities; Dhaka, Bangladesh; Greater Cairo, Egypt; Kumasi, Ghana; and Harare, Zimbabwe; with a view to showing whether, on balance, governments and citizens have more to gain by encouraging transformations or by attempting to prevent them. Figure 1 shows plans of a transformed house from each sample drawn to the same scale and with the original dwelling in hatched tone.

In Dhaka, the occupants of refugee housing in Mirpur were allocated 22 sq.m. space in a single room and veranda in semi-detached houses arranged in closely-spaced grids. Since their first occupation in the mid-70s, the houses have been extended until now they have medians of 5 habitable rooms and 55 sq.m. floor area (3.2 square metres habitable space per person). While increasing their own habitable space by a factor of 1.6, the main households have also provided space for two tenant households per house. Although the occupants are still tenants, they have invested a median of PPP£3,880[2] in extending the houses and a total of about PPP£22.35 million in the whole development of 4,300 houses. Their median household income is PPP£4,214 per annum and their house cost to income ratio is now about two.

In Greater Cairo, five-storey walk-up flat dwellers in Workers' City, Helwan, and Medinet Nasr, have managed to extend by co-operating amongst themselves to engage specialised contractors to build stacks of rooms attached to the mother building. Through a combination of internal alteration and outward extension, they have increased their living space by 57 per cent from a median of 26 square metres to almost 42 square metres. Despite increases in population, transformation has increased floor space per person by more than one sq.m. to 10 square metres habitable space per person, and kept occupancy rates down to 1.2 persons per room. The scale of investment involved is around PPP£2,500 at the median for households at about one year's income.

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[2] In all our discussions of money, we have converted local currency into £ Sterling at Purchasing Power Parity (PPP) using data from UNDP (1993, table 1). Thus, Bangladeshi Taka are multiplied by 4.1524 (PPP conversion) before being converted at the official exchange rate. The factors for the other countries are 3.259 for Egyptian Pounds, 2.6051 for Ghanaian Cedis, and 2.2831 for Zimbabwean Dollars.

In Kumasi, many of the original government-built dwellings from the 1940s and 50s are single rooms set in terraces so the narrow frontages severely constrain the potential for extension activity. The remainder are semi-detached dwellings standing in their own plots, many of which are very spacious. Overall, transformations have allowed the main households to increase the habitable space from a median of 24 sq.m. to 54 sq.m., and the habitable rooms from a median of 2 to 6 per house. Although many more people live in the houses than when they were first built, transformers have more habitable space per person (5.6 square metres) than non-transformers (4.4 square metres). The habitable space available to the main household has increased while, at the same time, they have provided new accommodation for tenant households in 27 per cent of houses and rent-free (family) tenants in 33 per cent. The cost of transformations is estimated at PPP£4,800 at the median per house, implemented by households with annual incomes of PPP£3,400 at the median.

In Harare, transformations to bungalows with 30 sq.m. habitable area at the median have so far achieved 53 sq.m. habitable space and six habitable rooms per house at the medians. Main households have benefited by 4.4 sq.m. at the median and two tenant households per house are now accommodated. Some of the rented space is in the form of sectional wooden structures (known as shacks), but the remainder is, as in the other country studies, at least as high standard as the original structures. At the median, PPP£3,660 has been spent on the extensions by households with median incomes of PPP£3,770 per year. House cost to income ratio is now around four for transformers and three for non-transformers.

Our findings in the four case studies support a positive view of transformations. In general, physical standards in the extensions are as good as or better than the original house (except for Zimbabwe's shacks). The main (original occupier) households improve their own housing circumstances both in the services they enjoy and in the space available. Services have been improved by many transformers. In Ghana and Bangladesh few of the sampled houses originally had toilets but now 54 per cent in Ghana and 87 per cent in Bangladesh have them. A similar though more marked improvement has occurred in water provision.

The improvements in habitable space per person (measured as the difference between transformers and non-transformers) is fairly constant at the median for each country at 1.2 sq.m. However, not only is there more space for the household, but also the occupancy rates have been reduced against whatever measure we may use as a proxy for the original circumstances. Thus, although population densities and floor space indexes have undoubtedly increased through transformation,

occupancy rates (a much more crucial measure of housing quality) have been considerably reduced.

Although it has not been a main motive in any of our case studies except Zimbabwe, additional accommodation has been provided for a number of tenant households, some of whom live rent-free through family loyalties. The numbers of extra households housed vary from virtually none in Egypt, where the five-storey walk-up flats provide little scope for separate living within the original dwellings, to two at the medians in Bangladesh and Zimbabwe. Though there are renters in the Bangladesh, Egypt and Ghana samples, the main motive for extending has been the need to accommodate the growing household.

Through this study we have seen that neighbourhoods designed for a different era and reaching the end of their economic lives have become renewed, if sometimes rather chaotic and crowded. Rather than being in decline, they are increasingly full of a variety of people and uses. Where once they were relatively poorly serviced (as in both Bangladesh and Ghana), they are now serviced to a similar level to surrounding neighbourhoods. From being enclaves of government housing untypical of their cities, they are increasingly indistinguishable from the rest of their urban milieux.

In this paper we attempt to divine why some households invest substantial amounts of money in extending their houses while others do not. In other words, what characteristics distinguish transformers from non-transformers. By so doing, we can point out the issues which could be addressed by policy in order to increase the efficiency of transformations as a housing supply mechanism.

Predicting the Transformation Decisions

The data on transformers and non-transformers provided the basis for a two-step econometric analysis of the decision to transform. The factors which influenced the decision to transform were identified, and then the amount spent on the extension was modelled. The analysis is similar to that used by Ziegert (1988) and Garrod *et al*. (1995) and was based on the two-stage Heckman procedure (Heckman 1976; 1979)

In a similar way to that described in Garrod et al (1994), we used a probit model (in SAS) to find which variables are affecting the decision to extend. Not all the variables looked at by Garrod et al. were available from our study, e.g. ethnic group

or whether a respondent has worked abroad. However the following variables were used in the modelling procedure:

ExtCost	=	Cost of extension indexed to 1993 prices.
Age	=	Age of head of household.
IncPC	=	Income estimated by household expenditure per head In Bangladesh, in thousands of Taka; in Egypt, in L.E.; in Ghana, in 100,000s Cedis; in Zimbabwe, in Zimbabwe Dollars.
IncDiff *(Not used in Bangladesh)*	=	Difference in annual income of household and mean annual income for other households in their estate In Egypt, in thousands of L.E.; in Ghana, in 100,000s of Cedis; in Zimbabwe, in Zimbabwe dollars.
Sex	=	0-1 variable: whether respondent is female.
HseStay	=	Number of years spent in the house.
EmpStay	=	Number of years in current employment.
RBefExt	=	Number of rooms in the house in 1990.
ABefExt	=	Area of house in 1990.
OwnElse	=	Other houses owned (0-1 variable).
EducYrs	=	Years spent in education.
Estate	=	The estate within the country sample; i.e., in Egypt, Helwan or Medinet Nasr; in Ghana, Asawasi, North Suntreso or South Suntreso; in Zimbabwe, Mbare, Highfield: (Egypt and Jerusalem), or Highfield, (Canaan and Western Triangle).
Acquire *(Not used in Bangladesh)*	=	Method of acquisition; bought, inherited or rented.
StayCity	=	0-1 variable: whether respondent intends to stay in the city.
Depend	=	Dependency ratio (number of children / number of adults).
SellL	=	0-1 variable: whether the respondent will sell on leaving.
Family	=	0-1 variable: whether respondent will pass house to family.
AgeArrv	=	Age when moving into house.
HHSize	=	Household size (1993).

These variables relate to the fundamental characteristics of the respondent households and their houses or flats, and the relationships specified by Mendelsohn (1977) in his model. Except in Bangladesh, the presence of non-transformers in the

sample made it possible to generate a variable representing the difference between the income of the household and the mean for the area.

The first-stage analysis utilized a binary dependent variable 'Ext', which took the value one if a household extends their house during the period 1990 to 1993 and zero otherwise. Thus, all recent transformers (1990-1993) in the survey took the value one, and all non-transformers zero. The probability of transforming was then modelled as a function of the households' characteristics during the period being examined. This was not used in Bangladesh as there were so few non-transformers in the sample.

In stage two of the Heckman procedure, we modelled the decision on how much to spend (in 1993 prices) on the transformations once the decision to transform has been taken. Only recent transformers were included to determine the variables for this stage though all transformers were sometimes modelled. The same variables are used as in the first stage.

Lambda, the inverse Mill's ratio, was output by the first-stage probit analysis and was entered into the second-stage analysis to counter any possible sample-selection bias. This was necessary because the observed data in the second-stage model are not sampled randomly from the population, but as a result of the extension decision. If the data had been treated as having been randomly sampled from the population of house-owners, rather than from the sub population of extenders, then potentially serious biases could have occurred (Heckman 1979). Thus, in each sample for which we have carried out the first stage of the procedure, account has been taken of the difference between the proportion of the sample who are recent extenders and the proportion of them in the area as a whole. The latter was roughly estimated from our experience of the areas involved. This allows the calculation of weights for the observations reflecting the ratio of the observed to true mix of extenders to non-extenders in the population (see Manski and McFadden 1981).

Bangladesh

In Bangladesh, income was measured not by the difference from others in the neighbourhood but by its actual size through a variable:

TotEx	=	Total Annual Household Expenditure (as a proxy for income) in thousands of Taka.

In addition, an acquisition variable was added:

Acquire	=	Means of Acquisition of the house: 0 = Rent from public sector; 1 = Buy Possession.

Because there were so few non-transformers as a comparator in the Bangladesh sample, only the second stage of the model was relevant.

The probit model was estimated using LIMDEP 5.1 (Greene 1989). The influential variables, all of which were significant at the 0.15 level, are as shown in table 1.

Table 1 here

The variables are given in decreasing order of significance and this model explains 22% of the variability.

The covariate 'RBefExt' has a negative coefficient implying that the fewer rooms a house has in 1990 the more will be spent on the transformation. 'TotEx' (in Thousands of Taka) has a positive coefficient implying that the more affluent a householder is, the more money (s)he will spend on transformation. The effect of the 'Acquire' variable is quite marked. Adjusted mean extension cost for householders who buy possession of the house can be calculated at Tk.25,514 whereas for those who rent from the public sector it is only Tk.17,800.

As we might expect, incomes have some small but significant effect on whether a house is transformed and a larger effect on how expensive the transformation is once the decision is taken to go ahead. However, the smallness of the house before the extension (expressed as area in the first stage and number of rooms in the second) is more important.

In Bangladesh it seems that householders will transform if they have smaller houses, i.e., if there is still space on their plot and they will build as many rooms as they can afford. Those who bought possession and are thus demonstrably willing to invest in housing, are capable of building the most expensive extensions.

Egypt

The Egypt study had a number of unique variables which were included in the model. These are as follows

HHbefExt	=	Number of people in the household before any extension

HseType	=	Flat type: 1=Helwan 2 roomed back to back narrow; 2=Helwan 2 roomed back to back wide; 3=Helwan 2 roomed straight through; 4=Helwan 3 roomed straight through; 5=Medinet Nasr 2 roomed straight through; 6=Medinet Nasr 2 roomed straight through.
Floor	=	Floors 1 to 5.
Estate	=	1=Helwan; 2=Medinet Nasr.

The usable sample for the Egypt data set consisted of 69 (25%) recent extenders and 208 (75%) respondents who had not extended their houses since 1990. This tallied with informal estimates of a recent transformation rate of around 20% for this period. The sample was adjusted slightly to take account of the small discrepancy between observed and expected numbers of extenders.

The probit model was estimated using LIMDEP 5.1 (Greene 1989) on the weighted observations. The results are shown in table 2.. Again all variables shown entered the model at the 0.15 significance level.

Table 2 here

Households in Medinet Nasr were more likely to transform than those in Helwan because by 1990 most flats in Helwan had already been transformed. There was a strong correlation between the number of rooms in the flat in 1990 and the area of the flat at that time and, as a result of this, these variables were only significant when entered into the model jointly, rather than singly. As a result, it was difficult to separate out their individual effects on the decision to transform. One reasonable interpretation may be that the impetus to transform was the combination of a relatively small floor area divided into a large number of rooms. Conversely, fewer rooms in a large area would discourage transformation, probably because it suggests that the householder had transformed prior to 1990. Thus, cramped conditions may be an important stimulus to the decision to transform, both before and after 1990. This may seem somewhat counterintuitive, as we would expect Muslims to wish to divide up space so as to maximize privacy and therefore would expect more smaller

rooms in houses that had already been transformed. However, this does not mean that they would not wish these rooms to be as large as possible.

A greater number of years in education and a higher rate of income than the average for the area both increased the probability that a householder will transform. The chances of transformation also rose if the householder acquired the house through inheritance.

The goodness of fit statistics suggest that our model was a good approximation of reality, in that it provides a very good fit for the data and correctly predicts over 90 per cent of all recent transformations.

The second-stage empirical analysis estimated a linear model of the cost of the extension (ExtCost) using the 69 extenders, mostly from the Medinet Nasr estate. The inverse Mills ratio, Lambda, linked the two stages of the empirical analysis by controlling for sample-selection bias. Aside from the Mills Ratio, variables which were not significant at the 0.15 level were discarded from the model. The results of the second-stage analysis are shown in table 3.. The explanation of just over 30 per cent of the variation in the dependent variable was satisfactory.

Table 3 here

Physical structure seemed to be an important determinant of spending on transformations. The flats on higher floors had less spent on extensions (presumably a logistical issue, as larger extensions are less practical on higher floors), and certain original layouts of flats in Helwan also seemed to attract lower expenditures. The 1990 flat layout was correlated with the number of rooms in the flat before 1990. However, the variable RBefExt was a highly significant and positive determinant of spending in the model specified, either with or without layout variables. This again tallies with the notion that respondents living in the most cramped conditions are most eager to extend and, here, suggests that this will lead to a high spend. However, in this case, there is less evidence to support this notion as the area of the flat before extending is not a significant factor in explaining spend. Surprisingly, the more educated Egyptians are spending less on transformations. This may suggest that they have spent money on extensions previously or, if they are younger, may be dividing their resources between work on their flats and on bringing up their children.

The Egyptian government seems intent on continuing to build walk up flats. The most obvious response to the first-stage analysis, is to suggest that new housing is

built with future transformations in mind. Flats should have at least three rooms, with the smallest being those rooms most easily continued into the extension.[3]

Ghana

The Ghana data set included a useful variable specifying house type:

Hsetype	=	1=Semi-detached 2 roomed; 2=Semi detached 3 or 4 rooms; 3=End terrace 1 room; 4=End terrace 2 rooms; 5=Mid terrace 1 room; 6=Mid terrace 2 rooms.

Our sample is essentially a random one with the exception that non-transformers are over represented. Although it is estimated that approximately 90 per cent of houses have been transformed and 10 per cent remain non-transformed, our sample had a ratio of 78 : 22. This is mainly because there are very few non-transformers left in Kumasi and we needed as many examples as possible. Hence weights were used to reduce this bias and reflect a more representative view of the population.

There were 392 usable observations in the Ghanaian data set, 72 (18%) recent extenders and 320 (82%) respondents who had not extended their houses since 1990. The relative proportion of recent extenders was probably slightly higher than this, with perhaps around a quarter of households extending between 1990 and 1993 (see (Garrod and others 1995) for a discussion of this issue).

As before, we are primarily interested in the dependent variable 'Ext' which takes the value 1 if the house has been extended between 1991 and 1993 and the value 0 otherwise. The probability of extending (that Ext=1) is then estimated using LIMDEP 5.1 on the weighted observations. The results are shown in Table 4.. All variables shown entered the model at the 0.15 significance level.

Table 4 here

[3] Indeed this would solve one of the major problems of the flats once extended, that the internal room loses daylight and ventilation. This way either the original room is continued out into the extension or the first part of the extension allows a window to be opened into the original room before a new room is created further into the extension.

Owners of semi-detached houses are more likely to extend than those who own terraced houses. Houses occupied by the owner who acquired them from the State Housing Corporation, or his/her representative (caretaker), are more likely to be transformed than those which have been inherited. Respondents with higher incomes than their neighbours were more likely to extend, as were those with larger households and, therefore, more pressure on space. The number of rooms in the house before 1991 was also influential, the more rooms there were in the house at that time, the less likely it was to be extended. This is probably because previous extensions had already been built and it would then tally with the analysis of extension decisions in Ghana carried out by Garrod et al. (1995).

The goodness of fit statistics suggested that the model was reasonable and that it provided an adequate fit for the data, correctly predicting nearly 80% of all recent transformations.

The second-stage empirical analysis estimated a log-linear model of the cost of the extension (ExtCost) based on the 72 extenders from the first-stage model. Apart from the Mills ratio, variables which were not significant at the 0.15 level were discarded from the model. The results of the second-stage analysis are shown in table 5. The explanation of around 30 per cent of the variation in the dependent variable was reasonable given the data available.

Table 5 here The area of the house before transformation was a significant factor in this case, with householders in larger houses spending more on their extensions. Again, this may have been an effect of the greater affluence of respondents already living in larger (extended) houses. These respondents may have had more disposable income to spend on transforming their houses and the space necessary to achieve their objectives. Living in two-room terraces reduces spending on their extensions. Those respondents who acquired their house directly from SHC spent more on their extensions than those who left the house in the hands of a representative or who had inherited. Owners are under pressure to provide accommodation for extended family members, either in the form of space in their own household or as rent-free rooms separate from their own households' rooms.

The analysis seems to suggest that space to extend is an important factor in the decision to extend and on how much is spent. House-owners do not want only two or three rooms in a country where traditional houses are much larger and accommodate more people. Thus, they will build more if they have the space.

Zimbabwe

The usable sample of 282 observations consisted of 138 (49%) recent extenders and 144 (51%) respondents who had not extended their houses since 1990. The relative proportions of these two groups in the population were probably less even than this, with approximately 30% of households estimated to have extended their houses since 1990. The probit model was again estimated using an appropriately weighted sample. The results are shown in table 6. All variables shown entered the model at the 0.15 significance level.

Table 6 here

The area of the house in 1990 was found to be an important factor in the decision to extend, although the number of rooms in 1990 was not. Unsurprisingly, the larger the house, the less likely was it that the householder would transform between 1991 and 1993. It would seem that the area of the dwelling, rather than the number of units it is divided into, is the crucial factor in the extension decision.

Differences between estates also proved to be important. Houses in Highfield (Egypt and Jerusalem) were the most likely to be transformed in the period of interest, while householders in Mbare were the least likely to transform because most of them had already done so prior to 1991. The positive sign on the plot area coefficient suggests that the larger the plot, the more likely the householder is to extend. This makes intuitive sense given that sufficient area within which to extend is a prerequisite of such activity.

The goodness of fit statistics suggest that our model is a reasonable approximation of reality, in that it provides an adequate fit for the data and correctly predicts nearly 70% of all recent transformations.

The second stage analysis used the same variables as in the first stage but added:

Shack	=	0-1 variable reflecting whether a house has only a shack transformation or not

The second-stage empirical analysis estimated a log-linear model of the cost of the extension (ExtCost) using the 138 extenders from the first-stage model as the source data. Apart from the Mills ratio, Lambda, variables which were not significant at the 0.15 level were discarded from the model.

Table 7 here

The results of the second-stage analysis are shown in table 7. Considering the data available to model the cost of the extension, the explanation of around 65 per cent of the variation in the dependent variable was highly satisfactory. This was not necessarily evidence of the theoretical validity of the model, there may have been much stochastic variation in the data overshadowing the systematic influence of variables: nonetheless it did provide important evidence of reliability.

As expected, householders transforming shacks spent considerably less on transformation than other respondents. The length of stay in the house was also a significant explanatory variable, though surprisingly its effect was negative, with those who had spent longest in their houses spending the least. This may be because these respondents had already completed most of the transformations they desired in the past. The fact that the head of household had retired was not a factor for determining spending. There was no significant difference in spending on recent extensions between households where the head was retired and those where the head was still employed. More surprisingly, those respondents who already had most rooms spent the most on their transformations. Number of rooms may be an indicator of affluence, and respondents who already have more prestigious houses may have spent more than those whose houses are more modest. The area before extending was not a significant factor, nor is any conventional indicator of affluence such as per capita income.

This analysis seems to point to the inevitability of extensions. If a house has not been extended, it will be, and if there remains sufficient room on the plot this process may be repeated. Those wishing to build prestigious dwellings will lavish the most money on them as householders invest in accommodation for this and the next generation. Those who build the humble shacks can extend cheaply and the ability to provide some extra housing space can be achieved on low budgets.

All Countries

In an experimental probit analysis for all countries, the estate proved to be such an influential variable that all else paled into insignificance. Thus, we do not present what cannot be a very reliable predictive model here. Instead, we look for similarities between and patterns among the findings for the four countries.

Table 8 here

It is noticeable how the same variables appear to be influential in different countries, and how important house characteristics are. Area and/or rooms before

extension are influential[4] in all three samples. House type, with the related characteristics of space round the house (expressed as estate, plot area, or whether or not there is a plot), are influential in each.

The variables expressing household characteristics tend to be less influential than house characteristics and less, perhaps, than would have been expected. However, where they do occur, they are the ones we would expect: measures of household expenditure (TotEx and IncDiff, both postively correlated with extending) and per capita expenditure. Only in Ghana has household size any significant influence on the decision to extend.

Table 9 here

House characteristics are influential in deciding the cost (scale) of transformations. Rooms or area before extension are significant and positively correlated in each country except Bangladesh where space is so cramped that the variable 'more rooms' is heavily linked to there being less space available. Rising floors and the freedom to build shacks reduce spending.

Household variables such as total household expenditure, household size, education, sex of head (in varying directions), and length of stay in the house are influential in some samples and more than in the decision to extend. In addition, housing tenure (means of acquisition) is influential in two case studies.

Conclusions

The main conclusion from this exercise is that, in the decision to extend, the house is more influential than the household. In the cost of extension, however, the influence of the house reduces and that of the household increases.

If a household has a plot (space around the house which they can claim as their own), they are very likely to extend and to spend considerable amounts of money on the extension. The physical characteristics of the house are likely to have more effect on the decision to transform than the household's income or composition. The influence of income and household size on the cost of transformations is not as important as might be expected, and certainly not as important as house characteristics. Future housing policies should avoid small two- and three-roomed dwellings even for very low income households unless they are built as core housing

[4] though in varying directions, see Egypt example for an explanation

with enough space around them to permit future transformation when and if the householder desires.

We can assert from the model that anyone who has the space to transform is likely to do so. If policy is required to encourage transformations in housing areas currently being planned, plots should be clearly demarcated and large enough to accommodate several new rooms. The usual assistance with finance and the other inputs would be useful in improving efficiency, as in all housing supply. But, if there is private space to put them on, extensions appear to be almost inevitable in the life of low-cost housing in developing countries.

Table 1. Variables which affect the amount spent on transformations, Bangladesh

Variable	Coefficient (t-value)
Constant	9.665 (40.95)
RBefExt	-0.131 (4.24)
Totex	0.12 (3.83)
Acquire = Bought Possession	0.361 (2.19)
R-squared	0.22
Adjusted R-squared	0.199
F-Statistic	10.37

Table 2. Variables which appear to affect the decision to transform. Unweighted parameter estimates in order of significance.

Variable	Coefficient
Constant	-2.213 (-2.50)[a]
Estate=Medinet Nasr	3.193 (7.37)
Educ Yrs	0.050 (1.95)
RBefExt	0.218 (1.56)
ABefExt	-0.039 (-1.57)
IncDiff	0.0001 (1.92)
Inherit	0.991 (2.42)
Unrestricted Log Likelihood	-41.467
Restricted Log Likelihood	-154.336
Likelihood Ratio test[b]	225.7
Pseudo R-squared[c]	0.731
Correct Predictions (%)	94.5%

a. T-values are shown in parentheses.

b. The likelihood ratio test statistic is computed as twice the difference between the initial and maximum log-likelihood values: asymptotically this statistic has a chi-squared distribution with n (number of restrictions, see (Gujarati 1995) degrees of freedom. At the 95% confidence level the critical value of the chi-squared distribution is 12.59 with 6 df.

c. Pseudo R-squared is computed as 1-(unrestricted log-likelihood/restricted log-likelihood) and is, according to McFadden (1974), an alternate measure of goodness-of-fit for probabilistic choice models.

Table 3. Variables which affect the amount spent on transformation, Egypt

Variable	Coefficient (t-value)
Constant	3093.3 (2.18)
RBefExt	558.78 (3.34)
EducYrs	-101.15 (-2.75)
Sex of head	-868.19 (-1.47)
Floor	-271.80 (-1.69)
Helwan: 3 room straight through	-3851.3 (2.73)
Helwan: 2 room back to back wide	-6154.9 (-3.03)
Lambda	350.61 (0.63)
R-squared	0.302
Adjusted R-squared	0.222
F-Statistic	3.77

Table 4. Variables which appear to affect the decision to transform, Ghana. Parameter estimates in order of significance.

Variable	Coefficient (t-value)
Constant	-1.086 (-3.73)[a]
Acquire=bought from SHC	0.509 (1.94)
Acquire=owner's representative	0.613 (2.27)
Semi-detached, two rooms	0.989 (4.68)
Semi-detached, three or four rooms	0.798 (3.97)
RBefExt	-0.102 (-5.42)
HHSize	0.047 (2.28)
IncDiff	0.263×10^{-6} (2.24)
Unrestricted Log Likelihood	-190.24
Restricted Log Likelihood	-227.95
Likelihood Ratio Test Statistic[b]	75.42
Pseudo R-squared	0.165
Correct Predictions (%)	79.33

a. T-values are shown in parentheses.

b. At the 95% confidence level the critical value of the chi-squared distribution is 14.06 with 7 df.

Table 5. Variables which affect the amount spent on transformation, Ghana

Variable	Coefficient (t-value)
Constant	12.113 (15.75)
ABefExt	0.018 (3.63)
End terrace, two rooms	-1.409 (-1.77)
Mid terrace, two rooms	-0.898 (-1.75)
Acquire = Bought from SHC	0.645 (1.57)
Lambda	0.867 (1.37)
R-squared	0.290
Adjusted R-squared	0.236
F-Statistic	5.39

Table 6. Variables which appear to affect the decision to transform, Zimbabwe. Parameter estimates in order of significance

Variable	Coefficient (t-value)
Constant	0.920 (1.94)[a]
ABefExt	-0.049 (-7.56)
Estate = Mbare	-0.385 (-1.64)
Estate=Highfield (Egypt and Jerusalem)	0.665 (2.21)
Plot area	0.0050 (3.08)
Unrestricted Log Likelihood	-125.6
Restricted Log Likelihood	-195.4
Likelihood-Ratio Test Statistic[b]	139.6
Pseudo R-squared	0.357
Correct Predictions (%)	69.9

a. T-values are shown in parentheses.

b. At the 95% confidence level the critical value of the chi-squared distribution is 9.49 with 4 df.

Table 7. Variables which affect the decison on cost of transformation, Zimbabwe

Variable	Coefficient (t-value)
Constant	9.60 (30.20)
Sex	0.589 (2.64)
Shack	-2.819 (-14.01)
HseStay	-0.018 (-2.21)
RBefExt	0.126 (2.19)
Lambda	0.060 (0.19)
R-squared	0.659
Adjusted R-squared	0.646
F-Statistic	50.96

Table 8. Cross-country comparison of variables which appear to affect the decision to transform

Bangladesh	Egypt	Ghana	Zimbabwe
Not	Estate	Acquire	ABefExt (-)
included in	EducYrs	HseType	Estate
this stage	RBefExt	RBefExt (-)	PlotArea
of the model	ABefExt (-)	HHSize	
	IncDiff	IncDiff	
	Acquire		

Variables related to house characteristics are shaded
Negative coefficients are shown where they occur.

Table 9. Cross-country comparison of variables which appear to affect the cost of transformation 1990-1993

Bangladesh	Egypt	Ghana	Zimbabwe
RBefExt (-)	RBefExt	ABefExt	Sex
TotEx	EducYrs (-)	HseType	Shack (-)
Acquire	Sex (-)	Acquire	HseStay (-)
	Floor (-)		RBefExt
	HseType		

Variables related to house characteristics are shaded.
Negative coefficients are shown where they occur. These indicate a negative relationship between the variable and cost of the transformation.

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