

**HOUSING DEMAND AMONG PANAMA'S
MIDDLE- AND LOW-INCOME POPULATION**

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Introduction

This report contains findings from a housing survey conducted in Panama during the fall of 1995. The objective of the survey was to learn more about the demand for housing among the low- and middle-income urban population that is not well served by public sector housing programs. Focusing on this underserved population allows us to examine the behavior of households engaging in market transactions that are relatively uninfluenced by public assistance.

To ensure that our sample had a high probability of capturing unassisted low- and middle-income households, our sampling frame included only census tracts in which the majority of households had monthly incomes falling between B125 and B506 in 1990.¹ The lower cutoff was implemented to exclude areas that were likely to have a high degree of government assistance. The upper limit is equal to the 60th percentile urban household income according to the 1990 census. Local experts identified barrios within the sampling frame with large amounts of publicly assisted housing; these barrios were also dropped from the sampling frame.

The survey covered two urban areas: the Panama city metropolitan area and the city of David. David was judged to be a fairly typical city that, being located in the far west, was removed from Panama city's direct sphere of influence. Obviously, one city cannot adequately represent all other cities outside of metropolitan Panama; however it can draw attention to possible systematic differences between the metropolitan area and other cities. The final sample included 916 households from the Panama city metropolitan area and 511 households from David. Annex 1 discusses the sample in more detail.

The remainder of this paper is divided into five sections. The first section provides an overview of household and dwelling unit characteristics. The second part describes how households acquire their units and examines their mobility. The third section explores how households modify their housing consumption through additions and improvements to their units. The fourth section focuses on housing expenditures and financing. The final section summarizes the key findings.

¹1 Balboa = 1 U.S. Dollar.



Household and Dwelling Characteristics

Given the criteria we used for selecting the sample, particularly the exclusion of the poorest urban areas (which were likely to include publicly assisted housing), it is not surprising that we ended up interviewing a relatively well-housed population. However, because urban areas are not homogeneous, there is still a fair amount of variation in the sample with respect to income and other characteristics.

Household Characteristics

Households in the Panama metropolitan area and David have remarkably similar characteristics.² As Table 1 indicates, the average household size (4.4 persons) and age of head (47 years) are identical. In both areas, about 16 percent of households are headed by females, and almost a quarter of households contain extended families.

Table 1
Household Characteristics and Tenure

	Panama	David
household size (persons)		
mean	4.4	4.4
median	4.0	4.0
age of head (years)		
mean	47	47
median	45	44
% of households headed by females	15.8	16.6
% of households with extended families	22.5	24.3
monthly income		
mean	599	583
median	480	460
tenure distribution		
owner	67.5	62.0

²In the following discussion, it is important to keep in mind that we are talking about the characteristics and behavior of households in our sample only. To simplify the presentation, the terms "Panama" and "metropolitan area" will be equivalent to the term "Panama metropolitan area."



unregistered occupant	6.9	15.5
renter	18.6	19.0
rent-free	7.1	3.5

The tenure distribution is also similar for both areas. About three-fourths of households in both areas are owners. There are two categories of owners based primarily on whether owners have documentation proving ownership of the land occupied by their units. Owners lacking such documentation are called unregistered occupants. As Table 1 shows, the share of units occupied by unregistered occupants in David, at 15.5 percent, is about twice that of the metropolitan area. Just over two-thirds of Panama and three-fifths of David households are documented owners.

Although owners dominate the sample, about a fifth of households in both areas are renters. Rent-free tenants make up an additional 7.1 percent and 3.5 percent of households in Panama and David, respectively. Renters are of special interest since they are likely to be candidates for public assistance.

Although the B480 median monthly income of Panama is slightly higher than the B460 median monthly income of David, the income distributions for various tenure groups are similar in both places. Table 2 shows that documented owners are more than twice as likely as unregistered occupants to be in the highest income category (>B600). Renters are generally poorer than owners; nevertheless, nearly a third of renters in Panama and a quarter of renters in David are in the highest income category. Rent-free tenants are the poorest group overall, although unregistered occupants in Panama have the lowest median income.

Table 2
Monthly Household Income Distribution by Tenure

	owner	unregistered occupant	renter	rent-free	total
Panama					
income					
<=300	23.6	41.0	23.2	42.9	26.1
301-600	36.2	41.0	44.6	39.7	38.4
600+	40.2	18.0	32.1	17.5	35.6
total	100.0	100.0	100.0	100.0	100.0
median B	500	354	460	400	480
David					
income					
<=300	24.0	28.4	29.8	52.9	26.8
301-600	32.8	54.1	46.8	47.1	39.1
600+	43.2	17.6	23.4	0.0	34.1
total	100.0	100.0	100.0	100.0	100.0



median B	550	417	416	300	460
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Table 3 compares the characteristics of households in our sample to the characteristics of urban households in the most recent census. The "target population" comprises households occupying the same barrios as the barrios included in our sample. The "non-target population" includes households in barrios that were dropped from the sampling frame. The sample data were



Table 3
Household Characteristics and Tenure: The Sample and the 1990 Census

	Sample	1990 Panama Census		
		Target population	Non-target population	Total Urban population
Household size (persons)				
mean	4.4	4.1	4.2	4.2
median	4	4	4	4
Age of head (years)				
mean	47.1	43.0	44.9	44.6
median	45	40	42	42
% of households headed by females	16.1	26.2	27.7	27.5
Monthly household income				
mean	594	398	691	643
median	479	300	420	400
Distribution of monthly household income				
< 100	2.6	17.3	13.8	14.3
101-200	9.1	17.9	12.9	13.7
201-300	14.7	16.8	11.7	12.5
301-400	15.0	13.4	10.2	10.7
401-500	13.9	9.2	8.3	8.5
501-600	9.8	6.8	6.6	6.7
601-700	8.3	4.6	5.4	5.3
701-800	6.1	3.5	4.7	4.5
> 800	20.6	10.5	26.4	23.8
total	100.0	100.0	100.0	100.0
<= 300	26.4	52.0	38.4	40.6
301 - 600	38.7	29.4	25.1	25.8
> 600	35.0	18.6	36.5	33.6
total	100.0	100.0	100.0	100.0
Distribution of employment categories for head of household				
private enterprise	32.4	30.9	27.9	28.4
government	21.4	18.0	21.1	20.5
self-employed	18.5	20.5	17.3	17.9
other	2.4	4.9	5.4	5.4
not employed	25.4	25.6	28.3	27.7
total	100.0	100.0	100.0	100.0
Distribution of unit tenure				



	Sample	1990 Panama Census		
		Target population	Non-target population	Total Urban population
owner with formal title*	51.9	53.2	46.8	47.9
own with mortgage	2.7	5.6	20.5	18.0
own with provisional title	9.0	**	**	**
own with other documents	0.8	**	**	**
own with no documentation	11.1	**	**	**
gifted	**	6.2	4.9	5.1
rent	18.7	30.4	24.2	25.3
rent-free	5.8	**	**	**
condemned	**	4.6	3.6	3.7
total	100.0	100.0	100.0	100.0

Notes:

* In the census, the response was simply "owned."

** No such category existed.

collected in November 1995 while the census data were collected in 1990. Compared to the target population, the sample includes households that, on average, have older heads, slightly larger families, and higher incomes. We can only speculate as to the reasons for the differences between our sample and the census figures, since any difference could be entirely due to random factors. However, it is possible, given that roughly four-fifths of the households in our sample had not moved since 1990, that some of these differences may be due to the aging of the population in place. The higher income of the sample population likely reflects a combination of inflation and economic growth, but is also consistent with the higher incidence of older and larger households. It is not clear why the percentage of households headed by females should be smaller in the sample. This may have been caused by a difference in defining a female-headed household or could simply be attributed to chance involved in the random selection process.

The distribution of households among employment categories is remarkably similar for both the sample and target populations. Approximately one fifth of heads of household are employed by the government, another fifth are self-employed, and slightly less than a third are employed by private enterprise. A fourth of households are headed by unemployed or retired persons.

While differences in definition prevent clear-cut comparisons in tenure, it appears that roughly half of the population can be categorized as owners with formal title in both the sample and target populations. The sample appears to have captured a smaller share of renters, although the absence of the "rent-free" category in the census may mean that these households were simply categorized as renters. If we define owners to be everyone who is not a renter or who does not occupy a unit rent free, the differences in tenure distribution do not appear to be large. While we expect to find important differences between owners with formal title and owners without documentation (i.e., unregistered occupants), we will often combine them in our analyses. When unregistered occupants are not enumerated separately, they are included in the owner category.



The small number of rent-free households, however, are dropped wherever a table presents owners versus renters.³

By comparing the 1990 census data for the target and non-target populations, Table 3 offers insight into how the sample is likely to differ from the rest of the urban household population. For example, the income distribution of the non-target population, compared to that of the target population, includes a much bigger share of households with incomes exceeding B800 per month (26.4 percent versus 10.5 percent). As expected, the B300 median monthly income of the target population is considerably lower than the B420 median monthly income of the non-target population. This, of course, was the result of excluding regions with high median incomes and areas of publicly assisted housing (which are likely to include the poorest urban areas). Another key difference between the target and non-target populations is the higher likelihood of owning a unit with a mortgage among the non-target population (5.6 percent versus 20.5 percent, respectively). By excluding higher income households, we reduced the chance of households with mortgages appearing in our sample.

In much of our analysis we divide the sample by income groups, tenure, and location. However, to preserve sample size we sometimes collapse the Panama and David samples. Table 4 shows the relationship between tenure and some important household characteristics for the combined sample. The mean income of owners is about B80 more than that of renters and the median income is B50 higher. Even though owners are more likely to fall in the highest income group, about the same percentage of owners and renters fall in the lowest income group. Owners also have larger households and older heads of household on average compared to renters.

Table 4
Household Characteristics by Tenure

	Owners	Renters
Household size (persons)		
mean	4.6	3.8
median	4	4
Age of head (years)		
mean	48.6	41.4
median	47	38
Monthly income		
mean	621	540
median	500	450
Distribution by income category		

³The census allows the responses "condemned" and "gifted" for unit tenure, even though these terms respectively describe the unit's condition and means of acquisition rather than tenure.



<=B300	25.1	25.6
B301-600	36.7	45.4
>B600	38.2	29.0
total	100.0	100.0

Table 5 looks at a few key household characteristics of the combined sample by income group. The most striking statistic in Table 5 is that a quarter of households in the lowest income group is made up of female-headed households. The median age of head for female-headed households is relatively high (50 in David and 53 in Panama), which suggests that their low incomes are partly due to the reduced earning power of the elderly. Other household characteristics also vary by income. Not surprisingly, larger households tend to have higher household incomes (reflecting more wage earners). Richer households, in turn, are more likely to have a head of household employed by a private enterprise or the government. The median age of the head of household does not vary much across income groups.

Table 5
Household Characteristics by Income Group

	Monthly Income		
	< 300 (N=366)	301-600 (N=537)	> 600 (N=487)
Household size (persons)			
mean	4.0	4.4	4.8
median	4	4	4
Age of head (years)			
mean	48.6	45.7	47.6
median	46	43	45
% of households headed by females	25.4	13.4	11.5
% in formal employment*	41.6	59.9	57.8

Note:

*Head of household is currently employed by a private enterprise or the government.

Unit Characteristics

The correlation between income and homeownership is evident when examining dwelling unit characteristics. As Table 6 indicates, the vast majority of owners occupy individual permanent dwellings, built of high quality materials. Owned units tend to have almost twice the space of rented units. For example, in Panama, the average owner-occupied unit has 139 square meters of space and 3.7 rooms; for renters, the corresponding figures are 71 square meters and 2.5 rooms. Nearly all owners use electric lighting and have piped water in their unit or yard. About half of owners in Panama use pit latrines, but it is not clear to what extent this poses a health problem, since a properly used pit latrine can be perfectly safe. Almost all owners use either a pit latrine, septic tank, or sewerage system for disposal of sanitary waste.



The main area where owners could significantly improve their situation is solid waste disposal. Only about half of owners are serviced by the municipality or DIMA. In addition, in Panama, 18 percent of owners and 33 percent of unregistered occupants burn their trash.

Table 6
Unit Characteristics by Tenure

	Panama					David				
	owner	unregistered occupant	renter	rent-free	total	owner	unregistered occupant	renter	rent-free	total
type of dwelling (percent distribution)										
individual permanent	96.3	90.5	47.1	29.2	82.0	97.5	89.9	33.0	66.7	83.0
individual semi-permanent	2.8	6.3	2.9	15.4	3.9	2.2	3.8	0.0	16.7	2.5
improvised	0.3	3.2	0.0	4.6	0.8	0.3	6.3	0.0	5.6	1.4
multi-family	0.6	0.0	50.0	50.8	13.3	0.0	0.0	67.0	11.1	13.1
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
mean number of units in structure (a)	12.0	*	11.0	9.0	10.0	*	*	3.0	2.0	3.0
mean number of rooms	3.7	3.5	2.5	2.4	3.4	3.7	3.1	2.7	2.5	3.4
mean total space (square meters)	139.0	149.0	71.0	68.0	122.0	109.0	93.0	67.0	52.0	97.0
mean lot size (square meters) (b)	657.0	624.0	396.0	311.0	631.0	629.0	507.0	441.0	363.0	592.0
building materials										
tile or concrete floor (% of units)	98.7	98.4	93.5	80.0	96.4	99.0	96.2	100.0	100.0	98.8
block, fiber cement, or wood wall (% of units)	99.8	98.4	99.4	100.0	99.7	97.8	92.4	95.9	100.0	96.7
metal roof (% of units)	97.4	98.4	74.7	66.2	91.0	93.1	96.2	92.8	88.9	93.3
electric lighting (% of units)	99.4	96.8	98.8	86.2	98.1	100.0	93.7	100.0	100.0	99.0
drinking water source (% of units)										
piped in dwelling	76.4	76.2	62.4	35.4	70.9	89.0	68.4	82.5	44.4	83.0
piped in yard	21.8	23.8	32.4	49.2	25.9	10.1	26.6	16.5	50.0	15.3
other	1.8	0.0	5.3	15.4	3.3	0.9	5.0	1.0	5.6	1.8
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
sanitary waste disposal method (% of units)										
pit latrine	46.9	68.3	27.1	40.0	44.2	14.8	41.8	18.6	61.1	21.3
septic tank	40.8	30.2	21.2	12.3	34.4	66.2	44.3	59.8	22.2	60.1
sewerage	12.0	1.6	51.8	46.2	21.1	18.9	13.9	21.6	16.7	18.6
other	0.3	0.0	0.0	1.5	0.3	0.0	0.0	0.0	0.0	0.0
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
solid waste disposal method (% of units)										
DIMA	25.4	12.7	65.3	63.1	34.6	0.3	0.0	1.0	0.0	0.4
municipality	27.3	28.6	13.5	10.8	23.7	51.7	32.9	69.1	50.0	52.1
private person	12.8	7.9	7.6	6.2	11.1	35.3	50.6	22.7	33.3	35.2
burn or bury	20.2	44.4	10.0	18.4	19.9	6.3	10.2	1.0	11.1	6.1
take to dump	14.3	6.3	3.5	1.5	10.8	6.3	5.1	5.2	5.6	5.9
other	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	0.0	0.4
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes:

- (a) Multifamily structures only.
- (b) Single-family structures only.
- * Small number of observations.



Unregistered occupants resemble other owners in many respects, but, as might be expected given their lower incomes, are somewhat more likely to occupy inferior units. For example, compared to owners, unregistered occupants are more likely to occupy semi-permanent and improvised structures (about 10 percent), less likely to have sewerage, less likely to have public trash service, and slightly less likely to use electric lighting.

Nevertheless, overall quality is quite high for many unregistered occupants, suggesting that this category of owner includes households in a wide range of housing situations. Some of these households probably occupy dilapidated dwellings, while others may lack proper documentation for some reason, but occupy units that are otherwise indistinguishable from secure owner-occupied housing.

Half of the renters in Panama and two-thirds of renters in David occupy multifamily structures. The number of units in multifamily structures in our sample ranged from 2 to 32 units in Panama to 2 to 10 units in David. The structure type helps to account for the smaller size (as measured by rooms and total space) of renter-occupied units. It also explains why renters are more likely than owners to have sewage systems and to have their solid waste removed by DIMA or the municipality.

The housing of rent-free renters broadly resembles that of renters in many ways, but is more likely to be of lower quality. In particular, over a fifth of rent-free renters occupy individual semi-permanent structures or improvised structures. They are more likely than renters to use pit latrines.

In Panama, only 86 percent of rent-free renters had electric lighting--the lowest usage rate of any tenure group. Rent-free renters, like unregistered occupants, appear to live in a greater diversity of living situations that are consistent with their lower incomes. At one end of the spectrum are households living in relatively well-serviced multifamily structures; at the other end are low quality improvised structures.

The amount of overcrowded households varies by tenure category. Table 7 presents the average number of persons per room for various tenure and income categories.⁴ Owners are the least crowded overall with 1.3 persons per room, while rent-free renters are the most crowded with over 2 persons per room. The low persons per room figure for owners is not so much the result of

⁴We did not compute households per unit, which is a popular overcrowding measure used in many countries. This measure is not meaningful for our sample because we have defined a household to include all people living in a single dwelling unit, regardless of their relationship. Thus, the total number of households is equal to the number of dwelling units.



small household sizes as it is due to owners having larger units. Small units help explain the relatively high persons per room figures for renters and rent-free renters.⁵

Table 7
Mean Persons Per Room by Income and Tenure

	owner	unregistered occupant	renter	rent-free
Panama				
income				
<=300	1.3	1.6	1.9	2.3
301-600	1.4	1.6	2.0	2.4
>600	1.3	1.3	1.6	1.8
all households	1.3	1.8	1.8	2.3
avg. persons/unit	4.6	5.1	3.7	4.3
avg. rooms/unit	3.7	3.5	2.5	2.4
David				
income				
<=300	1.2	1.8	1.6	2.8
301-600	1.3	1.7	1.6	1.3
>600	1.3	1.6	1.6	*
all households	1.3	1.7	1.6	2.2
avg. persons/unit	4.5	5.0	3.9	4.4
avg. rooms/unit	3.7	3.1	2.7	2.5

Table 8 shows that despite income differences, most households in the sample have individual permanent units with electrical lighting and good construction materials. The number of rooms and unit size increases with income although this does not appear to hold true for lot size.

⁵The total number of rooms excludes kitchens, bathrooms, and hallways. Table 7 seems to indicate that once you control for tenure, income does not have a great effect on overcrowding. The table, however, does not control for household size.



When looking for affordable housing, lower income households may choose to settle in areas farther from the city center where land prices are lower.

Lower-income households are more likely to dwell in multi-family units, have water piped in the yard as opposed to being piped in the dwelling, and have pit latrines as opposed to septic tanks or sewerage. Less than two-thirds of the households in the lowest income category have water piped into their dwelling, while the figure for households in the highest income category is close to 90 percent. Over half of the poorest households have pit latrines, compared to only about 16 percent of households in the highest income category. Methods for solid waste disposal, however, are fairly similar across income groups. This may be an area for improving services because close to half of all households do not have access to disposal by the municipality or DIMA.

Overall, the housing stock in metropolitan Panama and David appears to be in fairly good condition. Unregistered occupants and rent-free renters tend to occupy somewhat inferior housing, but they make up a relatively small share of the total stock in the sample. Most housing in the sample is fairly new, with about a quarter of the stock being built in the last nine years. The median age of units in metropolitan Panama is 16 years; for David the corresponding figure is 15 years.

Table 8
Unit Characteristics by Income Group

	Monthly Income			All
	< 300 (N=366)	301-600 (N=537)	> 600 (N=487)	
Type of dwelling (percent distribution)				
individual permanent	75.4	81.6	88.3	82.3
individual semi-permanent	5.2	3.4	2.1	3.4
improvised	1.9	0.9	0.2	1.0
multi-family	17.5	14.2	9.4	13.2
total	100.0	100.0	100.0	100.0
Number of rooms				
median	3.0	3.3	3.7	3.4
mean	3	3	4	3
Total unit space (square meters)				
mean	92	105	132	111
median	75	80	100	90
Total lot size for individual units (square meters)				
mean	645	563	656	616
median	535	500	525	500
Building materials				
tile or concrete floor (% of units)	94.3	98.3	98.8	97.3
block, fiber cement or wood wall (% of units)	97.2	98.9	99.4	98.6
metal roof (% of units)	88.8	92.2	93.2	91.9
Electrical lighting (% of units)	97.0	98.7	99.8	98.5
Drinking water source (percent distribution)				
pipied in dwelling	62.0	73.9	87.5	75.2
pipied in yard	32.8	23.8	11.1	22.1
other	5.2	2.3	1.4	2.7
total	100.0	100.0	100.0	100.0
Sanitary waste disposal method (percent distribution)				
septic tank	27.3	39.7	59.8	43.6
sewerage	18.6	18.8	23.6	20.2
pit latrine	53.8	41.3	16.4	36.0
other	0.3	0.2	0.2	0.2
total	100.0	100.0	100.0	100.0
Solid waste disposal method (percent distribution)				
municipality	33.6	32.6	35.3	22.3
DIMA	24.0	20.5	23.6	33.8
private person	17.2	20.9	20.1	19.7
burn or bury	17.2	15.8	11.3	14.8
take to dump	7.4	9.7	9.7	9.0
other	0.5	0.6	0.0	0.4
total	100.0	100.0	100.0	100.0

Unit Acquisition and Mobility

Unit Acquisition

One goal of the survey was to gain a better understanding of the process through which households obtained their units. The survey results show that a large share of owners (both secure owners and unregistered occupants) build their homes, using a combination of family, friends, and hired labor, after acquiring partially serviced or unserviced vacant land. (see Table 9).

Table 9
Unit and Land Acquisition in Panama and David: Owners

	Panama	David	Panama and David
Status of unit at acquisition			
complete unit	16.0	29.8	21.1
partial unit	7.8	9.8	8.5
plot with at least some services	9.6	23.8	14.7
plot with no services	66.7	36.6	55.6
total	100.0	100.0	100.0
Method of obtaining unit			
built unit	73.1	60.4	68.4
purchase from private entity	16.2	19.4	17.4
government	4.0	2.0	3.2
inherited	4.8	17.7	9.6
other	1.9	0.5	1.4
total	100.0	100.0	100.0
Method of obtaining land (a)			
purchase from private entity	36.1	77.4	49.5
MIVI	3.4	4.6	3.8
municipality	39.2	1.3	26.9
inherited	9.0	13.4	10.4
other	12.2	3.3	9.4
total	100.0	100.0	100.0
Who constructed the unit?* (a)			
family	54.2	34.7	47.9
friends	13.7	22.2	16.4
hired labor	39.0	60.3	45.9

Notes:

* Note that many households responded that a combination of family, friends and hired labor performed the construction. A household using all three labor sources would be counted in each of the three categories.

(a) Population limited to those who built unit.



Over 70 percent of owners in metropolitan Panama built their homes; only about a quarter acquired their units in complete or partially complete form. About two-thirds of all owners in Panama initially acquired unserviced plots, and an additional 10 percent or so started with partially serviced or completely serviced plots. In David, owners were somewhat more likely to buy a complete unit, but a substantial share (about three-fifths) still built their homes. Compared to Panama owners, David owners were more likely to acquire plots with at least some services.

Households who built their homes in metropolitan Panama relied more heavily on government sources for access to land than did households who built their homes in David. In David, over 90 percent of sites came from private owners (77 percent) or through inheritance (13 percent). In Panama, only half as much land came from these sources. About two-fifths of sites in Panama came from the municipality or MIVI.

Interesting differences emerge between Panama and David with respect to who constructed units. Over half of the households who built units in Panama relied on family for construction. Most of the remaining households (about 39 percent) hired labor. In David, households relied more on hired labor. Three-fifths of the households who built their units in David utilized hired labor, while only about a third relied on family.

When we analyzed the acquisition behavior of female-headed households, we found that they generally behave like their male counterparts. For example, nearly the same percent of female-headed and male-headed households built their homes. It is difficult, however, to draw conclusions about the relationship between historical events, such as the construction of a house, and the current status of a household. That is, a female-headed household today might have been a male-headed household at the time of construction.

Mobility

There are two ways households can modify their housing consumption: they can modify their unit or they can move. This section focuses on the latter approach.

Most households in our sample moved to their present location from another place. Table 10 shows the locations from which households moved according to their previous tenure. In both Panama and David former renters almost always moved within the same city. While a majority of former owners also moved intra-city, about a fifth came from other cities. A small percentage of households, particularly former owners in David, moved from rural areas. Table 10 only refers to households that moved to their present location; the share of households that have never moved is about 23 percent in David as opposed to only 7 percent in Panama.

Panama residents have been in their units slightly longer than David residents. In Panama, half of all households moved in after 1982, whereas in David, half moved in since 1985. About a fifth of all households in Panama moved in during the past five years. In David, a similar share of households moved in during the past four years.

Table 10
Location of Previous Unit and Reasons for Moving

Previous Tenure	Panama		David	
	Owners	Renters	Owners	Renters
Location of previous unit				
same city	77.4	93.7	64.4	93.5
other city	17.9	4.8	21.8	6.0
rural area	4.4	0.9	11.5	0.4
another country	0.4	0.7	2.3	0.0
total	100.0	100.0	100.0	100.0
Reasons for moving (% of households responding "very important")				
wanted to own	63.5	60.1	65.9	56.3
more space	55.1	59.7	64.4	63.8
only unit available	52.2	44.9	37.9	33.2
able to expand unit	51.5	46.4	42.5	46.6
better quality	51.5	44.7	37.9	55.6
better location	44.9	42.1	72.4	62.9
affordability	43.1	49.9	51.7	48.3
form a separate household	43.1	26.2	40.2	32.8
better services	34.3	31.5	34.5	43.5
greater safety	33.2	35.1	31.0	34.5
better environment	28.1	32.1	28.7	34.1

Table 10 also provides reasons households gave for moving. A relatively high share of households responded "very important" for most reasons offered, suggesting that households seriously weigh many factors when deciding to move. However, a few reasons clearly stand out: the desire to own a home, the desire to have more space, and, in the case of David, the desire to have a better location. There are no marked differences between the reasons owners and renters gave for moving, although former owners were somewhat more likely than former renters to cite the desire to "form a separate household".

Up to now we have focused on any household that has ever moved. Table 10A, however, concentrates on recent movers, that is, households which have moved to their present unit within the past three years. This group is of special interest to us because it consists of households who recently were active in the housing market. As such, this group can give us insight into current market behavior.

The top part of Table 10A shows how often recent movers improved their housing situation by moving. The figures were calculated by comparing the characteristics of a household's previous unit with the characteristics of its present unit. The base on which a percentage is calculated is given in parentheses, and varies according to the number of households that could improve. For example, if a household had electric lighting in its previous unit, it could not improve its lighting situation when it moved since it already had the best lighting source.

Table 10A
Changes in Housing Consumption by Recent Movers and Reasons for Moving

	Panama	David
% of households that improved their situation (a)		
more rooms	43.5 (108)	32.9 (73)
more space per person	46.4 (28)	48.5 (33)
better wall material	94.4 (18)	85.7 (7)
better sanitary facility	48.6 (35)	60.0 (15)
better water source	51.2 (43)	40.0 (10)
obtained electric lighting	85.7 (7)	100.0 (3)
became owner	39.5 (76)	31.4 (51)
improved tenure security	100.0 (3)	100.0 (2)
reasons for moving (% of households responding "very important")		
wanted to own	41.7	30.1
more space	50.0	49.3
only unit available	51.9	42.5
able to expand unit	33.3	26.0
better quality	41.7	47.9
better location	44.4	69.9
affordability	54.6	46.6
form a separate household	29.6	37.0
better services	34.3	43.8
greater safety	34.3	35.6
better environment	30.6	35.6

Note:

(a) The number of recent mover sample households that could improve is in parentheses. There were 108 recent movers in the Panama sample; 73 in the David sample.

The results indicate that recent movers often improve their housing situation, but the results are most interesting when compared to the reasons recent movers give for moving. Compared to all movers (Table 10), recent movers are less interested in ownership. Only about 40 percent of the recent movers in Panama who previously rented became owners. Like other movers, more space was strongly desired by recent movers (although less so). In Panama, about 44 percent of recent movers moved to units with more rooms. Recent movers in both Panama and David were less likely than other movers to view the ability to expand a unit as being very important. However, better location remains an extremely important reason for recent movers in David.

Given the importance households attach to the many reasons for moving to their unit, it is interesting to note how they subjectively rate their current housing conditions. Table 11 shows that households are generally quite satisfied with their housing. The least satisfactory rating was received in the solid waste disposal category. This is consistent with the findings in the previous section on unit characteristics, which suggested that garbage collection was a potential area of deficiency, particularly for owners. Interviewer observations also support the notion that garbage



disposal is a problem. Garbage was seen in the streets or yards of 29 percent of the units in Panama and 10 percent of the units in David. About half of the streets in Panama and 31 percent of the streets in David, which are adjacent to sample properties, are unpaved. No street lights were found near 17 percent of the units in Panama.

Table 11
Rating of Current Housing and Neighborhood Conditions

	Panama	David
% of households responding "excellent, good, or satisfied"		
quality	95.6	94.1
affordability	98.3	96.5
location	97.7	96.3
space	94.5	93.7
drinking water source	87.7	91.2
sanitary facility	88.2	88.1
solid waste disposal	69.2	69.1
electricity	94.9	96.3
safety	90.1	87.5
environmental conditions	94.7	94.1
ability to expand unit	85.3	94.3
street conditions (interviewer observation: % of units)		
garbage visible	29.1	10.0
clogged drains	5.8	5.9
no street lights	16.9	5.5
street not paved	50.0	30.9



Additions and Improvements

The second way to modify housing consumption, after moving, is to make additions or improvements to an existing unit. In this section, we focus on additions and improvements made to a unit after a household occupies a unit, rather than on incremental improvements that may have occurred prior to occupancy. This provides us with a clear distinction between housing investment occurring before and after occupancy.

The difference between an addition and an improvement can be difficult to define. For our survey, we defined additions or expansions to be "changes that have added space or major functionality to the unit." Improvements refer to activities such as painting, resurfacing, and replacing, but not routine maintenance or repairs (e.g., fixing locks or replacing light bulbs). Interviewers were equipped with numerous examples for respondents.

Types of Additions and Improvements

We do not expect renters to behave like owners when it comes to investing in their existing units. Table 12A confirms that renters are unlikely to invest in additions, and the few that do, have high incomes. Table 12B shows that renters do make a significant amount of improvements to their dwellings, but much less frequently than owners or unregistered occupants. The share of owners or unregistered occupants making improvements or additions ranges between 30 and 50 percent for most income categories shown in the two tables. The tables also demonstrate that, in general, owners and unregistered occupants in higher income categories are more likely to make additions and improvements than those in lower income categories.

Table 12A
Percentage of Households Making Any Addition to Dwellings

	Panama			David		
	owner	unregistered occupant	renter	owner	unregistered occupant	renter
income						
<=300	32.2	32.0	0.0	36.5	47.6	0.0
301-600	44.7	36.0	1.3	41.6	47.5	2.3
>600	51.4	18.2	0.0	50.4	53.8	9.1

Table 12B
Percentage of Households Making Any Improvement to Dwellings

	Panama			David		
	owner	unregistered occupant	renter	owner	unregistered occupant	renter
income						
<=300	44.1	28.0	10.3	39.2	23.8	10.7
301-600	47.5	44.0	30.7	43.6	50.0	18.2
>600	55.1	45.5	22.2	39.8	69.2	4.5

Table 13 displays the share of owners (including unregistered occupants) making various kinds of additions and improvements to dwellings by income group.⁶ About a third of all owners have added a room, the most common type being a bedroom. Two-fifths of all owners have also improved their roof, ceiling, wall or floor. For nearly every addition or improvement category, households in the highest income category were the most likely to have work done. We found little difference between female-headed and male-headed households with respect to their decisions to invest in additions and improvements.

Table 14 provides further evidence that income is correlated with the amount of money a household will invest in additions and improvements.⁷ The mean value of housing investment for households in the lowest income group is less than half the amount invested on average by households in the two higher income groups. Only 10 percent of the households in the lowest income group spent more than B1,000 compared to over 40 percent of households in the two highest income categories.

Method of Financing Additions and Improvements

Table 15 shows the financing method owners use to make particular additions or improvements. Savings are by far the most common method of financing additions and improvements. For Panama, additions are financed 72 to 77 percent of the time through savings

⁶Because of the relatively low incidence of making additions or improvements among renters, we have restricted this analysis to owners.

⁷The table focuses on households that moved in since 1984. This was done to reduce the effect of inflation (we are reporting historical figures as recalled by respondents) and to obtain a better picture of recent investment behavior.



only (depending on the type of addition); improvements, which are less expensive, are financed solely through savings 78 to 86 percent of the time. MIVI loans are rare, but bank and other financial institution loans taken together are used over 20 percent of the time for additions and 9 to 13 percent of the time for improvements.

Table 13
Percentage of Households Making Additions and Improvements to Dwellings: Owners

	Panama				David			
	<=B300	B301-600	>B600	All groups	<=B300	B301-600	>B600	All groups
Monthly Income								
Type of Addition								
Bedroom, dining room or living room	22.0	32.8	38.6	32.3	28.4	30.5	40.4	33.8
Kitchen or bathroom	13.7	21.3	23.2	20.1	16.8	24.8	30.1	24.9
Roof, ceiling, wall or floor	11.9	14.8	22.1	16.8	11.6	9.9	15.1	12.3
Terrace, garage, fence or other	6.6	10.6	17.3	12.2	16.8	18.4	31.5	23.0
Monthly Income								
Type of Improvement								
Roof, ceiling, wall or floor	39.3	39.8	46.1	42.0	19.0	29.1	30.1	27.0
Window or door	4.2	15.2	18.5	13.7	7.4	23.4	24.0	19.6
Kitchen, bathroom or other	4.2	6.6	11.8	8.0	13.7	17.0	13.7	14.9

Table 14
Housing Investment by Income Group: Owners in Panama and David Who Moved Since 1984 and Have Made Additions or Improvements

Monthly Income	<= B300 (N=30)	B301-600 (N=60)	> B600 (N=66)
Housing Investment*			
mean	666	1609	1871
Distribution of housing investment			
B1 - 200	40.0	21.7	13.6
B201-600	33.3	18.3	21.2
B601-1,000	16.7	11.7	22.7
B1,001-2,000	3.3	26.7	13.6
>B2,000	6.7	21.7	28.8
total	100.0	100.0	100.0
Percent of movers since 1984 who made any addition or improvement	51.7	61.6	61.0

Note:

* Money spent on additions and improvements.

Table 15
Financing Method by Type of Addition or Improvement: Owners Who Have Made Additions or Improvements

	Type of Addition				Type of Improvement		
	Added room	Added kitchen or bathroom	Added floor, roof ceiling, or wall	Added terrace fence or other	Improved ceiling roof, floor or wall	Improved door or window	Improved kitchen bath or other
Panama							
Financing Method							
only savings	73.1	72.8	76.5	71.7	86.3	78.0	83.0
used formal loans*	21.5	21.3	21.0	27.4	8.5	13.2	13.2
other	5.5	5.9	2.5	0.9	5.3	8.8	3.8
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
David							
Financing Method							
only savings	60.4	61.0	62.5	55.4	65.8	70.5	77.2
used formal loans*	32.8	32.0	31.3	34.8	22.5	20.5	21.1
other	6.7	7.0	6.3	9.8	11.7	9.0	1.8
total	100.0	100.0	100.0	100.0	100.0	100.0	100.1
Median cost in Balboas**	500 (40)	500 (21)	400 (11)	475 (16)	100 (79)	280 (37)	175 (18)
	(No. of observations)						

Notes:

* This includes households that reported using a combination of savings and loans. Formal loan sources include MIVI, banks, financial institutions or employers.

** Cost data were calculated from households that moved since 1984. Panama and David are presented together because of the small number of households who could report the actual costs.



Savings are also the primary source of financing additions and improvements in David, but there is a greater reliance on formal loans, including some from MIVI and employers. Formal loans are used over 30 percent of the time for additions and over 20 percent of the time for improvements. Compared to Panama, there is a greater use of loans from non-bank financial institutions in David. Employer and family loans are also more common in David; they are rarely used in Panama.

The bottom row in Table 15 shows the median cost of each addition or improvement within a category.⁸ Because of the problems inherent in collecting historical cost data, the cost figures in Table 15 should be viewed very cautiously. No attempt was made to adjust costs for inflation. At first glance, compared to the B18,000 median current value of an owner-occupied unit, a B500 room addition may not appear to be a significant investment. However, compared to the roughly B5,000 median initial price of units, the amount is quite impressive.

Table 16 looks at the financing method for additions and improvements by household income categories. It indicates that wealthier households are more likely than poorer households to obtain formal loans for making additions or improvements. Not surprisingly, they are also less likely to use only savings to make these investments. The table also shows that the incidence of formal loan use is much higher in David for all income groups.

⁸These cost figures are based on the responses of households that could separate the cost of a particular addition or improvement from any other addition or improvement costs they were incurring at the same time. Costs were collected only for the most recent time an addition or improvement was made.

Table 16
Financing Methods for Making Additions and Improvements: Owners Who Made Additions or Improvements

Monthly Income	Panama			David		
	<= B300	B301 - 600	> B600	<= B300	B301 - 600	> B600
Financing method for making additions						
only savings	83.0	77.4	65.9	63.9	62.7	55.4
used formal loans*	11.3	16.0	31.7	27.8	27.1	39.2
other	5.7	6.6	2.4	8.3	10.2	5.4
total	100.0	100.0	100.0	100.0	100.0	100.0
Financing method for making improvements						
only savings	91.4	85.0	83.5	65.6	79.7	63.3
used formal loans*	2.9	9.7	13.5	18.8	15.6	33.3
other	5.7	5.3	3	15.6	4.7	3.3
total	100.0	100.0	100.0	100.0	100.0	100.0

Note:

* This includes households that reported using a combination of savings and loans. Formal loan sources include MIVI, banks, financial institutions or employers.



Housing Expenditures and Financing

This section focuses on how much people spend on housing. It begins by examining house values and appreciation. It then describes how owners financed the initial purchase of their units, and analyzes monthly housing expenditures and the burden they represent for households. The section concludes with the presentation of two models: one that assigns values to various housing attributes, and another that relates housing demand to income and other factors.

Initial Prices and Current Market Values

The distributions of dwellings by their current housing value and their initial housing prices are given by income group in Tables 17A and 17B respectively. The distinction between income groups is most clearly seen in the lowest and highest categories for initial price and housing value. For example, in both Panama and David about half of the households in the lowest income category purchased units for less than B3,000; the corresponding figure for households in the highest income category is less than 25 percent. The reverse situation is true for units purchased for more than B6,000. Over half of the households in the highest income group purchased units in this range while fewer than a quarter of the households in the lowest income group did so.

Table 18 displays the median current value and the median initial price of owner-occupied units for various income groups. As expected, higher-income households tend to occupy more expensive homes. The price distributions in Panama and David are fairly similar, and both places share the same median current value of B18,000. Initial prices are somewhat lower for David, and this is partly reflected in a higher average annual percentage increase in value.

The annual percent increases shown in Table 18 are not true appreciation rates because they do not control for quantity changes. The initial price is based on all costs incurred by a household prior to occupying the unit. From the last section, we know that many households subsequently make additional investments in their units. These subsequent improvements are taken into account when a household assesses the current market value of its unit. We have no practical way of deciding how much of the value increase is due to improvements and how much is due to true appreciation.

Financing Sources

The distribution of financing methods for purchasing units is given in Table 19 by the initial unit price. Savings is the most common source of financing even for expensive units. For example, in Panama, three-fifths of the units with an initial price exceeding B10,000 were financed with savings only. An exception can be found in David, where only 15 percent of the units purchased for over B10,000 were financed solely through savings. About sixty percent of these units were financed by formal loans. For the other price categories in David and for all categories in Panama the usage of formal loans was considerably smaller.

Table 18
Current Unit Values, Initial Price, and Appreciation Rate by Income (a)

	Panama			David		
	median current value	median initial price	annual percent increase	median current value	median initial price	annual percent increase
income						
<=300	15000	3185	10.2	15000	2500	9.4
301-600	16000	4000	8.4	15000	3600	10.3
>600	20000	8000	6.3	25000	7000	8.8
all households	18000	5000	8.0	18000	4800	9.2

Note:

(a) Owners only. Annual percent increase is a compound rate.

Table 19
Distribution of Unit Prices by Financing Method: Owners

	Initial Price of Unit*				
	<= 1500	1501 - 3000	3001 - 6000	6001 - 10000	> 10000
Panama					
Financing method					
only savings	62.5	56.0	58.6	69.0	59.6
used formal loans**	12.5	14.7	21.8	16.1	25.0
other	25.0	29.3	19.5	14.9	15.4
total	100.0	100.0	100.0	100.0	100.0
David					
Financing method					
only savings	64.6	59.3	61.8	45.6	15.2
used formal loans**	12.5	22.0	25.0	31.6	60.9
other	22.9	18.6	13.2	22.8	23.9
total	100.0	100.0	100.0	100.0	100.0

Note:

* This includes all costs incurred before the family moved into the units. Therefore, it would include initial construction costs for families who built their unit.

** This includes households that reported using a combination of savings and formal loans. Formal loan sources include banks, financial institutions, BHN or employers.

Table 20 shows in more detail the various sources used to finance the initial cost of a unit. The column totals do not add up to 100 percent because owners can use multiple sources. Bank savings and other savings are by far the most common sources of funds in both Panama and David. In general, households in David were more likely to use a greater variety of sources than households in Panama.

Table 20
Method of Financing Unit and Amount: Owners

source	Panama		David	
	% of owners using source	median amount (a)	% of owners using source	median amount (a)
bank savings	34.6	3000	40.4	3000
employer savings	1.4	3000	5.5	4000
savings scheme	0.9	2000	4.5	***
other savings	36.3	5000	30.3	3000
sale of gold	0.2	***	3.9	***
sale of land	5.0	4500	12.7	5250
family loan	3.2	3000	6.7	2150
employer loan	1.5	6000	9.7	5000
BHN loan	3.3	5000	7.0	7000
bank loan	9.4	6000	21.9	7000
money lender	1.2	***	4.9	4500
inherited	1.1	4000	3.6	***
other	6.7	1400	11.2	1500

Notes:

(a) Only includes those who used the source.

*** Less than 5 observations.

As was true for the financing of additions and improvements, households in David tend to use loans of all kinds for acquisition more often than Panama households (see Tables 20 and 21). Overall, about 25 percent of owner households in David used formal loans. In contrast, only 14 percent of owner households in Panama used formal loans to finance the initial cost of their unit. The significance of loans is that they tend to be for relatively large amounts compared to other sources. The median bank loan, at B6,000 to B7,000, is twice the size of the median contribution from bank savings. Table 21 also shows that loan usage rate among households in the highest income category is about twice that of households in the lowest income category.

It is not surprising that we did not find a greater incidence of formal loan usage among our sample. Recall that Table 3 shows how we systematically excluded owners with mortgages from our sample. By excluding relatively high-income barrios, we included fewer households with formal loans.

Table 21
Financing Methods for Acquiring Unit: Owners

	Monthly Income			All owners
	<= B300	B301 - 600	> B600	
Panama				
Financing method for acquiring unit				
only savings	66.7	63.1	57.5	61.9
used formal loans*	9.5	11.9	18.9	14.0
other	23.8	25.0	23.6	24.2
total	100.0	100.0	100.0	100.0
David				
Financing method for acquiring unit				
only savings	41.1	52.5	30.8	41.4
used formal loans*	16.8	17.0	39.0	25.4
other	42.1	30.5	30.1	33.2
total	100.0	100.0	100.0	100.0

Note:

* This includes households that reported using a combination of savings and formal loans. Formal loan sources include banks, financial institutions, BHN or employers.

Monthly Housing Expenditures

The last section indicates that most owners are free from housing debt. For these households, monthly housing expenditures are basically confined to utility payments and taxes. This freedom from debt is translated into low monthly outlays. The bottom half of Table 22 summarizes utility and loan payment costs for owners in different income groups. Utility payments are quite similar in Panama and David. However, the greater use of large loans by David owners compared to Panama owners raises David's average gross housing cost above Panama's. The average gross rent in David is also a bit higher than that of Panama, due to slightly higher rents.

Table 22 shows how gross housing expenditures rise with income, but housing costs expressed as a share of income fall as incomes rise. This is a classic pattern observable in many market economies. Renters have the greatest burden due to a combination of substantial rent payments and relatively low incomes. The housing cost burden for renters is more than twice that of owners in both Panama and David. The mean housing cost burden for renters is about 18 percent in Panama; in David, it is about 24 percent.

Table 22
Mean Monthly Housing Expenditures and Housing Cost Burden by Income: Renters and Owners

	Panama				David			
	gross rent	utilities	rent	housing burden	gross rent	utilities	rent	housing burden
Renters								
income								
<=300	70	16	54	31.5%	79	17	64	32.9%
301-600	81	19	64	19.0%	94	20	74	21.8%
>600	108	22	90	12.6%	136	22	110	15.4%
all renters	87	19	70	19.7%	97	19	79	23.2%
Owners								
	gross housing cost	utilities	loan payment	housing burden	gross housing cost	utilities	loan payment	housing burden
income								
<=300	27	25	83	12.8%	29	25	73	13.4%
301-600	32	29	65	7.5%	44	34	152	10.2%
>600	45	39	98	5.6%	64	40	148	7.0%
all owners	36	31	81	8.2%	46	34	140	9.8%

Notes:

Utility payment amounts exclude those included in rent payments. Rent may include utility payments: 92 percent of renters in Panama reported that some utilities were included in their rent payment. For David this figure is 90 percent. The loan payment is the average amount for those making monthly loan payments. Housing cost burden is gross housing expenditure as a share of total household income. Gross expenditures include rent payments plus utilities for renters, and loan payments plus utilities for owners.

The Value of Housing Attributes

We have already observed some key differences between owners with secure tenure and those without (i.e., unregistered occupants), but what we have not ascertained from the tabular analyses is the degree to which owners value secure title to their properties. Using the hedonic index regression technique, we can estimate the value of various attributes of units, including tenure security.

In our model, the dependent variable is current market value. The independent variables and the reasons for including them are as follows:

total space: larger units should be associated with higher values; positive effect

time to city center: ambiguous effect; central locations may be more prestigious and close to jobs, but nicer housing might be found in suburbs.

secure tenure: homes with documented ownership should be more valuable; positive effect



piped water in unit: self-explanatory; positive effect

sewerage or septic tank: self-explanatory; positive effect

DIMA or municipal garbage collection: self-explanatory; positive effect

bad neighborhood conditions: this is a composite variable based on interviewer observations; it is equal to one if the neighborhood has garbage, clogged drains, or no street lights; negative effect

paved roads: self-explanatory; positive effect

bad building materials: another composite variable; it equals one if a unit does not have a tile or concrete floor, or does not have block walls; negative effect

age of unit: ambiguous effect; older units may have benefited from improvements over time, but older units suffer from normal depreciation.

Total space, time to city center, and age of unit are continuous variables; all other variables are dummy variables.

The results of the regression model appear in Table 23. Focusing first on Panama, we can see that the coefficient for secure tenure is both statistically significant and large. The estimated coefficients in a hedonic model can be interpreted as the price per unit of each characteristic. This means that secure tenure is worth about B3,564 in Panama, everything else equal. The tenure security variable was not significant in the David model, but the coefficient had the anticipated sign (positive).

The Panama model performed quite well. All of the estimated coefficients in the Panama model had the anticipated signs, except for the coefficient for the garbage collection variable, which was insignificant. In addition to secure tenure, the coefficients for total space, piped water, sewerage/septic tank, bad neighborhood conditions, and age of unit were also significant.

The David model did not fare as well, although all of its signs were correct. Only three variables produced significant coefficients: total space, sewerage/septic tank, and DIMA/municipal garbage collection.

Demand for Housing

To estimate the relationship between income and housing demand, we developed a model



based on Malpezzi's work on housing demand models in developing countries.⁹ The dependent variable (a measure of housing consumption) and income are both measured in log form, which makes it possible to interpret the estimated coefficient for the income variable as the income elasticity for housing demand. In other words, the income coefficient is equal to the percent change in the dependent variable that results from a percent change in the income variable.

⁹Stephen Malpezzi, "Analyzing an Urban Housing Survey: Economic Models and Statistical Techniques," World Bank Discussion Paper, Report No. UDD-52, May 1984. Much of the theoretical discussion presented in this section is drawn from this paper.

Table 23
Hedonic Regression Results for Owner-Occupied Units

Panama			
Variable	Coefficient	T-statistic	
total space	23	3.6 **	
time to city center	12	0.5	
secure tenure	3564	1.7 *	
piped water in unit	6562	3.9 **	
sewerage/septic tank	4607	3.2 **	
DIMA/municipal garbage collection	-539	-0.4	
bad neighborhood conditions	-2993	-2.1 **	
paved roads	2014	1.5	
bad building materials	-2335	-0.8	
age of unit	122	2.1 **	
constant	-1811	-0.6	
N = 428			
R Square	0.204	F = 11.23	
Adjusted R Square	0.186	Significance F = .00	
David			
Variable	Coefficient	T-statistic	
total space	47	3.1 **	
time to city center	28	0.4	
secure tenure	2674	1.2	
piped water in unit	4391	1.3	
sewerage/septic tank	7755	2.6 **	
DIMA/municipal garbage collection	4129	1.9 *	
bad neighborhood conditions	-94	0.0	
paved roads	2269	1	
bad building materials	-2703	-0.8	
age of unit	5	0.1	
constant	-4946	-1.3	
N = 284			
R Square	0.199	F = 7.29	
Adjusted R Square	0.171	Significance F = .00	

Notes:

* significant at the 0.10 level

** significant at the 0.05 level

Malpezzi's model includes the following independent variables: income, household size, and household size squared. We added length of tenure to this basic model. All of these are continuous variables. The models were estimated for four populations: renters and owners in both Panama and David. The dependent variable for owners is the self-reported unit value and for renters it is the reported gross rent payment (rent plus utilities). These are both measures of housing consumption.

For owners, we expect to find income, household size, and length of tenure to be positively related to housing consumption. The length of tenure variable captures the tendency of properties to increase in value over time. The household size squared term should be negative, reflecting the fact that housing expenditures should not rise in direct proportion to additional household members.



For renters, we expect to find similar relationships, except the length of tenure variable is likely to be negatively related to gross rent because of the so-called renters' discount which accrues to renters due to the tendency of landlords to not raise the rents of long term tenants to the levels they charge new tenants. In general, demographic variables are more important in housing demand models for renters than they are in models for owners. This is because owners tend to base their housing consumption decisions on their long-term anticipated household composition. Rent control, if effective, can result in a lower income elasticity for renters.

Tables 24A and 24B give the regression results. In all of the models the income variable was large, positive and significant. The coefficients were stable even when the models were modified to include other independent variables. This demonstrates that income is a pure effect and is not capturing the effects of other variables.

Table 24A
Demand Regressions Results for Panama

Owners: Dependent variable is the natural log of reported unit value

Variable	Coefficient	T-statistic
Natural log of monthly income	0.385	6.5 **
Household size	0.012	0.2
Household size squared	+	0.1
Length of tenure (years)	0.009	2.6 **
Constant	7.021	18.2 **
N = 398		
R Square	0.122	F = 14.02
Adjusted R Square	0.114	Significance F = .00

Renters: Dependent variable is the natural log of the reported rent payment.

Variable	Coefficient	T-statistic
Natural log of monthly income	0.424	6.3 **
Household size	-0.134	-1.9 *
Household size squared	0.012	1.9 *
Length of tenure (years)	-0.009	-2.7 **
Constant	2.101	5.1 **
N = 138		
R Square	0.243	F = 11.4
Adjusted R Square	0.221	Significance F = .00

Notes:

- * significant at the 0.10 level
- **significant at the 0.05 level
- + smaller than .001

Table 24B
Demand Regressions Results for David

Owners: Dependent variable is the natural log of reported unit value		Coefficient	T-statistic
Natural log of monthly income	0.444	6.7	**
Household size squared	0.000	0.4	
Constant	7.989	17.8	**
Adjusted R Square	0.159		
Renters: Dependent variable is the natural log of the reported rent payment		Coefficient	T-statistic
Natural log of monthly income	0.385	6.6	**
Household size squared	-0.005	-3.2	**
Constant	2.104	3.7	**
Adjusted R Square	0.255		

Notes:

- * significant at the 0.10 level
- **significant at the 0.05 level
- + smaller than .001

Household size is not a significant variable except for renters in Panama (where the estimated coefficient had the wrong sign, but was small). Length of tenure, however, is significant in all models except for David renters. As expected, the sign on this variable is positive for owners and negative for renters. However, all of the coefficients other than those for income are very small.

The estimated income coefficients are fairly similar for each of the four models. They range from 0.385 to 0.444, which means that demand is income inelastic. Overall, a one percent increase in household income should produce about a 0.4 percent increase in housing expenditures. This means that households spend more on housing as their incomes go up, but as their incomes rise, they spend a smaller share of their income on housing. This is consistent with the findings on housing cost burden presented in Table 22.



Conclusions

The survey gave us an opportunity to learn a great deal about the behavior of the low- and middle-income urban population that is not served well by public sector housing programs. Some of the major findings include:

- The sample population is fairly well housed, but could benefit from improved services (i.e., water supply, sanitary facilities, and especially solid waste disposal).
- The majority of owners have built their homes, often on plots which initially had no services.
- Households who built their homes in metropolitan Panama relied more heavily on government sources for access to land than did households who built their homes in David.
- Families play an important role in construction in both Panama and David; however, in David, households rely more on hired labor.
- Most people moved to their present units from another location in the same city. Movers do not necessarily want to own their new homes.
- Households are generally satisfied with their current housing and neighborhood conditions.
- Many owners make substantial investments in additions and improvements, especially those that add space.
- Savings are the major financing source for additions, improvements, and the initial acquisition of units. Households in David made greater use of formal loans to finance housing expenditures than did households in Panama.
- Property values have risen 8 to 9 percent per year due to a combination of incremental investment and inflation. Secure tenure for owners appears to be associated with higher housing values.
- Female-headed households tend to be poorer, on average, but do not behave very differently than other households.

The information in this report should be a valuable resource for those who wish to design policies to assist low- and middle-income households in Panama.

Annex

Description of the Methodology Used in Drawing the Sample for the Panamanian Housing Demand Survey

This appendix outlines the process by which the Urban Institute (UI) decided on the universe of communities to be surveyed and the methodology which was employed in drawing a sample population of households from that universe. The Urban Institute's subcontractor in Panama, Dichter and Neira Marketing Consultants, was responsible for actually drawing the sample, using the stated methodology.

In selecting the universe of communities, the Urban Institute followed the Inter-American Development Bank document, "Study 2: Housing Demand Among Middle and Low Income Population." When changes to the stated instructions had to be made, these were discussed with IDB representative Michael Jacobs. The Urban Institute used in its selection analysis 1990 and 1980 census data for all urban areas (as defined by the Panamanian Census Bureau). The geographic level at which communities were selected was the *barrio*. There are unique *barrio* names in each urban area.

Selection of Barrios in Panama City Metropolitan Area

The first instruction was to divide the country into the Panama City Metropolitan Area (PCMA) and the rest of the country. To define the PCMA, UI consulted officials from the Panamanian Ministry of Housing (MIVI). In their judgement, all urban areas in both Panama province and Colon province are part of the Panama City Metropolitan Area. Their reasoning was that the growth of Panama city has spilled over to areas in Colon province to the north across the canal, as well as to the areas in western Panama province.

As the housing demand survey is targeting middle and low income population, UI first had to analyze urban household income to determine an appropriate range to define this population. A floor of a \$125 monthly household income was established to avoid concentrating on the poorest population, who most likely cannot fulfill their housing demand. The original ceiling proposed by the IDB was a \$400 monthly household income. In analyzing the 1990 census data, UI found that the median monthly household income was \$400. Therefore, using \$400 as the ceiling would eliminate many middle range income households. Instead, UI chose the 60th percentile of household income, or \$506, to be used as the ceiling.

The next task was to identify the universe of communities in which the preponderant monthly family income falls between the target range of \$125-\$506. For each *barrio* a variable was created that was equal to the percent of households which fall within the target range. *Barrios* with a certain percentage of households within that range would be considered target *barrios*. Table 1 gives the distribution of *barrios* according to the percentage of households falling within target range for Panama City Metropolitan Area.

Table 1
Distribution of Barrios in Panama City Metropolitan Area
by Percentage of Households with Monthly Income in Target Range (\$125-\$506)
(Number of households in barrios given in parentheses)

Barrios with <50% of households in range	Barrios with 50-59% of households in range	Barrios with 60-74% of households in range	Barrios with >=75% of households in range
365 (130,511)	136 (72,574)	64 (23,601)	5 (181)

As stricter definitions of “preponderant” would have yielded few households, UI chose as its selection standard that 50% of the households in a given barrio had to fall within the target income range for the barrio to be considered a target barrio. The tentative universe of communities in PCMA contained 205 barrios, with 96,356 households.

This list of barrios was forwarded to UI’s representative in Panama, Benigna Magallon, who consulted the official in the Social Planning Section of MIVI’s Office of Planning and Budgeting who is responsible for tracking MIVI projects. The official identified which barrios on the UI list contain primarily households that have received MIVI subsidies in some form or another. This selection process eliminated another 89 barrios from the PCMA universe, including the entire sub-city of San Miguelito. The official contended that the extent of MIVI involvement in San Miguelito is so great, that to separate out households that are not beneficiaries would be impossible. Our PCMA universe now contains barrios which satisfy the income criteria but were not identified as MIVI subsidized communities. These are 116 barrios containing 45,753 households as of the 1990 census.

At this point it was important to recall the sample size proposed by the IDB. For the housing demand surveys to be executed in Panama City Metropolitan Area and in outlying urban areas, the IDB budgeted for a maximum sample size of 1,500 households, including those in the pre-test.¹⁰ According to our statistical analysis, a minimum of 900 interviews are required to cover the specified universe within Panama City Metropolitan Area. The remaining sample size of 500 interviews is large enough to provide adequate precision in statistical estimates by conventional standards for one other urban area. If more areas are studied, the sample size will be insufficient to ensure the requisite statistical precision for estimates from each area. Although the study is limited to two areas, contrasts between these two places with respect to housing will still be meaningful.

¹⁰One hundred interviews were allotted for the pre-test.

Selection of a City Outside of Panama City Metropolitan Area

To select the second city for the housing demand survey UI performed both income and population growth analysis on all other urban areas in the country. The income analysis was identical to that performed on barrios in Panama City Metropolitan Area. Of the 32 cities outside of PCMA, 26 cities had at least one barrio which satisfied the income criterion. The number of target barrios in a city ranged from zero (in Bajo Boquete, Bocas Del Toro, Canazas, Gualaca, Guarare, and Macaracas) to 29 in the city of David.

Parallel to the income analysis, UI calculated the percent increase in the number of a households from 1980 to 1990 in all cities outside of PCMA.¹¹ Table 2 provides a distribution of the outlying cities, according to the household population change from 1980 to 1990.

Table 2
Percent Increase in Number of Households in Panamanian Cities from 1980 to 1990
(outside of Panama City Metropolitan Area)

Cities with <30% increase	Cities with 30-39% increase	Cities with 40-49% increase	Cities with >=50% increase
7 cities	9 cities	8 cities	5 cities
28% Ocu	38% Chitre	49% David	74% Changuinola
22% Pese	37% La Concepcion	47% Monagrillo	72% Pedregal
22% Atalaya	36% El Valle	46% La Arena	70% Volcan
19% Bajo Boquete	34% Aguadulce	45% Santiago	55% Poci
18% Gualaca	32% Nata	43% Puerto Armuelles	50% Parita
16% La Palma	31% Penenome	41% Sona	
4% Bocas DelToro	31% Canazas	40% Las Tablas	
	30% Los Santos	40% Almirante	
	30% Anton		

Note:

Note that three cities were not considered urban areas in 1980 and no population change could be estimated.

Since only one city could be selected in addition to PCMA, it was important that the city itself was large enough to yield interesting results and that it satisfied both the income and growth criteria. The city of David by far had the most target barrios, with the largest resulting target population of 7,500 households. In addition, it saw a 49% increase in the number of households from 1980 to 1990. This was the 6th largest increase of the 29 cities for which population change could be estimated. Using this joint criteria, David was selected to be the second universe for the housing demand survey.

¹¹ Similar analysis was not possible in Panama City Metropolitan Area because approximately 30,000 records, or households, were missing from the PCMA section of the 1980 census. This was ascertained by UI by comparing data on the census tape with published statistics from the Panamanian Census Bureau.

The proposed list of target barrios for David was forwarded to the UI representative in Panama. Once again, the MIVI official identified the barrios which are predominantly inhabited by MIVI beneficiaries. After eliminating 9 barrios with the subsidy test, the final universe in David was defined by 18 barrios with a 1990 population of 3,785 households.

Drawing the Sample

The sample was drawn by the Panamanian firm, Dichter & Neira Marketing Consultants. The firm employed a two-stage methodology for drawing the sample. In the first stage, a computer program randomly selected blocks of households within the specified universes. Each block in the database contains no fewer than 20 and no more than 30 households. A random selection of blocks from this database gave each household within the universe approximately the same probability for being selected for the sample. The firm selected approximately 180 blocks in the Panama City Metropolitan Area and 100 blocks in David.

The second selection stage took place in the field. The field supervisor selected a point in the block from which to start. He or she then in clockwise fashion assigned to each interviewer the household to be included in the sample, according to a table of random numbers. Within each block, no more than five households were interviewed.¹² These are the firm's usual procedures for randomly selecting households within a block for national opinion polling and other similar survey work. The Urban Institute observed these procedures during execution of the pre-test and was reasonably assured that the field supervisors and interviewers had sufficient experience to draw the sample in this manner.

Statistical Analysis Used in Determining the Appropriate Sample Size

The appropriate sample size for the Panama Metropolitan Area is 900. This sample size is based on the following inputs and assumptions. Most of these assumptions are based on conventional standards in statistical testing in the social sciences.

(1) The size of the population of interest in the area is 45,753. As the size of the population increases, the required sample size also increases until the size of the population is for all practical purposes infinite in size. The size of this population, 45,753, is very large and, thus, had little impact on the sample size.

(2) The probability of type 1 error (α) is equal to 0.05. Type 1 error is rejecting the null hypothesis when it is true. The conventional level for the probability of type 1 error is 0.05. As the acceptable error level decreases, the required sample size increases.

¹²In calculating what would be an adequate sample size, it was assumed that clustering of interviews at a certain level would be necessary.



(3) The probability of type 2 error (β) is equal to 0.20, so the power is equal to 0.80. Type 2 error is failing to reject the null hypothesis when it is false. The power of the test is the probability of finding a statistically significant effect if it truly exists. The conventional level for type 2 error is 0.20; the conventional level for the power is 0.80. As the acceptable error level decreases, and power increases, the required sample size increases.

(4) Calculations are based on one-tail tests. The expected direction of effects is presumed to be known in advance. Two tail tests require larger samples than one tail tests.

(5) The minimum meaningful effect size in the population is a fifth of a standard deviation. If true effects are smaller than 20 per cent of a standard deviation than the power of test will be less than the conventional level of 0.80. A fifth of a standard deviation is a moderate sized effect. As the minimum meaningful effect size decreases, the required sample size increases.

(6) The tolerance is equal to 0.30. The tolerance measures the degree of association between factors of interest in a regression equation and control variables. The tolerance ranges from 0.0 to 1.0. At 0.0, factors of interest and controls are independent. As the tolerance gets larger, the required sample size increases.

(7) The proportion of the population with a characteristic of interest is 0.45. The smallest sample size required is when the proportion is 0.5. As the proportion gets further from 0.5 (toward either 0.0 or 1.0), the sample size increases.

(8) The sample will be complex rather than just a simple random sample. A complex sample involves multiple stages and has clusters and strata. Such a sample is always less efficient than a simple random sample of the same size, so a complex sample requires a larger sample size than a simple sample. The sample size is increased by about 7 per cent to allow for a small loss of efficiency due the complex nature of the sample. As the complexity of the sample increases, the loss of efficiency also usually increases which translates into a larger required sample size.