

Access to credit and large household investments in urban Africa: Evidence from a housing lottery.

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Abstract

Most households in developing country cities live in slums. What constrains the supply of private housing in these settings? Are households not willing to pay for better housing, or do market failures, such as credit constraints, make it impossible to make these investments? I study a housing program in urban Ethiopia where households are offered the chance to buy a condominium house with a subsidized mortgage. Owning a condominium is perceived to have high long-run returns, but the required down-payment of \$4000 is large: just less than the median annual household expenditure for this sample. Yet 96% all winning households make these large down-payments within the repayment window. A lottery is used to determine which of the applicants are offered condominiums. By comparing the finances of winning households to households that did not win the lottery I am able to accurately observe how households were able to make such sizeable investments. While a few households are able to get large formal bank loans covering the mortgage payments completely, most households get informal inter-personal loans from friends and family, or cash gifts to fund the down-payments. Much of these funds come from families outside of Ethiopia. Households also draw on existing household savings, and reduce expenditure on large consumer durables in order to make the down-payments. These results suggest that credit constraints are not the main factor constraining the supply of new housing.

1 Introduction

We study households that currently live in very poor housing, either squatting on land, or living with informal land rights, in Addis Abba, Ethiopia. Private investments in housing are very small across the city.

These households are offered the opportunity to invest in much improved housing, subsidized by the government, and constructed together in large condominium housing blocks. Will households choose to pay the high costs of housing, or will credit constraints prevent them from making such large investments.

Even with the subsidies the housing units would appear to be priced well above the wealth and income means of households who have applied. The 20% down-payment required on the mortgages is many multiples larger than the average households have saved. Yet almost all households who win the housing make the down payments.

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By comparing treated households who won a housing lottery, to those who did not, we are able to investigate how these households were able to make such large down-payments. We find evidence that households were able to leverage loans from a number of informal sources, including inter-personal loans from friends and family, as well as community financial savings groups. This suggests that households are not credit constrained, and are willing to invest in higher quality housing, but leaves a puzzle as to why investment in housing is so low in the absence of the government intervention studied in this paper.

2 The housing investment opportunity

In this Section I outline the investment opportunity given to households in this study.

The Ethiopian government has been building large green-fields housing projects under a scheme called the Integrated Housing Development Plan (IDHP) or more colloquially, as the condominium project. These housing opportunities are awarded to eligible households on the basis of a lottery. So far it is estimated that 100,000 housing units have been built over the last 5 years (including those built and awarded by lottery in 2015, which is the focus of this study), however, it is anticipated that many hundreds of thousands of new housing units will be completed and awarded in just the next few years.

Households were registered on waiting lists for the housing in 2005, 10 years prior to this study. The housing opportunities are awarded by lottery, conducted in public at the city hall at irregular intervals when new housing is nearing completion. Some of the initial registrants have won housing over the recent years, this paper works with a sample that had not won housing by March 2015, when the most recent lottery for new housing was conducted.

At the latest lottery round in March 2015 saw 30,000 housing units being awarded by lottery, out of about 100,000 households that were still waiting to win housing. This constitutes a 30% chance of winning the lottery, on average, for the remaining registrants.

Winners are then offered the chance to buy a housing mortgage, with a 20% down-payment, with the rest of the costs to be paid off over the next 15-20 years.

Under this program four types of housing modalities are available, ranging in size from Studio apartments ($32m^2$) to 3-bedroom apartments ($100m^2$). Table 1 outlines the costs of the housing. Column (2) indicates the total cost to the government of building the housing units, which factors in the cost of the land, which was estimated by the government. The land is in fact government owned, and given away for free for the purposes of constructing these condominiums, however land value estimates have been conducted by the government and used in the total costs estimates here, to approximate the cost to the government of delivering the housing.

Columns (3) and (4) estimate the true value of the housing using survey responses of housing winners no how much their new units can be rented or sold for on the open market. Although condominiums are not supposed to be sold freely, it is legal to rent out the units to other households instead of moving in, which is a reasonably common practice (although only 8% of the sample used in this study saw that they will not move in when the time comes). I use these rent values to calculate estimated housing values using price to earnings calculations.¹ Note that the respondents valuations of the housing value comes in lower than the government says it costs to deliver the units.

Column (5) then shows the total price charged to the winning households, after government subsidies have been applied. Note that the subsidies are highly progressive, with the smaller units (for poorer households) being more heavily subsidized²

¹I use a 7% risk free rate of return.

²In reality the government calculates the subsidies only on the basis of construction costs: smaller units are highly subsidized and larger units are charged a premium, such that government breaks even on the construction costs.

Table 1: Condominium housing prices and implied subsidies (prices in USD)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Type of house	Surface area (m2)	Total cost	Sale value (est.)	Rent value (est.)	Subs. user price	Cost subsidy	Market value subsidy	Annual Income
Studio	32	9,975	7,188	8,163	3,821	5,910	3,366	2,001
1-Bedroom	51	15,412	13,923	13,061	8,358	6,717	5,565	2,770
2-Bedroom	75	22,359	21,533	16,327	15,689	6,237	5,844	3,646
3-Bedroom	100	29,570	21,831	22,531	22,706	6,394	-875	3,893
Average	56	16,725	15,143	13,341	9,926	6,447	5,216	2,914

This allows me to calculate estimates of the size of the subsidy awarded to households, either relative to the costs of building the housing, or relative to the market value. In this sense, column (7) approximates the present value of winning the housing lottery. If a household is able to make the mortgage down-payment, this value will accrue to the household. In these calculations I estimate that the market value of the subsidy is negative for the large, 3-bedroom houses. This could be, however, because the value of the housing is measured with error based on expected rents. On average households stand to gain \$5,000 by making the housing down-payments.

However, while condominium houses are highly profitable investments, households are still required to make large down payments. In Table 2 I outline what financing for the condominium housing looks like. Households must make down-payments of 20%, which is many times larger (on average 5 times larger) than households current net monetary wealth, and about 70% of household annual income. As we will show in greater detail in a later section, most households have no where near that amount of money available and must rely on credit markets to find the down-payment cash.

Winning households must then make monthly payments, which are also large relative to monthly incomes of the households in this study. If there were to rent out the housing units on the open market, at estimated market rates, they can expected to break even (although there is heterogeneity across different housing types). Most of the households in this study either do not pay rent, or pay highly subsidized rent to the local government (these figures are given in columns (7) and (8)). Moving into the housing, while continuing to pay the mortgage down-payments will be costly: they will not save by moving into this housing, especially for the larger housing units, where monthly mortgage payments are considerably higher than current market rents, even for those who do pay rent.

Therefore winning households cannot expect high returns to the housing in the short run, returns which might otherwise allow them to repay loans that they may have used to finance the housing down-payments. Instead the condominiums are available in the long run, households who pay off the mortgages during over 20 years will end up with a valuable asset.

3 Data

The data for this study is taken for a sample of households who had applied for government housing during an initial recruitment drive. This was a self selecting group of households, who applied for the program during the city government's initial drive to recruit applicants in 2005. These are households who have been waiting for the chance to win housing for

However, the implicit land values are high, and larger housing units benefit more from larger free endowments, which means that they too are subsidized in aggregate.

Table 2: Condominium financing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							Current Rent Averages	
House type	Down payment	HH net wealth	Monthly payment	Expected rent	Net flow	Monthly income	Market rent	Gov Rent
Studio	764	152	28	42	13.9	167	40	0.9
1-Bedroom	1,672	481	62	68	6.6	231	58	1.5
2-Bedroom	3,138	676	130	109	-20.4	304	80	2.0
3-Bedroom	4,541	662	188	131	-57.0	324	99	2.0
Average	1,985	487	78	77	-0.8	243	62	2

10 years, during which time the supply of housing was lower than the government initially anticipated.

We sampled households from a list of eligible households given to us by the city government. The list was compiled on the eve of the housing lottery held in March 2015, at which date it was up to date. The data on the households was updated in 2013 to make sure that they were still on the waiting list for housing. Households were required to make savings contributions towards the housing scheme on a monthly basis. The sample only included households that had reached the initial savings requirement, which differed across different types of housing. Thus everyone in our listing sample had been eligible for the lottery that took place in March 2015.

Because of this our sample is a selected sample who were able to save regular savings contributions towards the housing program. However, we found that only x% of households that initially applied were deemed ineligible due to saving insufficient amounts.

The sample was surveyed *after* the outcomes of the housing lottery were announced and households were required to pay the down payments on the mortgages, but *before* households could actually move into the housing. This paper will compare households that won the lottery and had the chance to make the down-payments to those that did not win. We conducted a detailed baseline survey covering the health, labour, employment, expenditure and financial outcomes of households.

Table 3 shows that our sample is balanced across the treatment and control groups, across a range of outcomes that one might expect *not* to be influenced by winning the housing lottery. I show balance tests for the full sample, and then also among a sub-sample of households for which both households in the matched pairs were found. This sub-sample constitutes 76% of our observations and is more likely to be balanced because we know that this sample was balanced across the observable characteristics contained in the administrative sample. If there was significant differences in response rates and patterns, for instance if wealthy losing households were less likely to respond because they were angered by having not won the lottery, we might see imbalances between the groups in the full sample, that might not be apparent in the balanced sample where both the treated and untreated household in the matched pair were found. We show that the sample is strongly balanced the full sample as well as the matched sample for a wide range of outcomes that one would not expect to be influenced by winning the lottery just 3 months earlier, such as household characteristics, backgrounds, migration, education and health.

3.1 Sample representativeness

This provides a good indication that the lottery for housing run by the city administration is fair and was not manipulated. Of course, it could be the lottery was manipulated such that wealthier or more successful households were able to bribe their way into getting the housing. This could pose a challenge to the validity of our estimation if such households are more wealthy and able to access the means to have such influence. While this cannot be verified with the current data, we will be able to do further balance checks on a variety of financial and credit outcomes among a sample of the control group who will win housing at another round of housing lottery to be held during the next 6 months (35% of the control group are expected to win at this next lottery). By all accounts, the lottery, which is conducted publicly and is determined by the outcomes of a computer algorithm which is run by the Ethiopian national intelligence agency, and impossible to manipulate by someone outside of the agency.

Furthermore we show the rates of responses to the baseline survey did not differ across

Table 3: Table of baseline balance

	Summary			Full Sample (N = 1811)		Matched Sample (N = 1386)	
	N	Mean	S.Dev.	Diff1	F-test P	Diff2	F-test P
pre_condo	1811	520.93	524.04	-32.38	0.22	-3.47	0.88
hh_size	1811	3.56	1.95	-0.17	0.08*	-0.16	0.12
children5	1811	0.27	0.53	0.03	0.31	0.02	0.42
av_age	1811	30.56	9.96	0.12	0.80	0.71	0.18
kebele	1805	0.20	0.40	0.01	0.60	0.02	0.38
rent	1805	0.55	0.50	-0.03	0.15	-0.03	0.31
owner	1805	0.04	0.20	0.01	0.49	-0.00	0.88
form_wall	1811	0.23	0.42	0.01	0.51	0.00	0.85
form_toilet	1811	0.13	0.34	-0.00	0.98	-0.01	0.69
form_water	1811	0.90	0.30	-0.02	0.22	-0.01	0.47
informal_cooking	1811	0.44	0.50	0.01	0.61	0.01	0.64
informal_waste	1811	0.02	0.16	0.01	0.49	0.00	0.77
cook_keros	1811	0.14	0.35	-0.02	0.36	-0.01	0.46
cook_elec	1811	0.56	0.50	-0.01	0.61	-0.01	0.64
moved_5year	1712	0.39	0.49	0.02	0.51	-0.01	0.74
hazard_index	1706	0.00	1.88	-0.05	0.62	0.02	0.84
reg_age	1801	41.21	10.14	-0.55	0.27	-0.32	0.56
reg_female	1801	0.47	0.50	0.01	0.45	0.00	0.98
reg_amhara	1795	0.49	0.50	0.04	0.09*	0.03	0.20
reg_muslim	1798	0.09	0.29	-0.02	0.10	-0.01	0.55
reg_oromo	1795	0.19	0.39	-0.01	0.74	-0.01	0.49
reg_orthodox	1798	0.80	0.40	0.01	0.53	0.00	0.98
reg_married	1702	0.50	0.50	0.00	0.94	-0.00	0.98
reg_tigray	1795	0.11	0.31	-0.02	0.10	-0.03	0.12
reg_hwork	1801	0.06	0.23	0.01	0.37	0.01	0.31
reg_migrant_5y	1801	0.07	0.26	-0.00	0.51	-0.01	0.33
reg_migrant_birth	1801	0.65	0.48	0.03	0.20	0.00	0.85
reg_edhs	1787	0.25	0.43	0.01	0.55	0.02	0.46
reg_eddip	1787	0.17	0.38	-0.00	0.99	0.00	0.87
reg_eddipdeg	1787	0.33	0.47	-0.03	0.11	-0.03	0.17
reg_employed	1799	0.83	0.38	-0.03	0.06*	-0.03	0.08*
reg_unemployed	1801	0.03	0.16	0.01	0.10	0.01	0.33
reg_public	1811	0.27	0.44	-0.01	0.42	-0.01	0.57
reg_inlf	1801	0.88	0.32	-0.02	0.19	-0.03	0.12
reg_public	1811	0.27	0.44	-0.01	0.42	-0.01	0.57
reg_self_employed	1801	0.20	0.40	-0.03	0.10*	-0.03	0.22
reg_pensioner	1801	0.03	0.16	0.01	0.37	0.01	0.11
hh_job_rate	1811	0.57	0.30	-0.01	0.43	-0.01	0.62
hh_unemployed_rate_b	1811	0.09	0.17	-0.01	0.13	-0.01	0.25
hh_unemployed_rate	1811	0.09	0.17	-0.01	0.13	-0.01	0.25
hh_inlf_rate	1811	0.63	0.29	-0.03	0.07*	-0.02	0.21
hh_inschool_rate	1811	0.19	0.22	-0.01	0.44	-0.02	0.15
hh_hwork_rate	1811	0.06	0.13	-0.00	0.96	-0.00	0.97
hh_migbirth_rate	1811	0.51	0.36	0.01	0.72	0.00	0.83
income_pc	1811	164.71	195.36	-5.20	0.57	-7.62	0.44
income_pc_os	1811	87.90	119.08	-5.44	0.35	-5.55	0.39
earning_pc	1811	149.51	187.17	-9.93	0.26	-13.57	0.15

Table 5: Determinants of Survey Response

	(1) found	(2) found	(3) found
treat	-0.0133 (0.0186)	-0.0133 (0.0189)	-0.0192 (0.0190)
ts_1		0.0592** (0.0257)	0.0543** (0.0266)
ts_2		0.0446 (0.0301)	0.0502 (0.0316)
ts_3		-0.100 (0.0872)	-0.0928 (0.0888)
male		0.0384* (0.0196)	0.0328* (0.0197)
pre_condo			-0.000745 (0.000878)
public_sector			0.0106 (0.0278)
private_sector			0.0160 (0.0351)
self_employed			-0.0213 (0.0329)
Constant	0.778*** (0.0120)	0.716*** (0.0277)	0.735*** (0.0392)
Observations	2,410	2,410	2,346
R-squared	0.000	0.007	0.008
treat=0 (p-value)	0.478	0.483	0.315

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

responded to the questionnaire. We also regress the household response outcome on the different types of housing that households had applied for, as well observables known from the government administrative data. Male housing registrants were more likely to respond, as well as those who had applied for the larger housing types (one and two bedroom housing applicants and winners were more likely to respond than those who applied for the studio units).

4 Impacts on households finances

Ninety-six percent of households paid down the deposits on the condominiums during the three month window in which they could make these payments. To explain how these households managed to make such a payments we estimate the impact of winning the housing lottery on households financial outcomes at baseline to look at the contribution of various financial instruments (such as savings and loans) on the household's ability to pay down the deposits. We estimate the following equation:

$$y_{ic} = \beta_0 + \beta_1 T_{it} + X_{ic} + \epsilon_{ic} \quad (1)$$

This estimates the simple difference between the treatment group (indicated by the dummy variable T_{it}) and the control group, with standard errors clustered at the Woreda level (of which there are 113 in Addis Ababa).

Table 6: Impact of winning lottery on household savings and loans

	N	Control		Winning Effect		Quantile Regression		
		1(> 0)	Mean	1(> 0)	Mean TE	25th	Median	75th
condo_final	1749	100.0%	687.26 (578.52)	0.0% (0.0)	1365.06*** (43.2)	1285.71*** (4.54)	1249.29*** (16.08)	2305.62*** (40.28)
pre_condo	1749	100.0%	519.79 (465.78)	0.0% (0.0)	-2.56 (18.0)	-4.44 (5.54)	8.17 (30.72)	0.96 (17.84)
bank_saving	1749	57.7%	807.06 (2361.72)	-9.1%*** (2.8)	-244.40*** (69.2)	-80.95*** (23.54)	-188.10*** (48.93)	-666.67*** (168.45)
informal_saving	1749	37.2%	188.28 (560.26)	-5.4%*** (2.7)	-42.79* (23.7)	-19.05 (12.97)	-62.86** (24.82)	-95.24 (97.44)
lent_out	1749	9.0%	51.31 (430.87)	-4.0%*** (1.4)	5.77 (12.5)	71.43** (35.26)	142.86 (136.90)	476.19*** (179.80)
total_saving	1749	69.1%	995.34 (2460.79)	-8.3%*** (2.6)	-256.35*** (74.9)	-100.00*** (18.92)	-180.00*** (68.68)	-476.19** (192.94)
personal_loans	1747	7.6%	30.24 (197.82)	23.3%*** (2.1)	264.68*** (25.1)	428.57*** (65.92)	666.67*** (139.07)	1000.00*** (209.52)
bank_loans	1749	0.7%	10.98 (204.86)	4.7%*** (1.0)	301.15*** (69.2)	1247.10 (2683.34)	5419.38*** (680.06)	3476.19 (4718.25)
community_loans	1749	6.0%	52.77 (462.44)	6.0%*** (1.6)	118.37*** (28.1)	470.62*** (92.04)	666.67*** (170.01)	1004.76** (399.24)
total_loans	1749	13.4%	93.99 (545.64)	28.1%*** (2.4)	598.43*** (64.9)	390.48*** (60.89)	952.38*** (111.62)	1100.00*** (323.47)
local_gifts	1749	25.4%	88.36 (270.71)	2.6% (2.4)	67.99*** (19.8)	71.43** (30.95)	95.24* (49.23)	238.10** (102.33)
foreign_gifts	1749	28.2%	150.90 (446.19)	2.4% (2.5)	97.84*** (30.3)	95.24*** (30.56)	166.67*** (61.19)	333.33** (162.90)
inkind_gifts	1749	28.1%	49.46 (133.57)	-3.3% (2.5)	-11.58* (6.5)	-14.29* (7.78)	-23.81 (19.61)	-23.81 (20.96)
total_gifts	1749	53.8%	288.71 (605.06)	2.7% (2.8)	153.87*** (36.4)	28.57 (21.20)	152.38*** (44.15)	314.29*** (106.86)
net_wealth	1749	100.0%	780.12 (2544.96)	0.0% (0.0)	211.87* (110.3)	94.70** (41.64)	642.43*** (49.49)	781.04*** (127.11)

The results in this section show amounts measured in US dollars.³ The results are robust to using both the full sample and the restricted sample of paired-households (where both households in the paired listing data responded to the questionnaire); the results here show estimates for the full sample.

Many households had already contributed savings towards their condominium savings accounts before the lottery was announced. On average, however, households had only saved about 27% of the required down-payments during the 10 years that they had been on the waiting lists. Winning households paid back the remainder of the deposits within three months, while non-winning households continued to make deposits. As a result we see households reported condominium investments increase by 200% in the treatment group, which is reported on

Table 6 reports the impacts on the full sample. It shows, for each financial outcome, the proportion of control group households that have a non-zero outcome for that financial instrument (the extensive margin), as well as the average amount for the control group.

³Converted using the birr-dollar exchange rate at the time of 21 Birr = \$1

Then, in the middle two columns, I look at the average impact of winning the lottery on the both extensive margin, and the average outcome. Finally, in the last three columns, I perform a quantize regression to look at the impact of the lottery on the distribution of the various financial outcomes *conditional* on that .

Then Table 7 shows the average impact of winning the lottery across the three different types of housing for which households could apply. Because the households had to make different size down-payments (this figured is noted in the first row in each housing-type column), the impacts of having to make those down-payments differs.

Clearly households have made significant investments in the condominium housing. Households made, on average, deposits of \$1365 towards the down-payments, more than triple what the control group have saved. The second row in these tables show the average amounts that households had in their savings accounts before the lottery was announced (this value was taken from administrative records): note that control households have invested some money (on average \$170) in the four months since the lottery results were announced.

The results show that households withdrew from other savings accounts: treated households reduced their savings by about \$244 in order to pay the down-payments, while 9% actually closed their other banking accounts completely (Only 57% of the control have formal banking accounts at all). Households reduced their savings in other informal accounts, such as community savings groups, but by smaller margins, while some households seemed to have recalled their loans to other households.

However this use of existing household savings is not nearly enough to account for the full payments made in the down-payments. In fact, less than 20% of the full effect can be accounted for by reductions in other savings accounts.

Instead households rely more on loans to cover the costs of the down-payments. It seems that most households are not able to get bank loans to cover these down payments, but those that do get very large loans. The most common sources of loans is from friends and family, more than 30% of treated households have these “personal” loans, as opposed to only 7.6% of the control group. Winning households take out large loans from friends and family.

This suggests that the use of credit is not common in this setting, yet households are able to find sources of credit in order to pay the large down-payments required.

About half of all households receive cash from other households either outside of Ethiopia (28.2%) or in the country (25%). While treated households aren’t more likely to start getting this kind of financial support, the size of financial contributions from other households received in the last 12 months grows enormously in response to winning the housing lottery.

I consider gifts from friends and family to be “liabilities” in the sense that they explain how households were able to make the down-payments, but that may come with strings attached: either the giving families expect to be repaid, or households that were receiving regular remittances payments like these, can no longer expect to receive transfers in the future, because of the size of the donations given to pay for the housing. Doing so, I’m able to calculate a household “net wealth” defined as:

$$netwealth = totalsavings - totalloans - totalgifts + condominiumdeposits \quad (2)$$

This net wealth figure is not useful as an economic measure in itself, as the gifts given to the control group households are their’s to keep and may not have been invested in the housing down payments, which it seems much of the treatment group remittances were used for.

However, if households have drawn on savings, loan and gifts to make the deposit down-payments we should expect the full effect on net wealth to be zero. These figures are shown at the bottom of Tables 7 and 6. I find that winning the housing lottery has

Table 7: Impact of winning lottery on household savings and loans by housing type

	N	Full Sample		Studio		One Bed		2or3 Bed	
		Control	Treat	Control	Treat	Control	Treat	Control	Treat
Down-payment		1985		764		1672		3312	
condo_final	1749	687.3 (578.5)	1365.1*** (43.2)	447.8 (372.2)	503.2*** (63.9)	585.7 (491.3)	1175.2*** (32.8)	1018.0 (692.8)	2231.6*** (65.6)
pre_condo	1749	519.8 (465.8)	-2.6 (18.0)	304.0 (241.1)	-18.2 (23.5)	435.2 (376.0)	25.1 (19.4)	801.2 (587.2)	-41.1 (37.1)
bank_saving	1749	807.1 (2361.7)	-244.4*** (69.2)	443.1 (1167.6)	-213.0** (95.7)	681.7 (1673.3)	-271.0*** (93.1)	1257.1 (3651.3)	-204.4 (149.8)
informal_saving	1749	188.3 (560.3)	-42.8* (23.7)	100.5 (251.9)	-23.8 (38.8)	182.2 (556.3)	-32.2 (29.5)	234.2 (652.8)	-72.2 (55.0)
lent_out	1749	51.3 (430.9)	5.8 (12.5)	11.5 (67.9)	-4.5 (11.6)	28.1 (154.8)	18.0 (20.7)	119.1 (781.1)	-11.7 (16.3)
total_saving	1749	995.3 (2460.8)	-256.3*** (74.9)	543.6 (1259.8)	-236.8** (106.9)	863.8 (1849.8)	-264.7*** (94.7)	1491.3 (3682.6)	-241.4 (171.8)
personal_loans	1747	30.2 (197.8)	264.7*** (25.1)	63.7 (354.1)	88.5** (40.5)	18.1 (132.3)	236.2*** (28.0)	32.5 (178.7)	414.9*** (63.3)
bank_loans	1749	11.0 (204.9)	301.1*** (69.2)	6.8 (80.2)	61.1 (43.5)	18.0 (272.5)	355.0*** (88.2)	0.0 (0.0)	329.8** (167.6)
community_loans	1749	52.8 (462.4)	118.4*** (28.1)	12.1 (86.6)	24.1 (19.7)	67.9 (577.4)	87.0** (37.2)	48.2 (321.0)	229.9*** (64.1)
total_loans	1749	94.0 (545.6)	598.4*** (64.9)	82.6 (369.8)	173.7*** (64.5)	104.0 (649.2)	670.2*** (101.2)	80.7 (395.4)	695.7*** (105.1)
local_gifts	1749	88.4 (270.7)	68.0*** (19.8)	82.0 (273.5)	26.2 (41.4)	78.5 (244.4)	70.7*** (23.8)	114.1 (319.0)	85.8* (45.7)
foreign_gifts	1749	150.9 (446.2)	97.8*** (30.3)	139.7 (470.1)	-64.6 (64.5)	118.4 (343.8)	81.9** (34.0)	228.2 (590.7)	219.7*** (73.2)
inkind_gifts	1749	49.5 (133.6)	-11.6* (6.5)	43.9 (165.4)	-21.1 (14.9)	45.6 (116.4)	-9.9 (8.7)	61.8 (147.3)	-9.3 (12.6)
total_gifts	1749	288.7 (605.1)	153.9*** (36.4)	265.6 (685.5)	-12.2 (71.4)	242.5 (490.9)	140.8*** (38.8)	404.1 (744.8)	274.9*** (91.8)
net_wealth	1749	780.1 (2545.0)	211.9* (110.3)	339.2 (1473.2)	183.3 (157.1)	667.8 (1950.6)	113.1 (144.5)	1223.4 (3745.5)	442.8* (246.9)

increased households financial wealth marginally, by about \$210, but this is only 15% of the total down-payment cost that does not seem to be accounted for by compensating changes in savings, loans and gifts.

If treated households started out with the same net monetary wealth as control households, where did this additional money come from? In table 8 I find some evidence that households liquidated fixed assets, and reduced spending on a variety of household items over the previous few months in the lead up to making the down payments. I find that treated households are spending much less per month (measuring food and medium term expenditure over the last 30 days) and have spend much less over the last year “long_items”. Assuming that households made all reductions in annual expenditure during the 4 months since they won the lottery, and that they have maintained reductions in shorter term expenditure over those 4 months, I argue that such changes in expenditure can fully account for the impacts on net monetary wealth, and thus the remaining sources of funding to finish paying down the housing lotteries.

When we look at the impact of winning the lottery on an index of household assets,

Table 8: Impact of winning lottery on household recent expenditure and asset sales by type

	N	Control		Winning Effect		Quantile Regression		
		1(> 0)	Mean	1(> 0)	Mean TE	25th	Median	75th
long_items	1749	99.2%	506.36 (940.21)	-0.8% (0.5)	-42.85* (24.0)	-15.71 (13.23)	-35.95* (19.45)	-77.14* (40.28)
med_items	1749	99.8%	75.73 (68.06)	0.0% (0.0)	-8.97*** (3.1)	-6.10*** (2.33)	-8.14*** (2.81)	-10.43** (4.47)
food_items	1749	96.1%	68.70 (47.25)	0.3% (1.0)	-4.34** (2.2)	-4.19** (2.01)	-2.86 (2.32)	-4.76 (3.50)
total_exp	1749	100.0%	3107.61 (2127.33)	0.0% (0.0)	-256.88*** (96.4)	-132.19 (84.66)	-190.62* (108.36)	-396.29** (162.63)
asset_sales	1749	0.2%	53.04 (1587.30)	0.3% (0.4)	-45.27 (73.0)	3119.05 (4150.71)	3119.05 (34631.75)	-41904.71*** (3263.81)
food_share	1749	97.6%	0.03 (0.01)	-0.1% (0.8)	0.00* (0.0)	0.00** (0.00)	0.00** (0.00)	0.00 (0.00)
hh_index	1742	100.0%	0.05 (1.02)	0.0% (0.0)	-0.09* (0.0)	-0.13*** (0.05)	-0.08 (0.06)	-0.06 (0.08)

I find that treated households are 0.1 standard deviations less wealthy in terms of fixed assets. While this difference is hard to quantify in monetary terms it is perhaps suggestive of the fact that winning households have reduced expenditure on durable household items in order to make payments for the housing.

5 Conclusion

In this paper I study a housing lottery which offered households the chance to make large investments in newly constructed condominium housing assets.

I document that households do not have the cash on hand to pay the mortgage down-payments. Further, the short run returns from owning the housing are not large: if they rent housing on the open market they cannot expect to make returns at current market rent, after paying down the mortgages. If they move into the condominium houses, they will be saddled with large mortgage repayments, which are many multiples larger than the rents that households are currently paying.

Yet it seems that both banks and other private households are willing to lend large amounts of money to these households to help them pay the down-payments. Households who win the lottery are able to get large loans, as well as gifts and monetary donations, to help them make the down-payments.

The use of the housing lottery is crucial to understanding the sources of financing for the housing, since it allows the use of the untreated households as a counterfactual for those households who won the lottery and paid the down payments.

These results suggest that households are willing to make large investments in housing in these settings. It presents a puzzle as to why such investments were not being made in the past: households in this sample were living slum conditions, and investing very little in housing, as is the case for most households in Addis Ababa. They were not wealthiest households, nor are these investments so unusual: over 100,000 households have won condominiums out of a city of about 1 million households. The results suggest that government action can stimulate private investment in housing that was not otherwise happening, but in a setting where regulation may be hampering the private supply of housing investment opportunities.