Real Estate and Remittances in Accra, Ghana: A Case of the Winner’s Curse?

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Executive Summary

Background. Over the past 15 years Ghana has been one of the most rapidly growing economies in sub Saharan Africa. This growth has been aided by Ghana’s experiencing very high levels of remittances, driven largely by the country’s benign and improving policy environment. Remittances account for some 12 percent of the GDP, and there is anecdotal evidence to suggest that a significant share of this goes into real estate investments in the capital city. In light of this, the paper addresses the following questions: First, given the high and growing level of investments in Accra’s real estate, why is it the case that the housing conditions of the poor in Accra are considerably worse than those in a number of other African cities which have lower incomes? Second, why has this sharp and unmatched increase in remittances not contributed more to economic growth? And finally, are these mysteries related? That is, could Accra’s apparent real estate boom lead to both deteriorating housing conditions for many, as well as a relative slowing down of Ghana’s economy?

Our Approach. There is not a great deal of data available to answer these questions so our method is indirect and takes two approaches. First, we use a variant of the traditional mono-centric city model to calculate the city’s housing supply elasticity relative to those of a number of other similarly sized African cities. The model suggests that housing supply responsiveness is considerably higher in the other cities – in fact almost seven times higher in Dar es Salaam, and more than twice as responsive in both Nairobi and Addis Ababa. This muted supply responsiveness in Accra is, of course, consistent with the observed higher housing costs. It also suggests that increases in demand, such as those generated by remittances, would have a much the larger effect on housing prices rather than housing output. Second, we estimate a number of traditional housing demand and reduced form equations for Accra and the other African cities. The explanatory power of the equations, and the expected signs and estimated elasticities are consistent with previous findings and statistically significant. With a number of restrictions on the equations we can infer the overall supply elasticity for all of the cities, and with our estimates of the relative elasticities form a judgment about Accra’s housing supply elasticity.

Conclusions. Taken together our two approaches provide an answer to our first question. Lower income families in Accra have such poor housing conditions because the market is extremely unresponsive to demand. Although the housing market outcomes we have traced in Ghana— i.e., policy restrictions which cause both very high housing prices and low housing quality for the poor— are not unusual relative to the findings for other more developed economies, they are extreme. The welfare costs of current housing and land policies are considerable, so much so that in addition to direct housing market effects these policies also appear to have more significant implications for the achievement of more equitable growth. That is, in terms of our second and third questions, the mysteries do indeed appear to be related: Accra’s real estate boom appears to be related to both the relative slowing of economic growth, and to the low quality, high cost housing conditions of the poor.

As far as evidence on the effect of housing policy on equitable growth we once again are forced to rely on broad statistical evidence on urban and rural incomes and urbanization trends rather than direct empirical findings. Nevertheless, once again, a comparative perspective suggests that the linkages between Accra’s inelastic housing...
supply and slower growth is consistent with standard development theory. Indeed, it is exactly the sort of impediment to growth that development theorists, such as Lewis (1977), and economic historians, such as Williamson (1988) worried most about. Thus, the city’s inelastic housing supply implies that that while remittances are certainly creating more housing, they are also making it less affordable and thereby restricting movement to Accra. This restriction, in turn, makes it harder to exploit the potentially higher levels of productivity in the capital which attracted the remittances in the first place. If this is the case, as it appears to be, then housing market constraints may have become so binding that they are subjecting the economy to something akin to what is known in economics as “the winner’s curse,” whereby the gains of the broader policy reforms -- which have no doubt contributed to the high level of remittances -- are much lower than they otherwise would be.

**Recommendations.** Perhaps our main finding is that the overall perspective on policy matters. That is, if perspective taken focuses on economic growth rather than a more traditional sectoral perspective, the sequencing of reforms takes on more importance. In particular, seemingly welfare-enhancing housing market reforms may be obviated or even offset by their interaction with remaining housing market constraints. For example, while improving the workings of the financial sector is an essential economy-wide reform, just improving access to formal housing finance without making housing supply more elastic will fuel further price increases in the already expensive and inelastic housing market.

In other words, for policy reforms which increase housing demand, such as improved finance or remittances, to be most effective the prices of the assets financed should not be greatly distorted. This is not the situation in Accra where such prices are highly distorted. Two aspects of regulatory reform of real estate markets appear to be particularly important in this regard. First, problems with land administration have long been noted, and could certainly be significantly improved upon. However, we show that land development in Accra is already occurring at a rapid rate, creating a far-flung city with very long commutes. In other words, it is not constraints on the rate of land development, but rather the form it has taken that is the main problem in this regard. Second, and in our view more importantly, is the need to address the inflexibility of the city’s existing stock of housing. Throughout the world it is the existing housing stock that provides most housing services. Unfortunately, in Accra this stock is rarely recycled into taller buildings in correspondence with the greatly increased value of the land and expanding city boundaries.

To sum up, making Ghana’s and Accra’s real estate markets more responsive would go a long way towards improving the housing conditions of the poor. It would also no doubt help improve the effectiveness of remittances, make financial liberalization more productive, and reduce the city’s expanding footprint with its accompanying congestion and infrastructure demands. It would, in a word, make the broader policy environment less subject to the sorts of constraints that almost inevitably arise when an economy is reforming on so many fronts and not all of the important institutions needed to make the links across reforms are present. It would be the sort of reform that could lower housing costs, and in so doing would address the development problem highlighted by W. Arthur Lewis that “Urbanization is decisive [for growth] because it is so expensive.”
I. Introduction

Over the past 15 years Ghana has been one of the most rapidly growing economies in Sub Saharan Africa. This growth has been aided immeasurably by Ghana’s experiencing one of the world’s higher levels of remittances, which exceed development aid and foreign direct investment, the latter by a factor of almost ten.\(^1\) These remittances, in turn, have been driven largely by the country’s benign and improving policy environment, one in which the average rate of inflation fell from one of the highest in Africa to about 10 percent over the last few years.\(^2\) While statistics on how these remittances are invested are not available, a number of articles, Quartey (2006), Yeboah (2000) and Diko and Tipple (1991), a drive around Accra, discussions with bankers and developers there, as well as local newspaper accounts, all indicate that real estate investments in the capital city account for a significant share of the 12 percent of GDP received in remittances.\(^3\)

At the same time, housing in Accra has become more expensive, and is increasingly pricing middle and lower income groups out of the housing market, resulting in substandard and congested living conditions for a large majority of the city’s residents. This pattern suggests a number of mysteries: First, given the high and growing level of investments in Accra’s real estate, why is it the case that the housing conditions of the

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\(^1\) Ghana’s remittances, according to Addison (2005), in a Bank of Ghana study, increased from about $200 million in 1990 to about $1.3 billion in 2005. These estimates are of course of a difficult to measure activity, but as Quartey (2006) indicates, could well be underestimates. Development assistance, according to Addison, was less than remittances over the entire 1990-2003 period, as was Foreign Direct Investment by a large margin, and lower than their estimate for 2005.

\(^2\) Ghana’s average annual inflation rate for the 1980s was 47 percent almost three times the Sub-Saharan rate of less than 16 percent. For the 1990s it was close to 30 percent.

\(^3\) See Statesman article on housing in Accra Jan. 22, 2007. On the use of remittances in Ghana see Adams (2006). He details the generally pro-poor disposition of remittances, showing that they account for more than 20 percent of the expenditures of the lowest income quintile. However, his estimates are from 1998-99 when remittances were a small fraction of the level achieved in recent years. In addition, they are nation wide figures. Quartey (2006) suggests that housing investments are an important use of remittances. The soon to be released Living Standards Survey will allow for deeper analysis of this question.
poor in Accra are considerably worse than those of the poor in a number of other African cities which have lower incomes as shown both by Konadu-Agymang (1990) and our data? And second, why has this sharp and unmatched increase in remittances not contributed more to economic growth? In fact, the opposite has happened. Despite a sharp increase in remittances economic growth in recent years has slowed relative to that of other African economies, even those which have continued to experience high levels of capital flight, see Collier et al (2004).\(^4\) Finally, are these mysteries related? That is, could Accra’s apparent real estate boom lead to both deteriorating housing conditions for many, as well as a relative slowing down of Ghana’s economy?

While this last question is perhaps the most intractable it is also the most important as the situation in Accra is by no means an isolated case. Rapid house price escalation has characterized many cities across the world besides Accra, and particularly cities in emerging economies which have achieved higher levels of growth, such as India, China, and the EU-accession countries among others.\(^5\)

This paper attempts to shed some light on these mysteries. It examines the effects policies have on house prices in Accra, showing how these factors not only adversely affect house prices, but also the housing situation of the poor, and the broader economy. Before discussing our results, however, it is perhaps important to note the limitations of data availability and our corresponding efforts to place the far from perfect data we have into what we hope are theoretically rich but simultaneously simple empirical constructs.

\(^4\) Ghana’s per capita growth rate for 1990s was 1.7 percent whereas the average Sub-Saharan Africa rate was -0.2 percent. Over 2000-2004, Ghana’s per capita growth rate increased to 2.4 percent, while the rest of sub-Sahara Africa increased to 1.6 percent. That is, Ghana’s growth increased less than half the increase in the rest of Sub-Saharan Africa.

\(^5\) Konadu-Agyemang (1998) traces through the sharp increases in real house prices in Accra since 1980. House prices in India are similarly interesting in terms of external finance, in this case foreign direct investments. In 2005 foreigners were for the first time allowed to invest in Indian real estate. During the next year housing prices in most major Indian cities skyrocketed, leading the Reserve Bank of India to undertake a study, by Joshi (2006), of whether there was a bubble in housing prices in the country.
To this end, in our analysis of the housing market we draw the rich traditions of models of mono-centric cities about which Mills and Tan (1980) said “there are few cases in economics in which such a simple theory leads to so many testable implications… [and which is] based on a functional form that can be derived from respectable theory and tested with easily available data.” p.314. Similarly, with respect to the linkages between the housing market and growth we take as a point of departure W. Arthur Lewis (1977) view:

Urbanization is decisive because it is so expensive. The difference between the cost of urban and rural development does not turn on comparing the capital required for factories and that required for farms. Each of these is a small part of total investment, and the difference per head is not always in favor of industry.

Thus, while we would not put a great deal of confidence in the statistical significance of our empirical results and their coefficients, we nevertheless believe that our findings are fairly clear and consistent with the literature on development and even Ghana’s development agenda as propounded by Lewis (1954) as he developed his theories of economic development with specific reference to Ghana.

Our results are first, that the welfare costs of current sectoral policies are both considerable and regressive; and second, these policies prevent remittances from contributing as much to growth as they could if they were not fueling asset price increases. In other words, housing market constraints in many ways subject the economy to something akin to what is known in economics as “the winner’s curse.” According to this phenomenon, the winners of auctions often pay “too much” for their purchases. In the case of Ghana, the idea is that much of the “winnings,” i.e., the large scale of

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6 The winner of an auction is of course the one who submits the highest bid. In auctions where the auctioned item is worth roughly the same to all, bidders are distinguished only by their individual estimates. The winner is thus the one who makes the highest estimate. But, if the average bid is accurate, then the highest bidder overestimates the item's value. Thus, the auction's winner is likely to have overpaid and therefore suffered the so-called winner’s curse.
remittances, won through pursuit of an effective macroeconomic policy regime, appear to feed price increases rather than increases in output because of sectoral policies which constrain the housing market.\(^7\)

Finally, in addition to very high house prices, Accra also has very high sanitation costs and very long, highly congested commuting patterns, both of which have fundamental implications for housing costs and urban development, and which are indicative of the important role played by local governance. We have survey information on the former topic, and recent studies, World Bank (2002) and (2005), which provide a great deal of comparative information on the latter. Accordingly, we also consider how the city’s provision of these basic services affects the functioning of the housing market.

II. Background

Most fundamentally, the source of such significant levels of the growth in remittances in Ghana is the underlying strength of the economy, and the credibility of the policy environment. Such large resource flows imply a belief in the economy that is absent in many Sub-Saharan economies which have been experiencing the opposite phenomenon – capital flight of almost 4 percent of GDP per year, again see Collier et al (2004). For Ghana, such resource flows represent an enormous opportunity to sustain and deepen growth. However, these funds are flowing into an economy with a financial system which -- due to many years of high inflation and heavy government borrowing – remains, as shown in Table 1, among the more underdeveloped in Africa.

Table 1. About here

\(^7\) In the context of Ghana, the metaphor has two connotations. First, the country’s policy-makers may have paid a higher cost in terms of the political costs of pursuit of the economic reforms, given that the reforms did not contribute as much to growth. Second, individual home buyers may have purchased houses at prices higher than warranted in a process closely akin to the auction described above.
In such a context, significant asset pricing problems can arise, particularly when the single most important investment available appears to be real estate in the capital city, Accra. Figure 1 provides a spatial description of the price of land in various areas of the city showing that in the most expensive neighborhoods, such as the Cantonments and Airport Residential Area, land prices are at European levels. Similarly, a recent ranking of the cost of living in the 150 most expensive cities in the world – driven in large part by real estate prices -- placed Accra 75th between Melbourne and Houston, cities in countries with per capita income, even on a purchasing power parity basis, more than ten times higher than Ghana’s.8

In other countries such rapid house price increases have been identified as the likely culprit for both the problems of housing affordability and an inability to exploit many of the most productive employment opportunities, see Glaeser and Gyouko (2003) and Green et al (2005) for the U.S., Cheshire and Sheppard (2001) for the U.K, and Malpezzi and Mayo (2001) for Korea and Malaysia. Williamson (1988) also provides a discussion of these effects during England’s Industrial Revolution as well as for developing countries generally. Moreover, in a country like Ghana, where one city accounts for 20 percent of GDP or more, it would not be surprising if housing cost increases in just that city alone could affect the country’s growth rate.9

Figure 1. About here

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8 The rankings are from Global Cost of Living Rankings 2006/7 by Finfacts: Business and Finance Portal. The per capita income comparisons are from the World Development Indicators, 2006. As for the cost of real estate, a recent World Bank study (2007) indicates that the rents of Class A offices in Ghana are 40 percent higher than the average for 10 other Sub-Saharan countries, Table 9 .p. 48.
9 This assumption about Accra’s share of GDP would seem to be conservative as the Greater Accra area has a population of almost 15 percent of the national figure and incomes there are considerably higher than elsewhere as discussed later.
Evidence on Housing Costs and Conditions in Accra. Housing costs in some of Accra’s lower income neighborhoods are considerably lower than they are in the exclusive neighborhoods noted earlier. But then, so too are the income levels. To get a sense of how housing conditions in Accra affect households with different income levels it is necessary to either make detailed surveys of conditions across the city, or to compare Accra’s low income housing conditions with those of similarly-situated households in other cities. Because of data availability we choose the latter approach. This approach has the added advantage of benchmarking Accra’s experience with those of a number of other similarly large sub Saharan African cities. Our analysis compares the housing situation of inner city low-income neighborhoods in Accra with similar areas in Nairobi, Dar es Salaam, and Addis Ababa.10

As shown in Table 2, the mean and median expenditure on housing and services in Accra is much higher than that of similar expenditures in the other cities, yet the housing conditions in Accra are of lower quality in terms of services, and quantity. That is, while the residents of Accra pay much more for housing services, they get considerably less, paying, for example, a much higher share of the household income for some services, such as sanitation. Moreover, not only are costs high, the payment form is onerous. It is not unusual, for instance, for renters in Accra, who account for almost two-

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10 The data were gathered across the four cities between 2004 and 2006. They are described more fully in an appendix. In each case the surveyed households were located in contiguous, low-income central city communities. The differences in the income levels of the surveyed households were similar to the differences in the national per capita income levels across countries, suggesting that the surveys covered the same general part of the income distribution. As detailed in the annex, the four cities have populations from 2 to 3 million people, making them 4 of the 10 largest cities in sub-Saharan Africa. The populations also tend to rely on similar levels of population served by basic services such as water and sanitation. Finally, the transport nodes – e.g., the share of the population using public transport, and walking – are quite similar.
thirds of all households in the city, to have to make up-front payments of three years of rent, suggesting an extremely tight housing market.\textsuperscript{11}

Our survey results are also consistent with more general Census findings on urban housing conditions in Ghana, and a large body of literature on housing conditions in the city.\textsuperscript{12} These findings indicate that urban residents in Ghana live in highly dense areas: average room occupancy is high at more than 3 persons per room, with more than 45 percent of families living in a single room. Each plot houses several families (more than one-third of the plots covered in our study contain 5 to 9 separate households) often -- more than 40 percent of the time -- living in what is termed compound housing, see Korboe (1992) for a definition and discussion of the importance of this structural arrangement in Ghanaian housing consumption decisions.

This sort of housing deprivation and cost is unusual because, as shown in Tables 1 and 2, the per capita income in Accra is considerably higher, ranging from two to almost three times the level of incomes in the other cities. Such higher incomes should translate into consumption of higher levels of housing services, but in fact, the opposite is happening. Indeed, for the observed result to occur -- i.e., higher levels of income and lower levels of housing services -- requires that Ghanaian families must be unable to use their higher incomes to access better housing as would be expected. It suggests, in other words, that the policy impediments in Accra must be much more severe than they are in the other cities.

\textbf{Table 2. About here}

\textsuperscript{11} Gulyani (2006) shows that rent levels in Nairobi’s slums while expensive are considerably lower than Accra’s.

\textsuperscript{12} Tipple et al (1997) found housing conditions in Accra to be of lower quality than in neighboring Kumasi, Ghana’s second largest city, which has a lower income level. See also Konadu-Agyemang (1990) and (2001), Grant and Yankson (2003) and Korboe (1992).
One way to think about the range of policy factors that could affect demand has been developed by Green, Malpezzi, and Mayo (2005). They provide a clever summary equation that allows broad inferences to be drawn about both how elastic a specific city’s housing supply curve is, at least relative to other cities, as well as by how much various policies and natural conditions – such as whether the city is bounded by a coast or not -- might affect this elasticity.

The equation suggests that housing supply elasticity, $\eta$, is a function of: city population size, $n$, and a density factor $\varphi$. It is also affected by a discount rate, $i$, the city’s population growth rate, $g$, transportation costs, $k$, and the price of housing, $P$, at a fixed point in the city.

$$\eta = \frac{2}{(\varphi \sqrt{n})} \left[ \frac{(i-g)}{k} \right] P \quad (1)$$

The intuition underlying this equation is that the important factors affecting housing supply elasticity can be broken down into components. That is, the terms in the first bracket on the right hand side measure the size of the city, which, in turn, determines the distance from the city border to its center. In the second bracket are the city’s expected growth rate relative to the discount rate, $i-g$, and the costs of commuting, $k$. These factors account for how the city’s growth will affect the value of a property as well as the discount rate that affects the valuation of the future price increases due to city growth. Finally, all these factors are scaled by the price of a housing unit that is similarly situated in the different cities.

One can argue about the affects and relative magnitudes of the various policies on relative supply elasticities, including policies possibly not included – such as land market restrictions, or lack of property rights. Nevertheless, the results in Table 2 lead us to expect that the elasticities for the other cities to be considerably higher than is the case in
Accra. We examine this hypothesis by using equation (1) as a schema to consider how variations in policies would be expected to affect the housing elasticities in the various cities. That is, we use the equation to consider how basic aggregate statistics about each of the cities would affect their relative supply elasticities.

The basic equation estimated is:

\[
(2) \quad R = \alpha_0 + \alpha_1 Y + \alpha_2 HH + \alpha_3 HH^2 + \epsilon,
\]

where \( R \) is the log of rent, \( Y \) is log of income, \( HH \) is household size, and the last term is an error term. This specification can be viewed as a traditional logarithmic owner and renter demand equations which closely follows the approach used by Malpezzi and Mayo (1987) in their review of studies of housing demand in 16 countries. The model is clearly a very simple one and Malpezzi and Mayo (1987) provide considerable detail on both its weaknesses as well as its surprisingly strong performance relative to much less parsimonious approaches.

Based on this model in Table 3 we report the aggregate results of demand for housing by owners and renters in all four cities in equations (3) and (4). We also report the results from two other equations in the table, i.e., equations (5) and (6). These latter equations are reduced form estimates that also take supply factors in each city into account by including dummy variables for the other cities. Based on the discussion below we expect that the policy regimes in the other cities to be relatively more enabling than is Accra’s. Consequently, we expect the signs of the other city dummy variables -- what might be termed supply shifting variables -- to have a negative relationship with our dependent variable, rents. In the end, our model is clearly very simple, but

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13 See the Annexes for definitions, descriptions, and summary statistics for all the variables in the table.
14 We use the same definitions for rents and net imputed rents as do Malpezzi and Mayo (1987).
nevertheless, as described in Malpezzi and Mayo (1987), it is firmly rooted in traditional estimates.

For the limited number of observations which are spread out over two tenures and 4 cities the results are remarkably robust. The explanatory power of the demand equations is strong, with adjusted $R^2$ in the range of 0.36 to 0.63, and the signs for all of the variables as expected, with almost all of the 14 coefficients in the two specifications significant at the 5 percent level. In addition, previous work suggests a number of other expectations about the size of the coefficients of the various variables, which are also fulfilled, such as the income elasticity of housing demand ranging from .5 to .7 for owners and renters, respectively.

Similarly, in equations (5) and (6), the variables also have the expected signs, and in this case, all of the additional variables are also statistically significant, and the statistical significance of the other variables and the overall equation improve, with the adjusted $R^2$ increasing to 0.86. In addition, in the latter two equations we can also place an additional expectation on the findings that is also fulfilled. That is that household size should have a more significant affect on rent levels for renters than it does for owners.

This finding warrants some explanation. We expect household size to be a larger consideration for renters for a number of reasons. Perhaps the main one is the adverse selection problem that can affect rental decisions described by Basu and Emerson (2003).

In their analysis landlords attempt to discriminate between tenants based on household

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15 We have similar survey results for owners in one other African city, Mbabane, Swaziland. The empirical results which include Mbabane are very similar and slightly better confirmed for the additional degrees of freedom. We did not include Swaziland in our estimates because of our focus on how a variety of city conditions affect supply elasticities, and the Swaziland case was so different – the city has a population of only 80,000 rather than the approximately 2 million that characterizes the other cities. In addition, per capita incomes are considerably higher and population is decreasing in Swaziland.

16 We report only one of the specifications. A simpler one that did not include the square of household size was also estimated with similar results as reported above.

17 The other expectations are with respect to the coefficients for household size and its squared term. In addition, the intercept is expected to be positive.
characteristics so as to minimize the costs of tenancy. Having more children is likely, one
would think, to imply greater

**Table 3. About here**

maintenance and upkeep costs for the landlord, and has according to Malpezzi and Mayo
(1987), been more frequently found to be a significant variable in renter rather than in
owner demand equations. In addition, Korboe (1992) suggests that in Ghana owners are
subject to cultural obligations that cause them to accept even distant relatives to live for
free in their houses. Mabogunje (2006) makes a similar argument for other African
cities, and Konadu-Agyemany (1991) has an interesting discussion of how these sorts of
obligations affect housing choices in Ghana. Consistent with this result, the most recent
Census data indicate that some 22 percent of Ghanaian families do not pay any rent at all.
Unlike owners, renters are not under no such obligations. Hence, it is more likely that
family size has a significant effect on rents paid; consistent with our findings.

These overall results, as well as the coefficients on the dummy variables, support
our basic hypothesis: the Accra housing market is, at least for lower income families,
much more constrained.\(^\text{18}\) In order to get a sense of how much less responsive, we first
combine these results with previous empirical findings regarding the price elasticity of
housing demand to infer an estimate of the underlying overall supply elasticity. Then we
use equation (1) to infer relative elasticities across the cities. That is, based on previous
work, we first assume that the price elasticity for both renters and owners is
approximately -0.5. Then, using this figure along with our estimates of income elasticities
for the respective tenures we can infer the supply elasticity of housing as follows:

\[
\eta = \frac{\alpha_2/\gamma_1 + \alpha_1}{},
\]

\(^{18}\) We attempted to examine whether the dummy variables affected the slope of the supply curve rather than
shifted it. However, our estimates were limited by the degrees of freedom.
where $\alpha_2$ is the income elasticity of demand as estimated in equations (3) and (4), $\gamma_1$ is the coefficient on income in the reduced form equations, and $\alpha_1$ is the assumed price elasticity of housing demand. Plugging in the estimates for income elasticity from the demand equations and a price elasticity of -0.5 yields an overall supply elasticity estimates of about 0.3 for owners and 0.7 for renters. At first glance, these are highly inelastic supply curves, similar to those found by Malpezzi and Mayo (1997) for Malaysia and Korea’s restrictive housing markets, and considerably lower than even the lowest U.S. estimates, as found by Green et al (2005). However, first glances are a bit deceiving because this elasticity estimate represents a synthetic estimate of the overall supply elasticity for the four cities. While this sort of aggregation is of course impossible, the measure is, in many ways, similar to estimating a national housing supply curve as done, for instance, by Poterba (1991) among others.

To get an idea of how we might disaggregate the elasticities of the respective cities we turn to equation (1), and apply the results of two recent studies of transport costs in African cities, see World Bank (2002), and (2005), and other city-wide level data on the four cities. Based on this model we can also infer how much Accra’s policies have affected the housing supply curve relative to the aggregate estimate. Table 4 reports on our estimates of the various components of equation (1) and the corresponding estimate of the relative housing supply elasticity in each of these cities.

Once again, the equation presents a highly simplified schema. However, its very simplicity is one of its main advantages. Indeed, as Mills and Tan (1980) have argued “there are few cases in economics in which such a simple theory leads to so many testable implications… [and which is] based on a functional form that can be derived from respectable theory and tested with easily available data.” p.314. The equation makes
sure that all the important and interactive factors involved in an abstract model of city
development are explicitly treated, and it can be crudely estimated with a minimum
amount of aggregate data.

Before discussing how the various policies affect relative elasticities, consider the
main implication of the inferred supply elasticities. They indicate that Accra’s housing
supply elasticity is almost one seventh that of Dar es Salaam’s, and less than half of
Addis Ababa’s, and Nairobi’s. In other words, Dar es Salaam’s supply elasticity of about
1.5 to 2.0 is not unlike estimates for the U.S., see Topel and Rosen (1988) while Accra’s
is lower than the highly inelastic Asian results noted earlier.19

Table 4. About here

One way to think about this result is that if Accra could increase its supply
elasticity to the level of Dar es Salaam’s, the 20 percent increase in per capita income in
Ghana realized over the past seven years would have had virtually no effect on house
prices (rather than causing them to increase by 5 percent).20 In other words, in Dar es
Salaam’s supply-responsive market this sort of increase in demand would have had no
noticeable effect on house prices. Thus, in this perspective, at least part of the observed
increase in house prices in Accra is in effect a regulatory tax on housing supply which
redistributes wealth from largely poorer renters to those who own real estate. While the
estimated welfare losses associated with such a tax on the residential real estate

19 The elasticity measure for Dar es Salaam comes from multiplying the overall aggregate elasticity
measure that we estimated by equation (7) by the city’s relative measure, i.r, the results in Table 4, or
0.7*2.8=2.
20 The price increase is estimated by using the income increase since 2000 and the elasticity estimates for
price, income and supply elasticity used in equation (7). We then differentiated house prices with respect to
income.
component would not be great, on the order of .4 percent of GDP, they would still be more than double the size of the city’s budget.  

In addition, this regulatory tax almost certainly reduces productivity by its effects on slowing the ability to migrate to more productive jobs in the city. This result seems likely for two reasons. First, because the household income gap between urban and rural areas in Ghana is large, more than 60 percent. So too is the income gap between households in Accra and other cities, which is 20 percent. To see how large this gap is it is instructive to compare it to similar gaps in other times and places. Williamson (1988), for example, reports that the urban-rural wage gap for unskilled relatively homogeneous male workers in England during the Industrial Revolution was about 33 percent. Squire (1981) estimates a similar figure for developing countries at over 40 percent.

Clearly such indicators carry with them enormous measure problems, associated with differences in the cost of living, and the use of wage versus income measures. Nevertheless, one would at least expect these sorts of measurement problems to be relatively constant over time so that the increasing gap suggests that migrants to the cities are less able or willing to move despite larger incentives to do so. Aryeeetey et. al. (2004), show that while urban growth has been slowing to a surprisingly low level, a level more than 30 percent lower than that of already more urbanized neighboring countries, and

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21 This calculation assumes that Accra accounts for about 20 percent of Ghana’s GDP and that Ghana follows typical patterns of wealth holdings to GDP ratios of about 1.7 times as much housing/wealth as GDP, see Goldsmith (1984). It ignores the other fixed capital stock in the city which also confronts this regulatory tax. In this case, the 5 percent transfer to residential real estate property owners embodied in the price increase would be equal to 5 percent of 1.7*GDP*0.2, where the last term stands for Accra’s share of GDP, or all together, about 1.7 percent of GDP. Applying the crude deadweight loss formula to this sort of tax rate, and using the previously assumed price elasticity would result in a loss of about one quarter of that amount, about .4 percent of GDP. Because Ghana’s GDP is approximately $6 billion this translates into a $24 million deadweight loss. The city of Accra’s budget in 2004 was $10 million.

22 Of course some significant but unknown share of these higher nominal incomes are offset by higher living costs, and particularly higher housing costs.
more than 35 percent lower than the rate in two of our comparator cities, the income gap has been increasing.23 At Ghana’s lower level of urbanization, as shown by Williamson (1988), the opposite would be expected, even more so since the income differential between cities and the countryside has been increasing. That is, one would expect that urban growth should be higher than that of countries which are already more urbanized. This slowing of the urbanization process can lead to significant reductions in productivity and in costly misallocation of resources.24 Williamson (1986), for instance, shows that the deadweight losses implied by the misallocation of resources in nineteenth century with England’s seemingly smaller gap may have exceeded 3 percent of GDP.

III. Unbundling the Components of Accra’s Housing Prices

In order to focus in on which policies are to blame, it is helpful to once again refer to equation (1) and decompose the elements of the city’s housing supply elasticity.

City Density. The idea behind the first bracketed term in equation (1) is the notion that city density affects housing prices through its effect on the size of the city. The underlying perspective is that the city is assumed to be a mono-centric one which can expand in all directions. This is certainly the case in Addis Ababa and Nairobi, but it is not the case for the coastal cities of Accra and Dar es Salaam. In these cities, as shown in Figure 2 for Accra, the coast limits the ability to expand, and the city, correspondingly, has expanded overwhelmingly in one direction, towards the east.

This environmental condition can be considered in the analysis, as suggested

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23 Ghana’s urban growth rate is 30 percent lower than Senegal’s, Cote d’Ivoire’s, Cameroon, and Nigeria’s. On the growth rate for the other comparator cities see Table 4. Ghana’s urban growth rate between 1990-2003 was one-third lower than that of the average of the 24 Sub Saharan African countries considered by Kessides (2006) even though its share of urban population is close to the average figure.

24 The increase in urban unemployment would seem to contradict this argument. However, in a city with so much informal sector activity this variable is extremely difficult to measure with any accuracy.
by DiPasquale and Wheaton (2001). They show that when a city cannot expand in all
directions, the increase in population must be accommodated by further expansions along
the radials where expansion is possible. This form of expansion of course causes longer
commutes so that the same level of population can be supplied with housing only at
higher costs, and hence, a lower supply elasticity. Thus, this natural condition exacerbates
Accra’s already stringent supply conditions at least relative to two of the three other
cities.

**Figure 2. About here**

Another important factor in determining city size is how much land is used for
each specific new property. The minimum plot size for new developments in Accra, at
450 square meters, is very large, requiring a minimum level of income far beyond the
reach of most Ghanaians, as has been detailed in many studies, Yeboah (2000), Willis
and Tipple (1991), among others. Figure 3 compares the relatively new development
pattern in the peri-urban/suburban areas versus traditional development in the inner city
areas.

**Figure 3. About here**

This limitation on plot sizes for new housing at the city’s periphery means that the
city’s footprint has to be larger to accommodate a given population so transport costs
increase. However, it also means that those occupying the existing stock of housing are
less able to afford a new unit. If they stay in the city, their alternative is to consume less
housing space. As a result, in spite the more expansive plot sizes at the periphery –
indeed, largely because of it -- Accra is the densest of our four cities (see Table 4). From
equation (1) this effect reduces Accra’s supply elasticity relative to the other cities. That
is, $d\eta/d\phi < 0$.  


Moving to the other terms in equation (1), the numerator of the second bracketed term in equation (1) contains three terms -- the city’s population growth rate, the discount rate, and transport costs. We consider each of these in turn.

**Urban Growth.** One of the primary motivations for urban migration is to move to the higher paying, and correspondingly, more productive jobs in the city. In the case of Ghana, by 1998-99, urban income had become more than one-third higher than the rural level, having increased from being only about 12 percent higher seven years earlier.\(^{25}\) Recall that this discrepancy increased while urban growth rates slowed. Moreover, income levels in Accra relative to those in other cities also increased, as this gap also widened from being slightly more than 6 percent higher in the earlier period to being one-fifth higher in the latter period.\(^{26}\)

At a minimum, without taking the role played by house prices into account these sorts of trends would appear to be a contradiction of some of the most powerful motivating forces for rural-urban migration. That is, rather than increasing in response to a rising wage differential, urban growth rates have been falling.\(^{27}\) The higher housing costs may of course reduce the ability or incentive to move to the city. In the end, though,

\(^{25}\) While this gap in incomes may appear extreme it is consistent with the findings of Erickson and Peterson (2005) on informal sector productivity in urban Africa. They found that the urban informal sector in 18 West African countries was twice as productive as rural work.

\(^{26}\) These figures are taken from Table 5.2 on page 97 of E. Aryeetey et al. (2004). It is also worth noting that the higher urban incomes noted represent a reversal of the situation of the early 1980s when rural incomes were higher. See Canagararajah and Mazumdar (1999).

\(^{27}\) Accra’s urban growth rate of 3.0 percent exceeds the population growth rate of 2.4 percent over 1990-2003 by only 25 percent, a relatively low rate of urbanization for Ghana’s overall level of urbanization. This slower rate could stem from a variety of factors. It could, for instance, be a result of Ghana’s having a large second city, Kumasi, which also has more than a million residents, so that the country does not have to suffer the costs of such extensive urban primacy as is the case in so many smaller countries. In other words, its system of cities might be more diffused placing the largest city under less demographic pressure. It could also be that Ghana’s early efforts at rapid industrialization led to a stronger “urban bias” which made the country over-urbanized at the beginning of period, although Canagararajah and Mazumdar (1997) present evidence that contradicts this perspective. Finally, as Asabere and Owusu-Banahene (1983) suggest, Ghana’s early figures may simply be wrong thus giving a misleading picture of the urbanization pattern.
the model implies that slower city population growth, such as has occurred in Accra, reduces pressure on both house prices and supply elasticity.

**The Discount Rate.** When there is an almost total absence of mortgage finance or even informal finance that could be used for housing, discount rates will undoubtedly be high. Ghana certainly has had high interest rates as well as corresponding difficulty in mobilizing finance for investments in much of the city’s existing housing stock. But, investors in the other cities have also faced high discount rates. Two characteristics in the all of these cities appear to be important in generating these high discount rates.

First, the informality of employment and real estate ownership makes it difficult to offer lenders collateral. In Accra what is referred to as compound housing accounts for a significant share of the housing stock. These units are traditional family houses which have a complex system of ownership, usually with several members of the extended family having a stake in the property, and the each of the unit’s rooms being occupied by a combination of owner and renter households. This form of fragmented ownership makes it very difficult to use property as collateral for loans. And while Accra’s ownership patterns are unique similar sorts of ownership problems constrict financing options in all of the cities.

For instance, in Addis Ababa, most central city housing is in what is called kebele housing which is owned by the state and which residents can use but not legally exchange, see Mathema (2004). Similarly, in Nairobi, more than 90 percent of the city’s slum dwellers live in rental accommodations, the majority being either on land with insecure titles, or in substandard housing with inadequate services, see Gulyani (2006). Finally, in Dar es Salaam, most of the urban poor live in housing on land with *de facto*
ownership, but without titles. This lack of formal ownership greatly complicates borrowing, making it is very difficult to access credit based on the house’s value.

Second, besides the lack of formal property title, financing availability is also affected by the informality of employment, which characterizes most employment in all of these cities. Estimates by McKay and Aryeetey (2004) and the ILO (2002) estimate that on the order of 80 percent of the Ghanaian urban labor force is in the informal sector.

Given the informality of both ownership and employment in these cities it would be almost unimaginable for individuals to be able to pledge either their property or their income to finance the reconstruction and/or rehabilitation of the housing stock even if a plentiful supply of finance existed. However, to make matters worse, such a supply does not exist. Estimates suggest that the supply of mortgage finance in Ghana, which along with Kenya has the more developed housing finance systems of the four countries, amounted to only ½ of 1 percent of GDP.28

In sum, in the best of circumstances, financial institutions would not lend for most house improvements or expansion because both the asset and worker collateral are so weak. Not surprisingly, the discount rate in all of these cities is considerably higher than it is where formal employment and credit markets are available. Consequently, we know that this unobservable discount rate is very high in all of these cities. For lack of a better, more concrete measure we assume that this rate is the same in all these cities and on the order of 25 percent.

**Local Governance.** In terms of equation (1), local government expenditures directly affect only transportation costs. However, in general these expenditures and their associated regulations also affect the way the housing market functions through a number

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28 Both IFC and the US government are now beginning to support the development of housing finance, including work on improving Ghana’s foreclosure laws.
of other channels. For example, in addition to providing and managing roads and public transportation, local governments also provide or manage sanitation and water, and set minimum standards for plot size development as described above. To consider Accra’s overall policies in this regard it is perhaps useful to first consider how the city compares with the international experience. These data, as presented in Figure 4, suggest that Ghana’s decentralization of functions to local governments has been more in name than in substance. That is, even though Ghana started decentralizing in 1988, its local governments have very little autonomy for its level of income.

According to the measure developed by Henderson and Arzaghi (2005), Ghana’s decentralization of governance is well below the trend line as well as the observations for comparator Sub Saharan countries. Not surprisingly, in this sort of context, Accra’s ability to be a demand-responsive autonomous government is severely circumscribed. We focus on two of these limitations -- transportation costs and the provision of sanitation.

**Transport.** On the first issue, we follow the approach used by Mills and Hamilton (1984) to estimating the opportunity costs of commuting. We have data for Accra, World Bank (2005), as well as a detailed breakdown on the costs and types of the various modes and costs of commuting for the other three cities based on World Bank (2002). As a result, we are able to present stylized estimates of the costs of commuting in all of the cities. As detailed in annex 3, even with what we believe are conservative assumptions, Accra nevertheless still has the highest commuting costs. Because $\frac{d\eta}{dk} < 0$, it follows that these higher costs lower supply elasticity.

29 For our three comparator cities only Kenya has a similar decentralization measure, and as shown in the figure according to this measure it is considerably more decentralized. South Africa is right on the trend line for its income level. Uganda and Kenya are well above it, and Ghana and Mozambique are considerably below trend.
Sanitation. Another manifestation of the city’s weak public governance is its provision of sanitation services. In Accra, consistent with the minimal role of the public sector depicted in Figure 4, sanitation services have been largely turned over to the private sector. As depicted in Table 2, it is clear that these services are both very expensive -- accounting for more than 5 percent of average household income, versus less than 1 percent in the other cities -- even though their quality is of a similar level to that observed in the other cities.

In effect, privatization of sanitation services in Accra has provided local entrepreneurs with something approximating a spatial monopoly. This is the case because while people may be able to rely on distant water suppliers who are able to compete with each other to provide bottled or tanker-supplied water, for sanitation services, the facilities must be near at hand. As is the case with the services provided by all monopolists the immediate result is that services are both underprovided and priced above marginal costs, creating both efficiency losses associated with the good’s provision, and the distributional gains realized by the monopolists. Indeed, this inversion of public and private roles, causes the same level of population to have adverse effects on each others’ welfare in a given area. We ignore this effect, but in principle we could measure it by increasing φ, which in turn also results in an addition decrease in η.

House Prices. Finally, there is the matter of house prices. We use the data on net rental values from our survey data. These figures capture the notion of a specific fixed point in the respective cities because in each case the observation is from a low-income, central city neighborhood. Among other things, this variable embodies the sort of differences that could result because of regulatory differences which create difficulties in changing
the land-structure use described above -- and may be related to zoning approval problems -- as empirically documented for Accra, by Asabere, Sirmans, and Colwell (1983).

**Remittances.** Cumulatively, therefore, as shown in Table 4, Accra’s supply elasticity is much lower than the comparator cities. Its elasticity is perhaps even lower than the highly restricted markets Malpezzi and Mayo (2001) documented in Korea and Malaysia 15 years ago. Based on this result we find support for the argument raised at the outset that an increase in housing demand, as would be experienced, for example, with a sharp growth in remittances, could have a strong effect on house prices. Can we say anything more than this? Do we, in fact, find that Accra is indeed suffering from a winner’s curse? While data limitations prevent an unambiguous answer to the last question, we can also use the basic model to at least provide a quantitative perspective on how much remittances might have mattered.

For example, as a thought experiment, suppose that one-fifth of total remittances are invested in real estate in Accra, i.e., about 2.5 percent of GDP. One way of thinking about the effects of this sort of shock in terms of equation (1) would be to consider the increase as being equivalent to increasing the city’s growth rate $g$, and simulating the effects on elasticity and ultimately on house prices. One could, for instance, assume that the sort of increase identified would be similar to increasing Accra’s growth rate to about 6 percent. 30 This sort of large scale change would not only increase house prices directly, it would also reduce the city’s housing supply elasticity by an additional 20 percent, leading to further price increases.

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30 Remittances of about 2.5 percent of GDP have a similar effect on the city as does a population growth rate of 3 percent because Accra’s current population growth of 3.0 percent amounts to about 60,000 migrants per year. If their income is 50 percent higher than the average per capita income, the increase in income they add to the city is about $200 million or about 2 percent of GDP. The effects on supply elasticity were calculated by simulating equation (1) with a higher $g$ in Accra’s equation.
Thus, if remittances are anything like the level we conjecture then they are than they are certainly creating more housing and importantly, related jobs. At the same time, however, they are also causing house prices to increase significantly, and in so doing they are almost certainly contributing to slower migration to the city, and the reduced levels of productivity that attracted the remittances in the first place. Put simply, the higher level of remittances could well be contributing to its own undoing. That is, while the answer to the question of whether real estate constraints are causing remittances to result in a winner’s curse is beyond the scope of this paper, our results suggest it is a topic worthy of further analysis.

IV. Conclusions.

As has long been noted, Accra’s housing market appears to be a focal point for the investment of remittances. However, we do not know the dimensions or scale of these flows. Hence, an important first step is to develop this sort of information. Nevertheless, even without it, our results point to a policy regime that weakens Ghana’s ability to achieve the higher, more equitable rates of growth pointed to by Vision 2020 and the Noguchi Statement. Besides the effects on possible rural-urban migration, the policy-constrained housing market may also contribute to expectations of further capital gains on housing investments in Accra which could divert private investment to housing investments rather than other investments which might, for instance, help increase Ghana’s manufacturing base. In addition, by increasing the housing costs of the poor,

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31 In a general equilibrium sense the increase in housing investment, be it in higher relative prices or greater output certainly leads to more jobs and thereby indirectly increases the welfare of those who do not benefit from the price increases. However, particularly in the absence of mortgage finance, these “rents” should have much less of an effect on aggregate demand than would increased demand for inputs.

32 The first is a statement by the Government of Ghana on its economic vision for Ghana, calling for policies that will allow it to break into higher levels of growth with a “Golden Age for Business” perspective. The latter is a statement by a group of 40 Ghanaian economists who met in 2001 to discuss how Ghana might achieve macro stability, growth and poverty reduction. See Aryeetey and Kanbur (2004).
they also limit the ability of these investments to further the large gains in poverty reduction that have been realized in Accra.

The housing market outcomes we have traced through -- very high housing prices and low quality housing for the poor -- do not appear to be unusual relative to the findings for other, usually more developed economies, as discussed in Glaeser and Gyourko (2003). Nevertheless for Ghana they appear to be extreme, and to have more significant implications for the economy and the ability of policy to help generate more equitable growth. Certainly, at least some of the criticisms of Ghana’s having adopted a market orientation, such as Yeboah’s (2000), can, in many ways, be traced to the sorts of distributional implications that arise because of the way the housing market functions rather than because of the broader adjustment policies themselves.

Thus, addressing housing market constraints in Accra might be characterized by “second generation” reforms -- the sorts of reforms which would allow the beneficial effects of the on-going, broader reforms -- such as financial liberalization, decentralization, and improving land administration to realize synergies and complementarities. Conversely, in the absence of such improvements, progress on many of the broader reform initiatives will be severely hampered, again see Aryeetey et al (2005), Somevi (2001), and Antwi and Adams (2003).

For example, while improving the workings of the financial sector is essential, just improving access to formal housing finance will lower the discount rate, but without making housing supply more elastic it would largely fuel the already expensive and inelastic housing market. Similarly, because of the levels of informality of both employment and property title, it is unlikely that traditional instruments like mortgage
loans will have a significant impact on the estimated 80 percent of Accra’s labor force employed by the informal sector.

Two aspects of regulatory reform seem particularly important. First, problems with land administration and the need for improved local resource mobilization have long been noted, and could certainly be significantly improved upon. To cite just one example, large holdings of public lands characterize much of Accra, reducing the supply of this already very expensive good, and thereby increasing \( k \) and thereby lowering housing supply elasticity.

Nevertheless, in general, rapid land development in Accra has already taken place. Indeed, according to some measures this development has been too rapid, creating a far-flung city with very long commutes. In other words, while undoubtedly cumbersome, and often commented upon, land development does not appear to be any more restricted in Accra than it is in other comparable cities; the problem does not appear to be the rate of land development but rather that the form it has taken. By creating minimum standards—of plot sizes, for example—that exceed what most people can afford, the regulations have, in effect, created a very high floor price on new housing, as well as an implicit tax on those who suffer through Accra’s long commutes. Changing these land use regulations could have highly beneficial effects on both housing and commuting costs.

Second, and in our view more importantly, is the need to address the inflexibility of the city’s existing stock of housing. Throughout the world it is this always fixed capital stock that provides most housing services. But, in Accra this stock has rarely been recycled into taller buildings in correspondence with the greatly increased value of the
land and expanding city boundaries.\footnote{See the discussion in \textit{The Statesman} January 25, 2007 for a current discussion and Wheaton (2000) for an analysis of the effects that city size and congestion can have on inner city land values and the demand for high rise structures.} For the most part, there are no unambiguous legal titles to much of the existing stock of housing; hence, it is very difficult for a private investor to step in, despite the high potential for profits from redevelopment of this land. In other words, of particular importance in the case of Accra is that attention be given to making its existing housing stock more responsive to demand. Although this step was given high priority in one of the first comprehensive studies of housing policy in Ghana, UN (1956) it has not yet been realized.\footnote{The study was undertaken just prior to independence by two of the leading authorities on housing policy, Charles Abrams of Harvard and Otto Koenigsberger, the founder of London University’s Development Planning Unit, a well known think tank on urban issues in developing countries. As the Report details, the authors had many discussions with the Prime Minister, Kwame Nkrumah.}

To sum up, making Ghana’s and Accra’s real estate markets more responsive would go a long way towards improving the effectiveness of the remittances being received. It would also help improve housing conditions of the poor, make financial liberalization more productive, and reduce the city’s expanding footprint with its accompanying congestion and infrastructure demands. It would, in a word, make the broader policy environment less subject to the sorts of constraints that almost inevitably arise when an economy is reforming on so many fronts and not all of the important institutions needed to make the links across reforms are present. As Arthur Lewis (1954) suggested, when he began his inquiry into development with unlimited supplies of labor, it is exactly these sorts of constraints that increase the cost of urban infrastructure and lower the potential for economic growth.
References


World Bank (2002). *Urban mobility scoping study in three cities* (Draft Final Report), SSATP.


# Tables and figures

## Table 1. Per Capita Income, Growth and Financial Sector Depth in Selected African Countries

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>Ethiopia</td>
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<td>Ghana</td>
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<td>Sub Sahara</td>
<td>-0.1</td>
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*Source:* for columns 2 and 3 is the *African Development Indicators 2006*. The measure of financial sector development is the amount of credit supplied to the private sector as a share of credit. The per capita income figure is in purchasing power parity; it is from *The World Development Indicators, 2006*, World Bank.
Figure 1. A Spatial Mapping of Land Prices in Accra

Source: Ampofo Amerley, World Bank Urban Growth and Development Study (2007)
Table 2. Income, Housing Costs and Conditions in Selected African Cities

<table>
<thead>
<tr>
<th></th>
<th>Income per capita per month (USD PPP)</th>
<th>Expenditure on housing and services USD PPP</th>
<th>House condition rating (1-5)</th>
<th>Sanitation rating (1-5)</th>
<th>Water rating (1-5)</th>
<th>Floor area per person (m2)</th>
<th>Exp. on house as % of income</th>
<th>Exp. on housing + services as % of income</th>
<th>Exp. on sanitation as % of income</th>
<th>Exp. on water exp. as % of income</th>
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<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
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<td></td>
<td></td>
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<tr>
<td>Accra</td>
<td>*240</td>
<td>186</td>
<td>49.1</td>
<td>2.5</td>
<td>2.7</td>
<td>2.0</td>
<td>5.4</td>
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<td></td>
<td>**Mean</td>
<td>**Median</td>
<td>**13.6</td>
<td>**2.7</td>
<td>**3.2</td>
<td>**2.8</td>
<td>**6.1</td>
<td>**9.5</td>
<td>**21.9</td>
<td>**0.1</td>
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<tr>
<td>Addis Ababa, Nairobi, Dar es Salaam</td>
<td>Mean</td>
<td>Median</td>
<td>46</td>
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<td>3.0</td>
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* Difference in means statistically significant at 1 percent level
** Difference statistically significant at 5 percent level
*** Difference statistically significant at 10 percent level

Note: Ratings of 1-5 for housing, water, and sanitation are defined in Annex 1.
Table 3. Explaining Housing Rents and Prices

<table>
<thead>
<tr>
<th>Dependent variable: Household expenditure on housing and services</th>
<th>Intercept</th>
<th>Income per capita</th>
<th>HH size</th>
<th>HH size square</th>
<th>Dummy variable Ethiopia</th>
<th>Dummy variable Kenya</th>
<th>Dummy variable Tanzania</th>
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<tr>
<td>(3) Owners N=49 R square=0.36</td>
<td>Coefficient 3.04</td>
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<td>T statistic 5.72</td>
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<td>0.46</td>
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<tr>
<td>(4) Renters N=28 R square=0.63</td>
<td>Coefficient 1.04</td>
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<td>0.24</td>
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<tr>
<td></td>
<td>T statistic 1.85</td>
<td>6.14</td>
<td>1.93</td>
<td>-1.34</td>
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<td>(5) Owners N=49 R square=0.74</td>
<td>Coefficient 3.05</td>
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<td>0.03</td>
<td>-0.01</td>
<td>-1.09</td>
<td>-1.12</td>
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<td>-3.62</td>
<td>-5.18</td>
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<tr>
<td>(6) Renters N=28 R square=0.86</td>
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<td></td>
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### Table 4. Components of Housing Supply Elasticity

<table>
<thead>
<tr>
<th></th>
<th>Housing Price ratio (p)</th>
<th>Population (n)</th>
<th>Density persons/km² (q)</th>
<th>Pop. growth rate (g)</th>
<th>Transport cost USD PPP (k)</th>
<th>( \eta = \left( \frac{2}{\phi \sqrt{n}} \right) \left( 25 - g \right) p/k )</th>
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<td>0.045</td>
<td>14.38</td>
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</table>
Figure 2: Built Up Area Accra
Source: Angel et al (2005)
Figure 3: Periphery and Central City Plot Sizes in Accra

Source: Based on maps provided by the Surveyor General, Accra.
Figure 4. Decentralization and GDP

Source: Decentralization index is from Henderson and Arzaghi (2005). It is on a 0 to 4 scale with higher numbers reflecting greater decentralization. The GDP data is from World Development Indicators, 2006. Data are not available for the comparator countries of Tanzania and Ethiopia.
Annex 1. Rating of Housing and Services and Summary Statistics

**House condition (physical structure)**
1. Very poor  Unlivable - Needs to be demolished and rebuilt
2. Poor        Temporary construction, structurally deficient, needs major improvements.
3. Needs improvement  Structurally deficient/ mixed const. materials (kuccha/ pukka), but *improvable* on-site
4. Fair       Predominantly perm. construction; needs minor improvements
5. Good       Permanent construction (indoor kitchen and toilet); no need for improvements.

**Plot condition (accessibility)**
1. Very poor  Located in a hazard zone/ not upgradable (needs resettlement)
2. Poor       Only pedestrian access (no emergency access)
3. Needs improvement  Off the road, but has emergency access
4. Fair       On a secondary or tertiary unpaved road
5. Good       Has vehicular access (paved road)

**Water Access Rating**
1. Very poor  No piped water source (only well, river, spring etc)
2. Poor       Purchased from vendor or neighbors
3. Needs improvement  Shared or community standpipe
4. Fair       Own connection + purchase (due to poor water supply)
5. Good       Own connection (on plot-- indoor or outdoor)

**Sanitation Rating (Toilet)**
1. Very poor  None (use bush, beach etc.)
2. Poor       Public toilet with exp.>4% of income OR
              "Semi-flush"/unhygienic pit latrine shared by >10 HHs
3. Needs improvement  Hygienic pit on plot, shared by <10 HHs
4. Fair       Public toilet with exp.<4% of income
5. Good       Flush toilet connected to septic tank or sewer
Annex 2. Summary Statistics (from household survey data)

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Income per capita (USD PPP)</th>
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<tbody>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>median</td>
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<tr>
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<td></td>
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<td>median</td>
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<td>Nairobi</td>
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<td></td>
<td>median</td>
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<tr>
<td></td>
<td></td>
<td>renters mean</td>
<td>164</td>
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<tr>
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<td></td>
<td>median</td>
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<td>57</td>
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<tr>
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<td>owners mean</td>
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Annex 3. Estimates of the components of supply elasticity

<table>
<thead>
<tr>
<th>Value of house per unit area USD PPP, p</th>
<th>p ratio</th>
<th>Population of city, n</th>
<th>√n ratio</th>
<th>Area (km²)</th>
<th>d ratio</th>
<th>Growth rate, g</th>
<th>k ratio</th>
<th>[(2/d√n)(25-g)p]/k</th>
<th>Elasticity ratio</th>
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<td>21.02</td>
<td>0.28</td>
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<td>Ghana 4.9</td>
<td>1.00</td>
<td>1,981,000</td>
<td>1.00</td>
<td>185</td>
<td>1.00</td>
<td>0.034</td>
<td>0.22</td>
<td>87.77</td>
<td>1.00</td>
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</table>

Sources of data:

Population
- Accra: http://esa.un.org/unup/

Area
- Addis: www.ethiopar.net (Addis Ababa City Council)
- Accra: http://esa.un.org/unup/

Growth rate
- Addis: http://esa.un.org/unup/
- Accra: http://esa.un.org/unup/

Modal Split
## Transport Cost (k) by city

### ADDIS ABABA

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Average travel dist (km / trip)</th>
<th>Cost per trip (Birr)</th>
<th>Actual cost/day @ 1.9 trips (Birr / day)</th>
<th>Total distance travelled per day (km)</th>
<th>Avg travel time (min / day)</th>
<th>Opportunity cost per day</th>
<th>Total cost per day</th>
<th>Mode split (%)</th>
<th>Average cost/day (Birr)</th>
<th>Average cost per month (Birr)</th>
<th>Average cost per month (USD PPP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>9.7</td>
<td>8.2</td>
<td>15.7</td>
<td>18.4</td>
<td>55.3</td>
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<td>1.7</td>
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<tr>
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<td>1.0</td>
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<td>1.7</td>
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<tr>
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<td>0.8</td>
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Minimum wage: 120 Birr/m, 0.67 Birr/hr, 0.4 USD PPP

### ACCRA

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<tr>
<th>Mode of transport</th>
<th>Average travel dist (km / trip)</th>
<th>Cost per trip (Cedis)</th>
<th>Total distance travelled / day (km)</th>
<th>Avg travel time (hrs / day)</th>
<th>Opportunity cost per day</th>
<th>Total cost per day</th>
<th>Mode split (%)</th>
<th>Average cost/day (cedis)</th>
<th>Average cost per month (cedis)</th>
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<td>945.6</td>
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</table>

Minimum Wage: 19000 cedis/day, 2111.1 cedis/hr, 1.21 USDPPP

### NAIROBI

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<tr>
<th>Mode of transport</th>
<th>Average travel dist (km / trip)</th>
<th>Cost per trip (KSh)</th>
<th>Total distance travelled per day (Km)</th>
<th>Avg travel time (hrs / day)</th>
<th>Opportunity cost per day</th>
<th>Total cost per day</th>
<th>Mode split (%)</th>
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<th>Average cost per month (USD PPP)</th>
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Minimum Wage: 3850 KSh/m, 21.4 KSh/hr, 0.80 USD PPP

### DAR ES SALAAM

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<th>Cost per trip (TSh)</th>
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<th>Avg travel time (hrs / day)</th>
<th>Opportunity cost per day</th>
<th>Total cost per day</th>
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<th>Average cost/day (TSh)</th>
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<td>75</td>
<td>75</td>
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</table>

Minimum Wage: 30000 TSh/m, 166.7 TSh/hour, 0.3 USD PPP
Calculating the total cost of travel

Actual cost / day = Cost per trip X number of trips per day (for each mode of transport) ..............................................a

Opportunity cost / day = Travel time per day X minimum wage* ..........................................................b

* NOTE:
For car drivers: (2 X Minimum wage) X travel time
For public transport users: (1 X Minimum wage) X travel time
For walking/ bicycles: (0.5 X Minimum wage) X travel time

Daily minimum wage calculation is based on a 180-hour work month (45 working hours per week, and 4 weeks per month).

Total average cost of travel = a + b (weighted by modal split)
Average cost per month = 20 X daily cost

Assumptions

Car:
1. In calculating cost of trip, petrol cost is assumed at roughly UD$1/liter, and a mileage of 10 km/liter
2. Avg travel time calculated by assuming average speed of 20 km/hr

Public transport:
1. Avg travel time calculated by assuming average speed of 20 km/hr

Walking/ Bicycle:
1. Avg travel time calculated by assuming average speed of 4 km/hr