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ABSTRACT

This report details the design and execution of a survey technique for generating residential land price information for a large metropolitan area in the Third world. The land price database developed by the project has been analyzed to assess the effects of location, infrastructure, and tenure on residential land prices.

The purpose of the survey was to obtain price appraisals of hypothetical plots of residential land within the boundaries of the city of Jakarta. The conclusion of the analysis is that prices of informal sector plots are increasing faster than those provided by the formal sector. In order to moderate price increases and improve the accessibility of the poor to low-cost land for housing, the government should explore how the supply of informal sector-provided plots can be increase.

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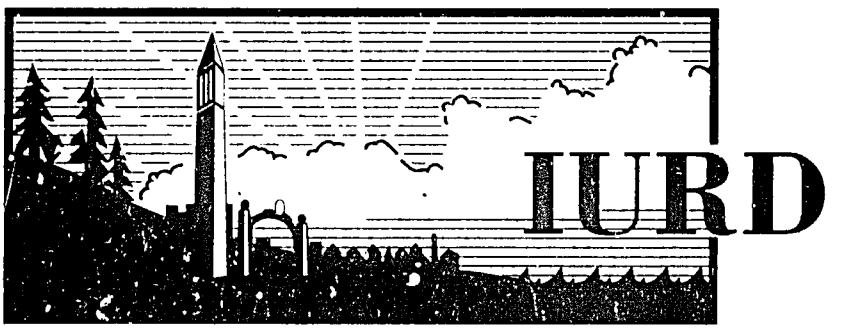
Working Paper 519



Institute of Urban and Regional Development

The Price of Land for Housing in Jakarta: An Analysis of the Effects of Location, Urban Infrastructure, and Tenure on Residential Plot Prices

David E. Dowall
&
Michael Leaf

May 1990

University of California at Berkeley

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EXECUTIVE SUMMARY

This paper reports on the design and execution of a survey technique for generating residential land price information for a large metropolitan area in the Third World. The land price database developed by the project has been analyzed to assess the effects of location, infrastructure, and tenure on residential land prices.

The purpose of the survey was to obtain price appraisals of hypothetical plots of residential land within the boundaries of the city of Jakarta (DKI Jakarta). The survey was carried out by kelurahan; a kelurahan is the lowest-level governmental division within Jakarta, and corresponds to a geographical division roughly comparable to a neighborhood (a more detailed treatment of this is given in Appendix A: "Notes on Methodology"). In all, the survey covered 128 kelurahan of the total 256 kelurahan within the city, and was carried out over a seven-week period (18 August to 6 October 1989) by five Indonesian surveyors.

The technique for arriving at average per-kelurahan land values was to interview three knowledgeable brokers with at least five years of experience and earning at least 50 percent of personal income from brokering for each of the last three years. The brokers were asked to appraise typical plots of residential land which differ by three categories of characteristics: plot size, infrastructure level, and tenure (detailed definitions of these categories are given in Appendices B and C). Each of these categories consists of three different types (three different plot sizes, three levels of infrastructure availability, and three grades of tenure claim), thereby giving a total of 27 different types of plots for each kelurahan (see the sample questionnaire in the Appendix F for a matrix of these 27 combinations). In addition, brokers were queried about land prices for 1987 and 1988 as well as current prices, giving a total of 81 possible values recorded in each kelurahan. Due to variations between local land markets and lack of knowledge not all of these 81 values are available in each kelurahan.

The median value of the three broker responses was chosen to be the representative land price for that kelurahan and entered into the database. By choosing the middle value, rather than calculating a mean of the three, we reduced the effect of "outliers," or cases where one person's response was unreasonably high or low when compared to the other two.

The results of the project clearly illustrate the applicability of the technique, and how its results can be used to support policy and investment decision-making. Our analysis of the land price data show that infrastructure and titling programs confer considerable benefits on property owners. The analysis also reveals that the price of informal-sector-provided plots are increasing faster than the price of formal sector plots.

Given the current average price of Rp. 113,721 per square meter for unserviced residential plots, the average per-square-meter benefit of infrastructure provision would be Rp. 57,429, about $32 per meter. On a per-plot basis, with plots averaging 120 square meters, the benefit of infrastructure provision would be Rp. 6,891,480, or approximately $3,786. This amount is

likely to exceed the actual per-plot cost of infrastructure provision. Thus, the increase in value is sufficient to support a cost recovery program.

The potential benefits of a land titling program that would offer titles to owners of land with tax receipts would be substantial. In the case of unserviced plots with tax-receipt-secured ownership, a clear registered title would increase the current average price per meter by Rp. 22,060. For parcels with high levels of infrastructure, the increase would be Rp. 32,554.

Based on an average size of 120 square meters, the per-plot benefit would be Rp. 2,647,200 (approximately $1,455) for plots without infrastructure. For plots with infrastructure, the per-plot benefit would be Rp. 3,906,480 (about $2,146). This benefit surely exceeds the per-plot cost of providing registered title and would justify the implementation of a cost-recovery-based program of land titling.

The final conclusion of the analysis is that prices of informal-sector plots are increasing faster than those provided by the formal sector. It is likely that the cause of the higher inflation rate is due to the strong demand for low-priced plots provided by the informal sector. In order to moderate price increases and improve the accessibility of the poor to low-cost land for housing, the government should explore how the supply of informal-sector-provided plots can be increased.

INTRODUCTION

The land market in Jakarta, like other large, fast-growing third-world cities, is terribly disorganized. In Jakarta, no one knows the shape of land prices from the city center to the suburbs. No one knows how infrastructure availability or having a clear title affects the values of residential plots.

With up-to-date and accurate land price information, governments can estimate how much money could be raised by a property tax system. With land price information, they can estimate the costs of acquiring right-of-ways for transit lines. If land price information is tabulated according to the availability of infrastructure and type of title, estimates of the potential benefits (as measured by higher land prices) of infrastructure investment schemes and land titling programs can be made, and provide the basis for recovering the costs of such programs. The private sector can benefit as well; a land price information system would be a boon to real estate appraisers, banks, and investors by providing information for rapidly assessing property values.

Despite the obvious benefits of having good land price information, no public- or private-sector agency in Jakarta is systematically tabulating land prices. There is no central recording of property transactions, and tax records are incomplete and inaccurate. To try to fill this gap, we applied an appraisal survey technique that had been previously used in Karachi [Dowall, 1989b]. The method involves asking experienced real estate brokers in neighborhoods to appraise the probable selling price of a typical residential plot. A separate appraisal is made for plots with varying levels of infrastructure and security of title. The appraisals were completed for 1989 and retrospectively for 1988 and 1987. Appendix A describes the survey method. Appendices B and C discuss how we measured the levels of infrastructure service and title and tenure. Appendix D presents the instructions given to the surveyors. Appendix E lists the neighborhoods (kelurahan) covered by the survey, and Appendix F presents the questionnaire used.

This report demonstrates the application of a low-cost research method for generating land price information. We hope that the results reported in this paper generate interest among economists and planners to apply the technique in other countries.

SURVEY METHODS

The purpose of the survey was to obtain price appraisals of hypothetical plots of residential land within the boundaries of the city of Jakarta (Daerah Khusus Ibukota, or DKI Jakarta). The survey was carried out by kelurahan; a kelurahan is the lowest-level governmental division within Jakarta, and corresponds to a geographical division roughly comparable to a neighborhood (a more detailed treatment of this is given in Appendix A: "Notes on Methodology"). In all, the survey covered 128 kelurahan of the total 256 kelurahan within the city, and was carried out over a seven-week period (18 August to 6 October 1989) by five Indonesian surveyors.

The technique for arriving at average per-kelurahan land values was to interview land brokers (market intermediaries who match buyers and sellers) and ask them to appraise hypothetical plots of land with specific characteristics.

As the occupation of land broker is not an organized trade--no trade association nor listing of brokers exists--contacts between surveyors and brokers were made through a variety of informal channels (i.e. by asking at coffee shops or through recommendations of friends) and, in some cases, by making inquiries through kelurahan government offices.

For the sake of having a consistent standard for qualifying our informants, we used a minimum for the brokers of five years of continuous involvement in the market and 50 percent of personal income derived from brokering for each of the last three years. We relaxed this minimum in a few instances (such as where a broker of long standing had been hired by the office of the Lurah to work on land development issues, hence giving up much of his personal brokering practice) where it was apparent that the broker was truly knowledgeable of local land prices.

Once three knowledgeable brokers were interviewed in a kelurahan, the middle value of the three responses was chosen to be the representative land price for that kelurahan. [In cases where we only had two values for a particular type of plot, a mean was calculated between the two values, provided that the difference between the two was no more than 20 percent. Of the 8,479 possible observations in the data base, 297 were calculated in this manner.] By choosing the middle value, rather than calculating a mean of the three, we reduced the effect of "outliers," or cases where one person's response was unreasonably high or low when compared to the other two. This method is based on the assumption that it is unlikely that more than one broker among the three will give faulty or strongly biased answers. As it was, the great majority of responses were within 20 percent of each other, indicating relatively consistent knowledge of prices among brokers.

In the interviews, brokers were asked to appraise typical plots of residential land which differ by three categories of characteristics: plot size, infrastructure level, and tenure (detailed definitions of these categories are given in Appendices B and C). Each of these categories consists of three different types (three different plot sizes, three levels of infrastructure availability, and three grades of tenure claim), thereby giving a total of 27 different types of plots for each kelurahan (see the sample questionnaire in the Appendix F for a matrix of these 27 combinations). In addition, brokers were queried about land prices for 1987 and 1988 as well as current prices, giving a total of 81 possible values recorded in each kelurahan. Due to variations between local land markets (such as the lack of large parcels in the center of the city or the unavailability of lands with the highest tenure claim in certain kelurahan on the periphery), not all of these 81 values are available in all kelurahan.

In making their appraisals, brokers were asked to consider five standard conditions for the hypothetical plots:

1. Plots are on purely residential streets.
2. Plots are located mid-block.
3. Plots are on small streets (3-5 meters in width).
4. There are no buildings existing on the plots.
5. Purchase of a plot is made in a single payment.

In a few of the kelurahan in the center of the city, it was necessary to relax the fourth of these conditions, as it is virtually impossible to find

truly empty land in those areas. In these cases, brokers based their appraisals on their knowledge of properties which were bought with buildings of negligible value which were then torn down, evidently a common occurrence in the oldest parts of the city.

At the outset of the study, we did not know whether or not it would be difficult to find brokers throughout the city who are sufficiently knowledgeable of land prices. Therefore, we began the survey on the periphery of the city, where it can be assumed that high proportions of empty land (currently or formerly agricultural) indicate markets large enough to sustain a number of brokers. As the surveyors progressed inward from the periphery, it became apparent that we could obtain reliable information within even highly built-up areas in the center of the city. Therefore, as the decisions on which kelurahan to include were ad hoc, the sample in this survey was not randomly chosen. Nonetheless, we feel that because the values we have obtained are both widely distributed and inclusive of 50 percent (128) of the total number of kelurahan in the city (256), the data is sufficient for carrying out a broad analysis of land price trends within the city.

ANALYSIS METHODS

The data collected from the survey are used in the analysis below for two basic purposes: to examine price changes over the last two years for lands with certain characteristics, and to estimate the contribution to land value (market price) of these characteristics. All price data were recalculated in constant 1989 rupiah, so as to control for the effects of general price inflation in our analysis of price trends over time. As it was determined from the analysis that distance from the center of the city is the single strongest variable for estimating land prices, a series of concentric rings was laid out about the center. Mean values of price were calculated for each of these rings.

Of the three categories of characteristics which we collected data on, plot size appeared to have a negligible effect on price when examined for the sample overall. Table analysis of plot-size categories by price showed us that prices and plot size are not statistically correlated. Therefore, no further analysis was carried out on this characteristic of land.

Two different analytical methods were employed in this study to systematically assess how land prices vary. In the first of these, average land prices were calculated according to the three types within each category (for example, a subset was made of each tenure type), so that price differences by category could be examined.

The other method for estimating values for particular characteristics of land was the use of multiple regression analysis to estimate values for the dependent variable (current land price) in terms of the proportional contribution of each of a series of independent variables (the characteristics of land). This same technique was used for constructing a land price gradient for the city, 6which relates current prices and those for the past two years to distance from the center of the city. Each of these methods--comparing means of subsetted categories and regression analysis--is discussed in greater detail in the sections below.

These analytical methods allow us to examine the interrelationships between location, urban infrastructure, and land tenure and land prices. Such an assessment can be useful to policy makers for understanding the potential economic benefits of land title registration and infrastructure improvements.

SPATIAL PATTERNS OF LAND PRICES IN JAKARTA

Typical of other large cities in market economies, the spatial pattern of land values is highest in the center of Jakarta, and prices decline with distance from the city center. In this section, prices of residential plots in both formal- and informal-sector residential areas are presented. Formal-sector-provided plots are defined as plots with both high levels of infrastructure and registered title. Informal-sector-provided plots are those with low levels of infrastructure and weak title claims. Subsequent sections will discuss in more detail the role of infrastructure and tenure in shaping land prices. Maps 1 and 2 illustrate the distribution of formal and informal median land prices by kelurahan for 1989. The prices do not reflect commercial land values located along major arterials. Table 1 presents land values for formal and informal plots by distance from the CBD for 1989. As it shows, formal sector plots are priced at about 2.2 times more than informal ones. This pattern is fairly consistent over the entire urban area, although, the ratio is higher in outlying areas.

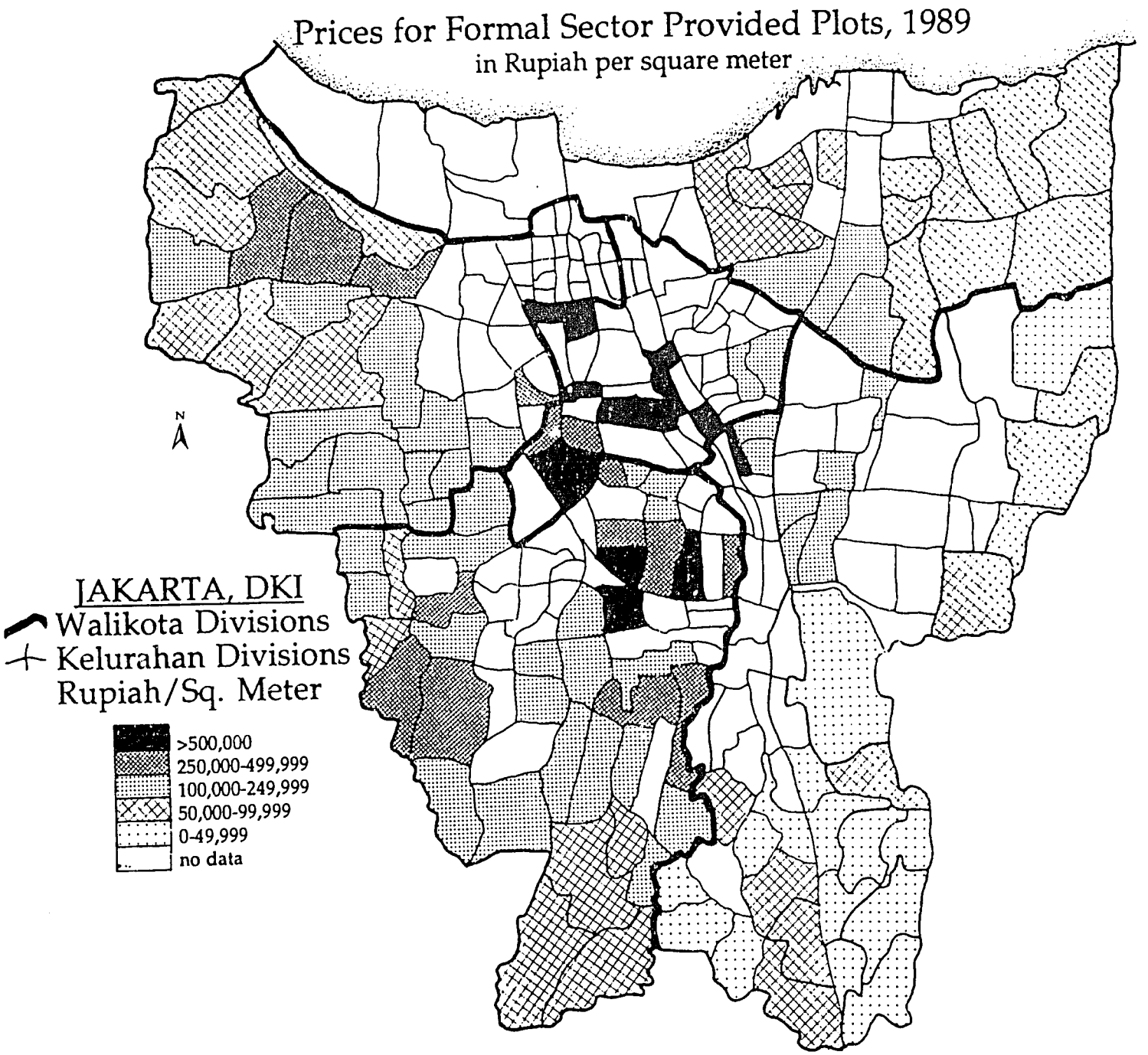
Overall (formal and informal) residential land prices in Jakarta, Karachi, and Bangkok are presented in Table 2. A comparison of the values suggests that residential land prices in Jakarta are lower than those in Karachi, where the land market is extremely constrained, but higher than in Bangkok, where the land market is very responsive to housing demand. If adjustments are made for differences in income, the Karachi case is even more severe, since at a GNP per capita of $350 (1986) it would require approximately 13 percent of per capita GNP to purchase one square meter of residential land ten kilometers from the CBD. In contrast, a similarly situated plot in Bangkok would require 4 percent (GNP per capita of $810 in 1986). In Jakarta it would require 9 percent (GNP per capita of $490 in 1986).

A systematic and precise method for assessing the relationship between land values and location is to develop a land value gradient model [Alonso, 1964]. Worldwide, researchers have found that land values decline with distance, illustrating that land users are willing to pay more for a square meter of land the closer it is to the center of the city.

In recent years, economists have attempted to determine whether these patterns apply to third-world cities. Mills, in 1972; Ingram and Carroll, in 1981; Ingram, 1982; Mohan and Villamizar, in 1982; Haddad, in 1982; Dowall, 1989a; among others, have generally found that these patterns of declining land values hold true for cities around the world regardless of their stage of development.

The best method of fitting the data to a non-linear function is to use a logarithmic function. The most widely used estimation of land value gradients is the following specification:

MAP 1


Prices for Formal Sector Provided Plots, 1989
in Rupiah per square meter
N
JAKARTA, DKI
Walikota Divisions
Kelurahan Divisions
Rupiah/Sq. Meter
>500,000
250,000-499,999
100,000-249,999
50,000-99,999
0-49,999
no data

MAP 2

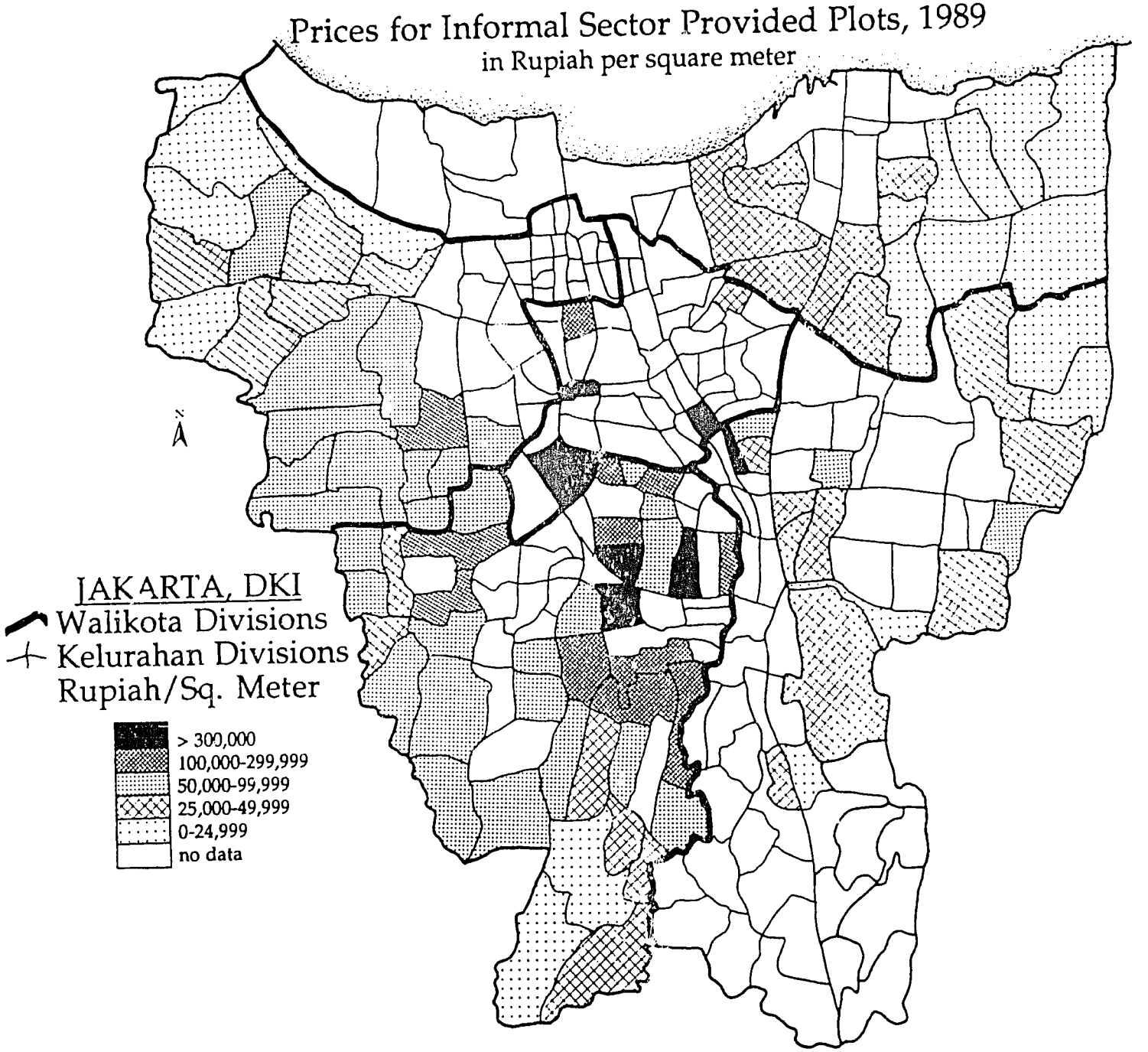

Prices for Informal Sector Provided Plots, 1989
in Rupiah per square meter
JAKARTA, DKI
Walikota Divisions
Kelurahan Divisions
Rupiah/Sq. Meter
> 300,000
100,000-299,999
50,000-99,999
25,000-49,999
0-24,999
no data

Table 1

Formal and Informal Land Prices in Jakarta
by Distance from CBD, 1989

Distance from CBD, km.	Rupiah per square meter: Formal Sector	Rupiah per square meter: Informal Sector	Ratio of Formal/ Informal
0-5.0	514,828	232,162	2.22
5.1-10.0	206,783	102,878	2.01
10.1-15.0	98,660	43,352	2.28
Over 15	48,070	18,068	2.66
Overall	199,083	92,313	2.16

Table 2

Comparison of Overall Residential Land Prices
in Jakarta, Karachi, and Bangkok
by Distance, 1986-1988

Distance from CBD, km.	Price per square meter in U.S. Dollars* Jakarta 1988	Karachi 1988	Bangkok 1986
5	$105.92	$140.22	$49.90
10	44.49	91.47	32.70
15	18.68	69.71	19.30
20	7.85	38.90	11.40

*To assure comparability, these prices are based on the results of land price gradient models developed for each city. They include both formal and informal land prices.

SOURCE: Jakarta: Dowall and Leaf, 1990; Karachi: Dowall 1989b;
Bangkok: Dowall 1989a.

$$V_x = V_0 e^{-hx}$$

where: V_x is land value at distance x kilometers from the city;
V_0 is land value at the center of the city;
e is the naperian logarithm; and
h is the land value gradient parameter to be estimated.

Table 3 presents regression estimates of the land value data for 1987 through 1989, using the results of our survey of brokers. The results of the regression models are highly statistically significant. All of the variables enter with the correct sign: the intercept value (the estimated land value at the center of the city) is positive; and the land value gradient (h) is negative, indicating that land values decline with distance from the city center. Each variable in each equation is statistically significant at the .001 level of confidence. The overall variation in land values is well-explained by distance. The R^2 values indicate that approximately 62 percent of the variation in land values is explained by distance from the CBD.

The equations show that the intercept values increases in real terms between 1987 and 1989, from Rp. 424,088 to Rp. 463,596 per square meters. This reflects higher prices for land in the center of the city. However, prices in the outlying areas have increased even faster, and as a result the gradient parameter is smaller for 1989 than for 1987. The gradient--that is, the proportional change in land value for each one-kilometer change in distance from the CBD--has decreased from -.1813 in 1987 to -.1689 in 1989.

Relative to other Asian cities, Jakarta's gradient is far steeper than those recently estimated for Bangkok and Karachi. In Bangkok, the gradient ranges from -.10 to -.12, about two-thirds the level of Jakarta. In Karachi, the gradient is less than half of Jakarta, ranging from -.07 to -.08. These differences reflect the differences of transportation accessibility and the patterns of density found in the cities. In Karachi, for example, residential plots are generally much larger than found in the other two cities, and infrastructure availability is far more important; and the deployment of infrastructure is mainly in outlying suburban estates controlled by the Karachi Development Authority.

Despite the differences in the gradient levels, all cities have experienced a pattern of "flattening out" which reflects the impact of increasing mobility and the decentralization of urban activities. The Jakarta results here closely match those reported by Ingram [1982] for cities in Columbia and Korea, and by Dowall [1989a and 1989b] for Bangkok and Karachi.

Table 4 illustrates the increase in land values estimated by the three regression models for 1987, 1988, and 1989, for distances of zero, five, ten, fifteen, and twenty miles from the center of the city. As the table shows, land prices have increased much faster on the outer edges of the city over the 1987-1989 period. For example, at the center of the city, prices (in real terms) increased by less than 5 percent per year, whereas in the area of the city between 15 and 20 kilometers, prices increased three times faster--nearly 15 percent per year. On the edge of the city, the rate of increase of parcels is four times faster than at the center. Since these estimates are in real terms, they suggest that land price inflation in suburban Jakarta is considerable.

Table 3

Regression Model Estimates of Jakarta's Residential Land Price Gradient, 1989, 1988, 1987
(Intercept Values in Real 1989 Rupiah per square meter)

Year	Intercept Value (Vo)	Land Value[b] Gradient (h)	R^2
1989	463,596* (221.5)[a]	-0.1690* (-67.4)	62.3%
1988	441,349* (214.3)	-0.1735* (-67.5)	62.3%
1987	424,088* (201.6)	-0.1813* (-66.7)	61.9%

[a] t statistics in parenthesis.
[b] The gradient value is the proportional change in land value for each one-kilometer change in distance from the CBD.
* Statistically significant at the 0.001 percent confidence level.

Table 4

Estimated Land Values for Residential Parcels, Jakarta, 1987, 1988, and 1989 (Constant Rupiah per square meter)*

Distance from CBD, km.	1987 Rp./sq.meter	1988 Rp./sq. meter	1989 Rp./sq. meter	Annual Compound Change 1987-1989
0	424,088	441,349	463,596	4.6%
5	171,320	185,363	199,220	7.8
10	69,209	77,851	85,610	11.2
15	27,959	32,697	36,789	14.7
20	11,295	13,732	15,809	18.3

* Based on regression models presented in Table 3.

HOW INFRASTRUCTURE SHAPES LAND PRICES

After accessibility, the availability of urban services is the most important determinant of residential land values. This section reports on our assessment of the effects of infrastructure availability on plot prices.

In the survey, we collected appraisal data for three different levels of infrastructure availability, designated here as High, Medium, and Low. To a certain degree, the definition of these three categories is self-evident--"High" means fully serviced, and so forth. There are, however, certain factors which are particular to the infrastructure of Jakarta, such as the heavy emphasis upon roads and accessibility. These issues, as well as detailed definitions of the three categories, may be found in Appendix B: "Notes on Infrastructure." In this section, we make comparisons across these categories so as to examine the effects on market price which result from the provision or lack of infrastructure.

The availability of infrastructure adds considerably to the value of a typical residential plot. The precise benefit of the availability will vary according to the location of the plot and the type of tenure accorded the owner. In this section, we will compare the differences in plot values for high and low infrastructure availability.

As Table 5 and Figure 1 illustrate, the effect of infrastructure is significant, adding on average 49 percent to the value of a residential plot. As the table reveals, the impact of infrastructure increases with distance from the city, so that, for plots located over 15 kilometers from the city, the increase in value approaches 90 percent. This differential effect is due to the fact that, in the closer-in areas, parcels without infrastructure are less disadvantaged than those located in more remote locations.

Tenure also has an important intervening role shaping how infrastructure affects land values. Table 6 and Figure 2 illustrate the differential effects of infrastructure by tenure type. The impact of infrastructure on plot values is less for plots with clear title, such as registered title or tax receipts, than for a weak claim. In the case of weak-claim title, the effects of infrastructure availability is nearly a 60 percent increase. The reason for this may be that infrastructure provision has an important equalizing effect, bringing land values of both registered and weak-claim-title plots closer together.

The impact of infrastructure availability on property values has varied over the past two years. As Table 7 illustrates, the percentage difference in plot values for high versus low infrastructure availability has decreased from 57 percent in 1987 to 49 percent in 1989. This convergence is difficult to explain without more precise information, but a plausible explanation may be that both massive demand for inexpensive land for both use and investment is pushing up the price of unserviced plots faster than for serviced ones, and thus prices are converging.

HOW TENURE SHAPES LAND PRICES

The third-most-important determinant of residential plot values is whether they have clear title. Clear title makes it easy to transfer land, and to use

Table 5

Impact of Infrastructure Availability on Residential Plot Prices, by Distance, 1989

Distance from CBD, km.	Rupiah per square meter: High Infrastructure	Rupiah per square meter: Low Infrastructure	Percentage Difference
0-5.0	428,457	329,407	30.1%
5.1-10.0	184,898	123,471	49.8
10.1-15.0	87,213	47,691	82.9
Over 15	43,036	22,913	87.8
Overall	169,275	113,721	48.9

PLOT PRICES BY INFRASTRUCTURE LEVEL BY DISTANCE FROM THE CBD

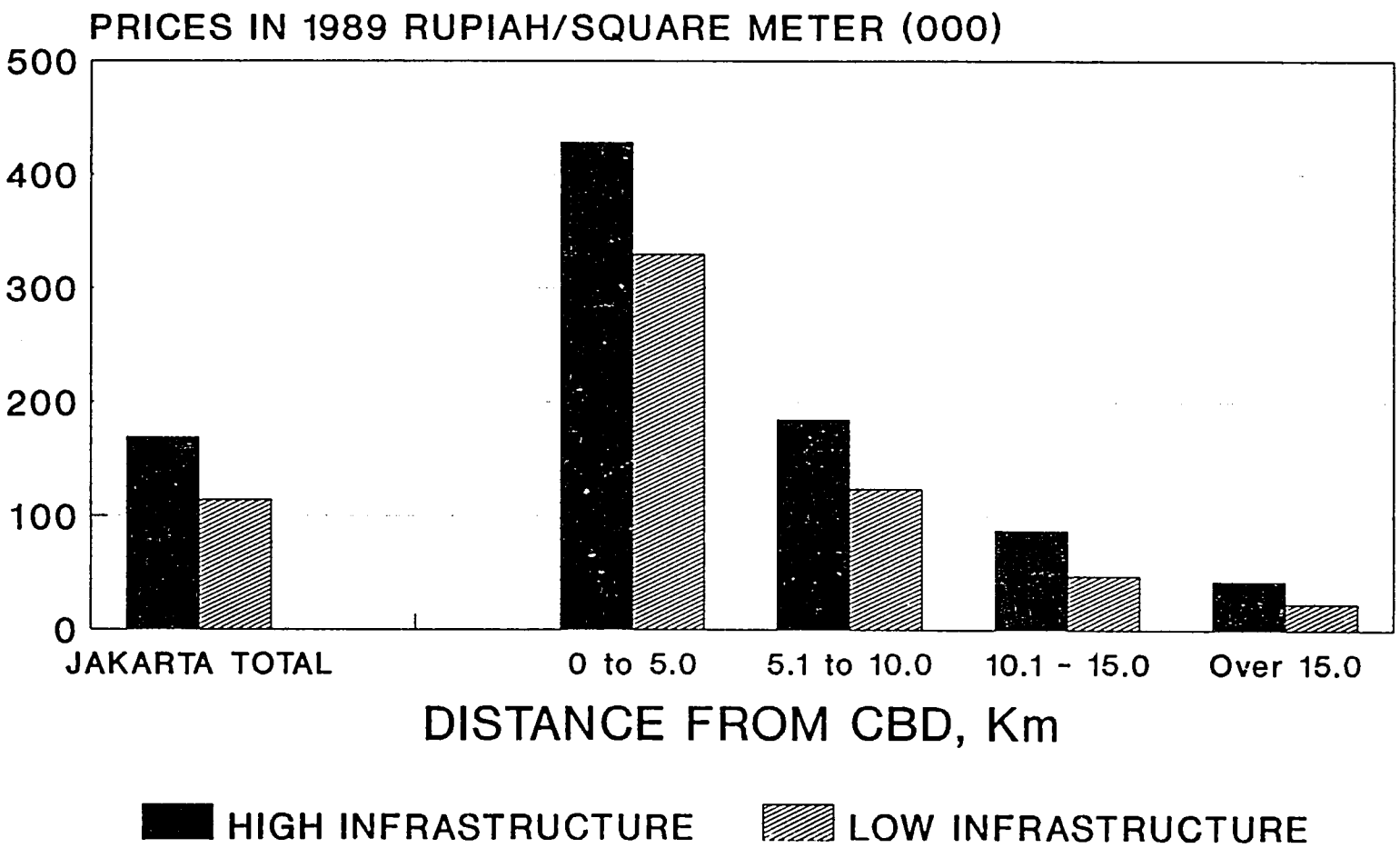


FIGURE 1

Table 6

Impact of Infrastructure Availability on Residential Plot Prices, by Type of Tenure, 1989

Type of Tenure	Rupiah per square meter: High Infrastructure	Rupiah per square meter: Low Infrastructure	Percentage Difference
Registered	199,083	139,642	42.6
Tax Receipt	157,280	106,577	47.6
Weak Claim	145,845	92,313	58.0
Overall	169,275	113,721	48.9

PLOT PRICES BY INFRASTRUCTURE LEVEL BY TYPE OF TENURE

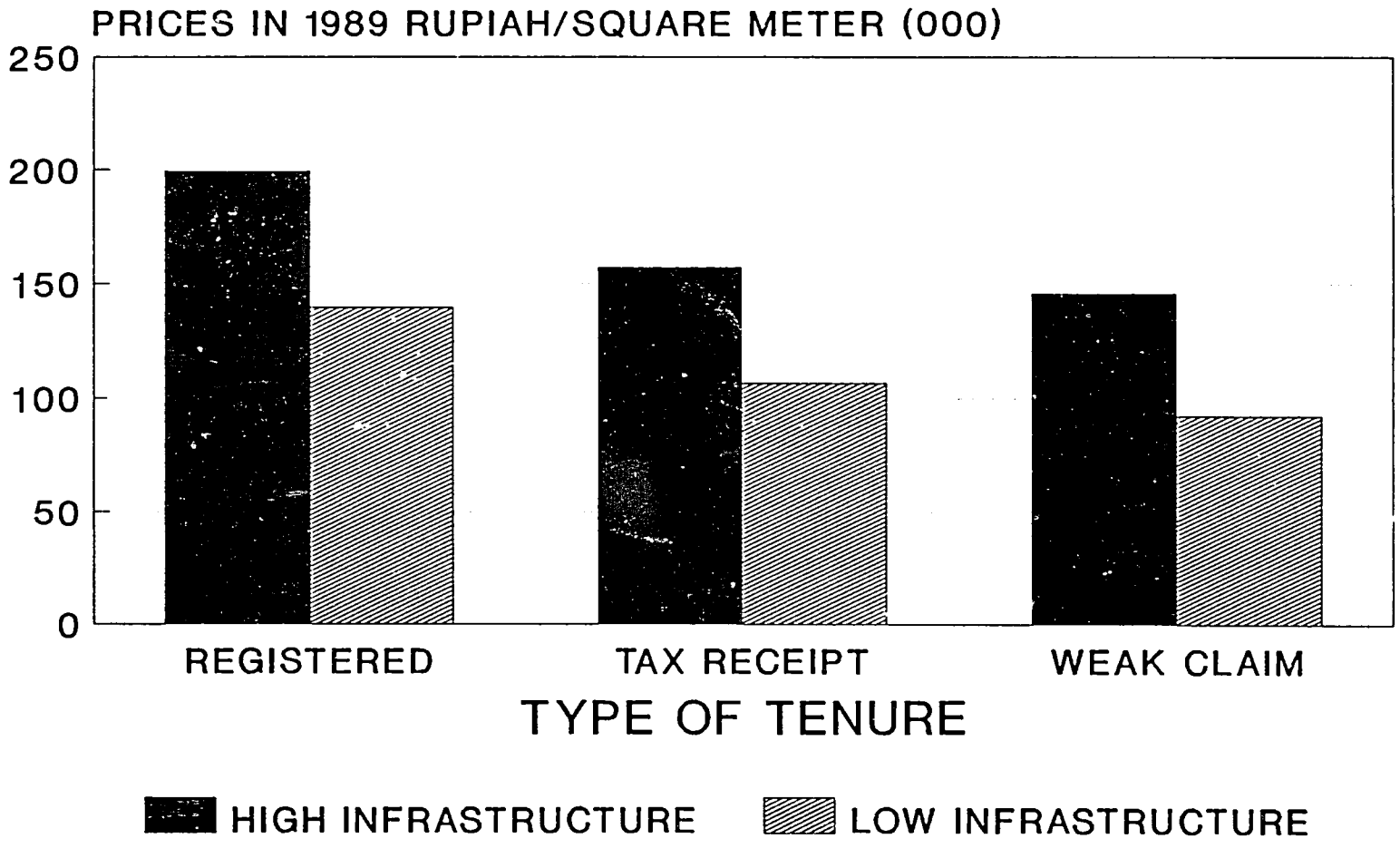


FIGURE 2

Table 7

Price Differences Between Plots with High and Low Infrastructure Availability, 1987, 1988, 1989, by Distance from CBD

Distance from CBD, km.	Ratio of High-to Low-Infrastructure-Service Plot Prices		
	1989	1988	1987
0-5	30.1%	31.6%	34.4%
5.1-10	49.8	52.8	56.0
10.1-15	82.9	99.1	110.8
15.1-20	87.7	98.0	120.4
Over 20	80.0	40.0	133.3
Overall	48.9	53.0	57.4

it for collateralizing loans. Clear title also grants more security of tenure. In Jakarta as in most other developing nations, there are a variety of types of titles or land claims.

From the array of land tenure claims which are found in the land markets of Jakarta, three were chosen as categories for our analysis. The highest or most secure category, "Registered," designates lands which are registered with the Nation Land Agency (BPN) of the Indonesian Government. The second category, "Tax Receipt," refers to lands which have tenure secured by accumulated tax receipts. The third category is designated as "Weak Claim" and is intended as a catch-all category for land claims which are less secure than "Tax Receipt." Detailed definitions of these terms are given in Appendix C: "Notes on Tenure."

More secure tenure, like infrastructure, increases the value of residential land. Overall, plots with a registered title or tax receipt are more valuable than those with only a weak claim. Registered title plots are 45 percent more valuable than those with weak claims. Plots secured by tax receipts are about 12 percent more valuable than those with only weak claims. As Table 8 and Figure 3 illustrate, the impact of more secure tenure diminishes with increasing distance from the city center.

When the level of infrastructure is incorporated into the analysis, the pattern value premiums conferred by either registered title and tax receipts remains, although it is greater for plots with low levels of infrastructure. Table 9 and Figure 4 illustrate patterns for plots with both high and low infrastructure by distance from the city center.

In the case of plots with low infrastructure availability, the impact of more secure tenure first declines, then rises with distance. This may reflect the fact that, in the unserviced periphery of the city, the greatest conflict is occurring between formal developers and small land-owners who rarely have registered claims to their land. Conflicts over land price often arise because of a policy of the Indonesian government which is referred to as "Pembebasan Hak" (Release of Land Rights). Release of Land Rights is a legal process which exists because Indonesian land law does not permit corporations to obtain the same rights to land as are held by individuals. This process is required whenever a corporation purchases land from individual land-owners. Whenever the purchase of land is for a purpose which is deemed within the public interest (and this includes housing projects built with subsidized financing from BTN, the National Savings Bank), the government intervenes to establish a purchase price (referred to as compensation). The rates of compensation determined by this process are notoriously low. Furthermore, even for projects which are not in the public interest and are therefore not tied to the compensation rates as established by the government, developers often use the official rates as a baseline for negotiating a sales price. In such cases, social pressures to accept the low rates may be very strong.

Registered parcels, being legally more secure and therefore commanding higher prices than lands with lower claims, are less attractive to developers who are attempting to minimize their land-assembly costs. The high premia associated with registered land rights at the periphery may therefore be interpreted as reflecting the high value of registered land in an environment where owners of unregistered parcels are vulnerable. It is likely that the premia

Table 8

Variation in Residential Plot Prices, According to the Type of Tenure Held, by Distance from CBD, 1989

Distance from CBD, km.	Rupiah per square meter: Registered Title	Weak Claim	Percentage Difference
0-5	462,604	274,636	68.4%
5.1-10	174,289	131,603	32.4
10.1-15	76,141	57,430	32.6
Over 15	38,299	27,506	39.2
Overall	169,051	116,444	45.2

PLOT PRICES BY TYPE OF TENURE BY DISTANCE FROM THE CBD

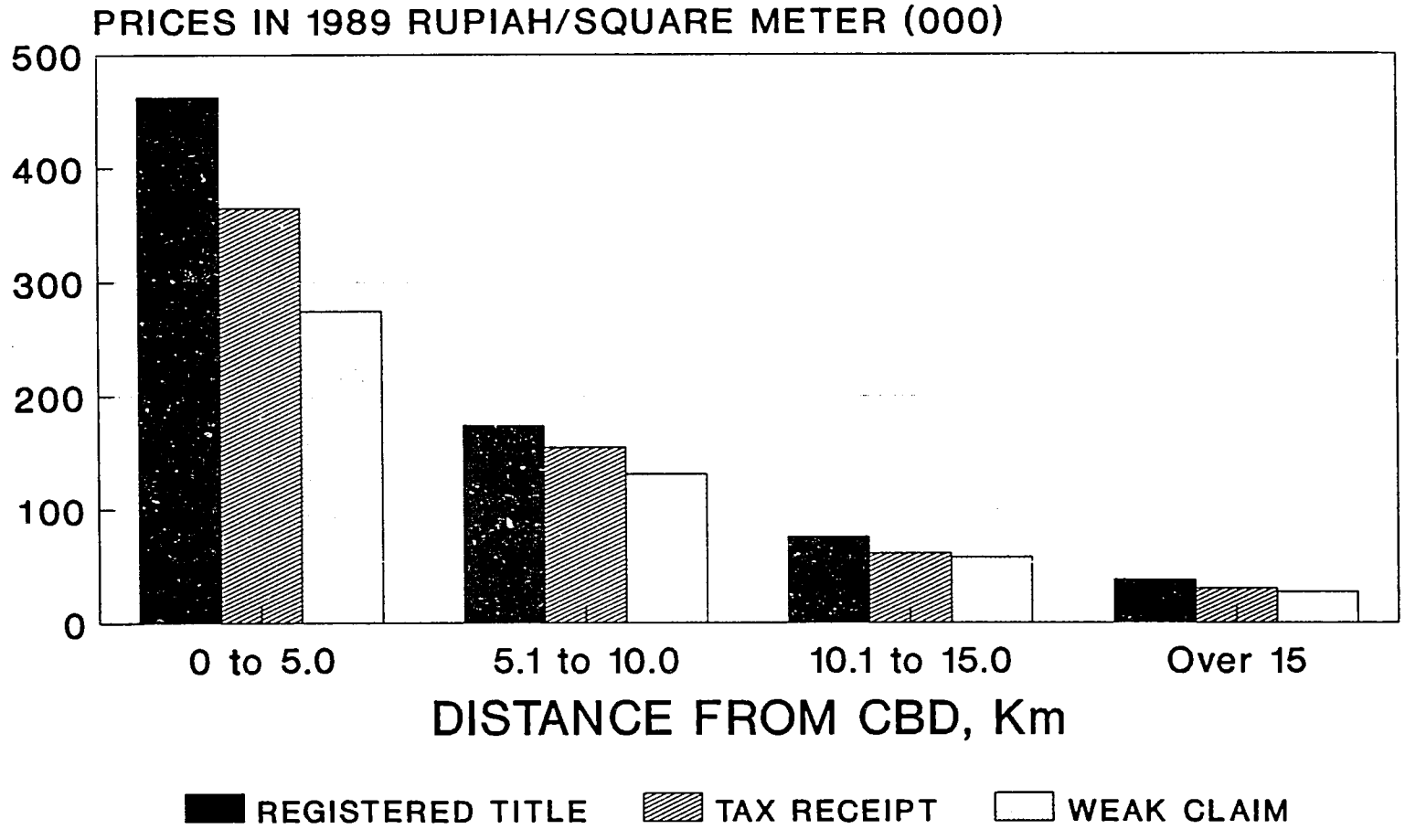


FIGURE 3

Table 9

Variation in Residential Plot Prices, According to Distance and Infrastructure Level, 1989

Distance from CBD, km.	High Infrastructure Registered Title	High Infrastructure Weak Claim	Percentage Difference	Low Infrastructure Registered Title	Low Infrastructure Weak Claim	Percentage Difference
0-5	514,828	324,662	58.6	403,702	232,162	73.9
5.1-10	206,783	160,934	28.5	143,304	102,878	39.3
10.1-15	98,660	79,185	24.6	45,338	43,352	30.0
Over 15	48,070	41,292	16.4	27,031	18,068	49.6
Overall	199,083	145,845	36.5	139,642	92,323	51.3

PLOT PRICES BY INFRASTRUCTURE BY TENURE BY DISTANCE FROM THE CBD

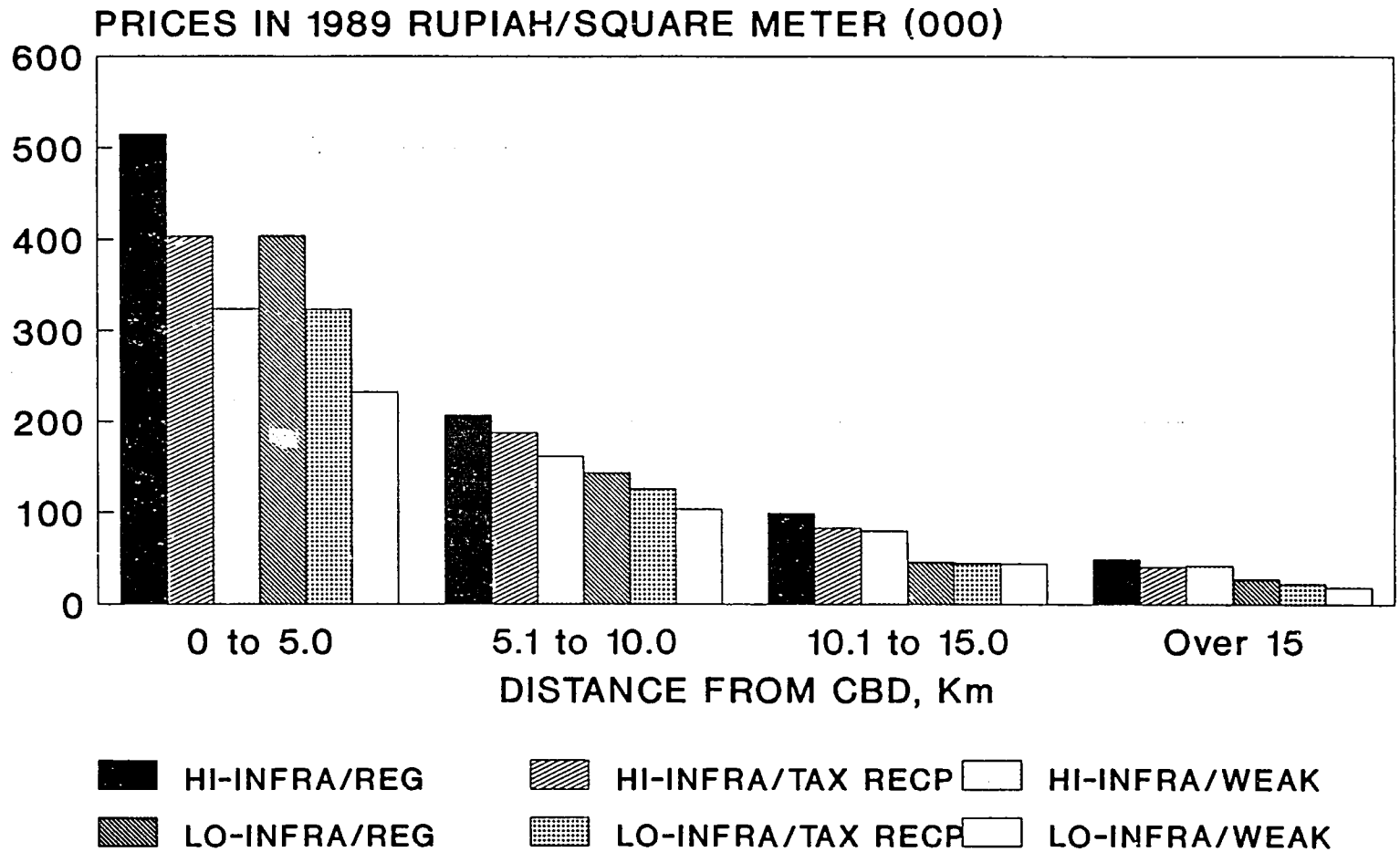


FIGURE 4

will also be higher for lower infrastructure categories, as high-infrastructure lands would probably include the few parcels which have registered rights.

Changes in tenure premia over 1987-9 indicate that the gap between plots with registered titles and those with weak claims is decreasing. As can be seen in Table 10, the price premia that result from registering plots are decreasing over time, meaning that the relative value to the land owner of registering a parcel with BPN is lower now than it was two years ago. The premium for having a registration certificate for land with a high infrastructure level, for example, was 51 percent in 1987 and only 37 percent in 1989. From the point of view of the government, which is actively trying to increase registration of residential lands, this trend in the marketplace should be taken as a potential countervailing force. If the value derived from registering a parcel of land continues to decline, there will be less incentive for land owners to undertake the registration process. However, the premium for registration still far exceeds the costs of providing title.

As with the similar decreasing land value effects of infrastructure availability over recent years, we again hypothesize that growing demand for inexpensive plots for both use and investment is pushing up prices at different rates, depending upon tenure type. The patterns of land price increases will be covered in a section below.

HEDONIC PRICE MODELS

Previous sections reporting on the relative effects of tenure and infrastructure availability on residential plot prices relied on table analysis of means. In this section, multivariate regression analysis is employed to gauge the combined effect of distance, infrastructure availability, and tenure.

The regression analysis builds on the simple land value gradient model introduced in Table 3 above. We now introduce into the regression equation three dummy variables (variables which take the values of either 0 or 1) which represent characteristics of land in the data set. Dummy variables provide estimates of value associated with the presence (dummy=1) of particular characteristics.

To gauge the impact of infrastructure and tenure on plot price, the regression model presented in Table 3 was modified to include three dummy variables. Dummy variable d1 flags those estimates that are for plots provided with high infrastructure service. Dummy variable d2 signifies value estimates for plots with registered title. Dummy variable d3 signifies value estimates for plots with tax-receipt-secured title. Following the log form of the previous equation, the current equation is estimated and presented in Table 11, for 1989, 1988, and 1987:

$$V_x = e^{c} * e^{d1} * e^{d2} * e^{d3} * e^{hx},$$

where: V_x is the estimated plot price at a distance of kilometers from the CBD in rupiah per square meter;
c is the constant;
e is the naperian logarithm;

Table 10

Price Differences Between Plots with Registered Title and Weak Claims, and High and Low Infrastructure Availability, 1987, 1988, 1989

Distance from CBD, km.	Ratio of Mean Prices of Plots with Registered Title to Those with Weak Claims					
	Plots with High Infrastructure			Plots with Low Infrastructure		
	1989	1988	1987	1989	1988	1987
0-5	53.6	71.2	77.2	73.9	90.2	99.5
5.1-10	28.5	31.9	33.2	39.3	45.4	52.7
10.1-15	24.6	28.0	29.6	30.0	54.2	59.2
Over 15	19.5	29.3	28.0	54.1	71.2	84.2
Overall	36.5	44.8	51.0	51.3	67.9	79.6

Table 11

Jakarta Land Price Models,
1987, 1988, 1989

Distance Year	Constant[a]	High Infra-structure[b]	Registered Title	Gradient	R^2
1989	368,573	1.504	1.312	-.1684	68.2%
	(217.4)	(18.8)	(12.7)	(-74.4)	
1988	326,409	1.538	1.365	-.1735	69.2
	(211.4)	(19.7)	(14.4)	(-76.0)	
1987	281,069	1.606	1.417	-.1812	69.4
	(195.14	(20.0)	(15.3)	(-75.2)	

[a] Log value converted to Rupiah.
[b] Log value converted to multiple of constant.

d1, d2, d3 are the dummy variables for plots with high infrastructure, registered title, and tax-receipt-secured tenure respectively;
h is the distance gradient coefficient; and
x is distance from the CBD in kilometers.

For all years, the regression estimates are highly significant, and all independent variables have the correct sign.

The results are quite good for such spatial models. The model explains between 69 and 70 percent of the variation in plot values for the three years. The inclusion of the dummy variables for infrastructure and tenure do not significantly alter the price gradient coefficients presented in Table 3--they are about the same.

The model estimates that the availability of complete infrastructure adds between 50 and 60 percent to the value of a residential plot, independent of location and tenure. This finding is important in that it clearly establishes the beneficial impact of infrastructure on residential property values. The measured effect is consistent to recent results of the benefits of infrastructure in Karachi. There it was estimated that the availability of services added 130 percent to the value of a residential plot. In Karachi, where desert conditions make it impossible to drill individual water wells, such a substantial impact is logical.

The impact of having registered title to a site is reflected in the estimated coefficients for dummy variable d2. Here the results suggest that having a registered title adds between 45 and 60 percent to the value of a residential plot, independent of its location or level of infrastructure. The benefit of tax-receipt-secured ownership, dummy variable d3, adds between 20 and 25 percent to the value of a typical residential plot with a weak claim.

The benefit of registered title over tax receipts is considerable, adding between 20.7 and 28.0 percent to the value of plots secured with tax receipts. This differential reflects the measure of benefits that would flow from a land titling and registration system.

These estimates of the value of more-secure tenure are roughly comparable to an estimate derived from a regression model in a previous study of Indonesian housing [Struyk, 1989]. This analysis used data collected in a household survey, and yielded premia of 35 percent between a Certificate (i.e. registered title) and a lesser title (presumably comparable to our category of "Weak Claim"). In comparing this estimate with our own, it should be kept in mind that Struyk et al. used the value of a house as their dependent variable, whereas ours is the price of land.

Overall, the regression model underscores the importance of providing infrastructure and registration. The provision of both of these services can increase a residential plot's value by 118 to 157 percent.

RECENT LAND PRICE TRENDS

It is a common conception that land prices in Jakarta have been rising at increasing rates. The assumed existence of a land price "spiral" in Jakarta is a theme which is often used by government officials and other practitioners and underlies much of the writing on urban land issues in the popular press. The idea of a spiraling increase in prices is supported by accounts of rapid percentage returns on land investment, particularly at the urban edge, and the knowledge that properties in the center city (specifically for commercial lots) are traded at prices which are orders of magnitude higher than lots at the edge of the city. The perception that urban land price increases are out of control is not unique to Jakarta, nor even to cities in developing countries.

Previous to this study, however, there has been no systematic examination of land prices and price changes within the city of Jakarta, so that until now there has been no way to check the validity of the "spiral" thesis as it may apply to the city overall. Certainly there is no lack of anecdotal information or isolated examples of drastic price changes in Jakarta.

The patterns of land price increase in Jakarta are not uniform. For example, as illustrated in Table 4, the annual rate of increase in land prices in Jakarta was four times faster on the suburban periphery than in the city center

Table 12 illustrates the variation in land price trends according to formal and informal plots and distance from the city center. As the table shows, land prices have consistently increased faster for informal-sector plots than formal sector ones (11.8 versus 23.8 percent per year increase). This pattern supports the hypothesis that Jakarta's massive low-income demand for affordable residential plots is pushing up prices faster in the informal sector than in the formal one.

As discussed in a previous section, land prices in both the formal and informal sector are increasing faster in suburban Jakarta than in the city center. Prices are increasing approximately 50 percent faster in the area beyond 15 kilometers than in the urban core.

Table 12 suggests that the prices of "informal-sector" lands are increasing faster than plots in formal-sector subdivisions. This result is consistent with the rapid increase in the size of the informal-housing sector in Jakarta over the past ten years. These strong pressures on marginal plots means that their prices are increasing faster than those in the relatively tranquil formal sector.

As a form of investment, over the past three years, informal-sector residential plots in <u>suburban</u> Jakarta would have been a better place to have put one's money than in one-month time deposits, which offered a real inflation adjusted return of 10 to 12 percent per year over the same period. Investment in fully serviced centrally located formal-sector subdivisions would not have been a good investment; they underperformed time deposits.

CONCLUSIONS AND POLICY IMPLICATIONS

This paper has reported on the application of a low-cost technique for generating residential land price data for a large third-world metropolitan

Table 12

Land Price Trends for Formal and Informal Sector Residential Plots, 1987-1989, in Constant 1989 Prices, by Distance

Distance From CBD, km	Plot Prices Rp/m^2 Formal Sector 1987	1988	1989	1987-89 Annual Compound Change	Plot Prices Rp/m^2 Low Infrastructure 1987	1988	1989	1987-89 Annual Compound Change
0-5	416,333	465,690	514,828	11.2	159,191	189,857	232,162	20.8
5.1-10	161,488	184,544	206,783	13.2	72,029	86,917	102,878	19.5
10.1-15	72,207	86,182	98,660	16.9	23,278	30,240	43,352	36.5
15.1-20	36,148	43,574	49,352	16.9	10,196	13,762	18,068	33.1
Overall	159,302	180,009	199,083	11.8	60,255	73,791	92,313	23 8

area. The fieldwork, data coding, and analysis took approximately six months and cost less than $20,000.

The results of the project clearly illustrate the applicability of the technique, and how its results can be used to support policy and investment decision-making. Our analysis of the land price data show that infrastructure and titling programs confer considerable benefits on property owners. The analysis also reveals that the price of informal-sector-provided plots are increasing faster than the price of formal-sector plots.

Given the current average price of Rp. 113,721 per square meter for unserviced residential plots, the average per square meter benefit of infrastructure provision would be Rp. 57,429, about $32 per meter. On a per-plot basis, with plots averaging 120 square meters, the benefit of infrastructure provision would be Rp. 6,891,480, or approximately $3,786. This amount is likely to exceed the actual per-plot cost of infrastructure provision. Thus, the increase in value is sufficient to support a cost recovery program.

The potential benefits of a land titling program that would offer titles to owners of land with tax receipts would be substantial. In the case of unserviced plots with tax-receipt-secured ownership, a clear registered title would increase the current average price per meter by Rp. 22,060. For parcels with high levels of infrastructure, the increase would be Rp. 32,554.

Based on an average size of 120 square meters, the per-plot benefit would be Rp. 2,647,200 (approximately $1,455) for plots without infrastructure. For plots with infrastructure, the per-plot benefit would be Rp. 3,906,480 (about $2,146). This benefit surely exceeds the per-plot cost of providing registered title and would justify the implementation of a cost-recovery-based program of land titling.

The final conclusion of the analysis is that prices of unserviced fringe plots are increasing faster than those provided by the formal sector in fully serviced subdivisions. It is likely that the cause of the higher inflation rate is due to the strong demand (for either investment or use) for low-priced plots provided by the informal sector. In order to moderate price increases and improve the accessibility of the poor to low-cost land for housing, the government should explore how the supply of informal-sector-provided plots can be increased. Guided land development is one tested method that is well-known to Jakarta's planners.

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APPENDIX A: NOTES ON METHODOLOGY

The kelurahan, a governmental unit overseen by an administrative chief or Lurah, is the lowest level of local government in Indonesia. The city of Jakarta consists of 256 kelurahan (excluding the four kelurahan of the offshore islands); these range in area from less than 30 hectares in the most densely settled parts of the city to more than 1,000 hectares on the urban periphery, and in population from roughly 3,000 to more than 60,000 persons.[1]

For studying overall trends within the residential land markets of Jakarta, we considered the kelurahan to be a sufficiently small geographical area to serve as the basis for our sample. Within each kelurahan surveyed, we sought to determine typical or average values for various types of land plots. The wide variation in sizes of kelurahan does not present a problem in this regard if one considers that the largest kelurahan are at the edge of the city, where land prices tend to be more homogeneous than in the center of the city. Nonetheless, there is generally a wide variation in land prices within any one kelurahan.[2] The particular characteristics of land which we examined in this study are intended to cover these ranges of values.

It was decided at the outset that the variables which we would collect data on in the survey were land tenure, plot size, and infrastructure, as each of these is generally considered to be an important determinant of land price. For the sake of keeping the questionnaire from becoming too cumbersome, it was decided to limit the number of levels or types for each of these variables to three or four. Initial selection and precise definitions of the categories of tenure, plot size, and infrastructure were arrived at after open-ended interviews with six land brokers in the outer districts of the city, followed by long discussions with the surveyors. The purpose of this was to determine categories which would encapsulate important aspects of the three variables as they affect market prices. Detailed definitions of the categories used for Infrastructure and Tenure are given in Appendices B and C. The Variable Plot Size was not used in the analysis.

One surprising aspect of the residential land markets in Jakarta is the general lack of a difference in land prices per square meter due to the size of plot being considered. At the outset, we chose standard sizes for our hypothetical lots to be $70m^2$, $120m^2$, and $200m^2$, representing, respectively, small, medium, and large lots as one would find in the market. In our initial discussions with land brokers, we were told repeatedly that we would not find any difference in price within this range of plot sizes. From these interviews, we determined that, in general, one would not be able to obtain a price discount unless one bought a plot of at least $1,000m^2$ in area. Therefore, for the survey, we chose $100m^2$, $1,000m^2$, and $2,000m^2$ as hypothetical sizes of plot. In using sizes as large as these, we were stepping beyond the bounds of the residential markets

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[1]Population figures are taken from the 1980 census, and land area estimates are from the DKI Jakarta Structure Plan. These data are compiled in Gardiner, Peter, "The Demography of Jakarta in the 1990's: A Review of the DKI Jakarta Structure Plan," Jakarta: Huszar, Brammah and Associates, 1989.

[2]Differences between the highest and lowest values for land per kelurahan in our sample ranged from less than 50% for the most homogeneous kelurahan to more than 400% for the most diverse.

per se, although one might argue that lots of 1,000m^2 or 2,000m^2 would eventually, if not immediately, be subdivided for resale as housing lots.

Unlike the categories for tenure and infrastructure which, when subjected to table analysis against ordinal categories of price, proved to have statistically significant distributions at the .01 level, the categories of plot size did not exhibit good distributions. Although the values for this variable were not useful for analysis, it is at least noteworthy that all of the premia associated with smaller plots have positive signs, meaning that within none of the geographical areas covered here are per-meter prices consistently higher for larger plots.

Once the variables were defined and questionnaires developed, a pretest was given, where each surveyor covered or attempted to cover one kelurahan (e.g. three qualified brokers). The pretest was undertaken not only for the sake of testing out the questionnaire and to accustom the surveyors to methods of interviewing, but for determining ways of locating brokers to interview. The proper means for locating brokers was a topic of great discussion before the pretest was undertaken, as the surveyors were of the opinion that brokers might be reluctant to participate in a survey which appeared to be "official," as the status of their profession falls into a legal gray area. From the pretest, we determined that brokers were actually quite easy to locate, as they generally keep high profiles in the communities they work within and are well-known to most residents. We had no problems with uncooperative informants; nonetheless, we avoided asking them any questions about their actual land brokering activities other than the initial qualifying questions. We did not want the brokers to feel as if their personal business activities were being scrutinized. The only significant change to the questionnaire which resulted from the pretest was a rewriting of the qualifying questions, which had previously been based on the number of transactions which the broker was involved in during the course of the year, a measure which was harder to standardize across the range of participating brokers than was the proportion of their income earned from brokering work.

The five surveyors who carried out the interviews all had prior experience administering surveys, either from working on household surveys with Jakarta's Kampung Improvement Program, or, in the case of one surveyor, through coursework and academic research in his training to become a sociologist. Nonetheless, the conversational approach to interviewing which we employed was a departure from their previous household survey work, which had generally been based on specific questions and answers. Basic instructions were given to the five surveyors in written form (Appendix D), although more thorough information was communicated through a series of meetings prior to administering the survey.

Throughout the course of the interviews (from 18 August to 6 October 1989), the surveyors worked independently of each other, dividing up the four outer districts of the city (initially excluding Central Jakarta) among themselves, with two surveyors starting out in South Jakarta, as this was the area which initially had the largest number of kelurahan to cover. After the majority of the kelurahan in South Jakarta were surveyed, one of these two surveyors concentrated on kelurahan within Central Jakarta. Although the surveyors went out singly to the field, they often made contact with well-connected brokers who would accompany them to meet other land brokers. The

surveyors were instructed to conduct interviews one broker at a time, in isolation from other brokers, so as to decrease the likelihood of biased appraisals.

The questionnaire which is included in Appendix F was developed for recording information. All of the interviewers, out of personal preference, chose not to take the questionnaire forms with them to the interviews, using notepads instead so as not to inhibit the conversational tone of the interviews nor to unintentionally intimidate their informants. After completing an interview, a surveyor would write up the results, transferring his information from notepad to recording sheet.

Initial selection of the kelurahan to be covered was made by examining a standard map of the city of Jakarta and estimating the amount of open land in each kelurahan. If more than roughly 20 percent of a kelurahan was indicated on the map as being open land, it was assumed that we would have no trouble finding informants, as most likely there would be thriving land markets. In this manner, the first 68 kelurahan were determined, primarily along the edges of the city. Our intention was to progress toward the center of the city from these kelurahan until we would not be able to find people knowledgeable about the price of empty land. Although at the outset we assumed that there would be areas which are built-up to the point where it would be difficult to find land brokers, in practice even in some of the inner-city locations there are enough dispersed empty lots for brokers to be able to make estimations. In a few of the most central kelurahan, price appraisals were based wholly or partially on informants' knowledge of prices for properties which had been sold with buildings of negligible value.

The survey eventually covered 128 kelurahan (50 percent of the total in the city, excluding four located on the offshore islands). Three categories each of three variables gave a possibility of 27 different types of plots to be appraised for each kelurahan. As brokers were asked to make appraisals for current prices as well as for each of the past two years, the total number of possible values which could be determined for each kelurahan is 81, giving a total of 10,368 price appraisals to be entered into the data set. In practice, however, approximately 18 percent of these values were unobtainable, as not all of the types of land which were examined are available in all the kelurahan.

APPENDIX B: NOTES ON INFRASTRUCTURE

The variable we are using as a measure of infrastructure availability (Infrastructure Level) is a categorization of lands which originated within the market, for it is used by land brokers themselves. From our initial interviews, it was apparent that brokers use a three-part classification, based primarily upon the distance of the plot from a main road, to indicate the marketability of a plot of land. Although the definitions of these three "classes" (the term used by brokers) of land are not precisely the same throughout the whole of Jakarta, there are enough similarities in definitions from various parts of the city that we were able to define usable categories for this survey.

Class I lands are considered in practice to be those close to a main, paved road, meaning in some parts of Jakarta less than 50m away, and elsewhere less than 100m. Definitions of Class II range from between 50m and 300m to between 100m and 500m, with the greater distances used in more outlying parts of the city. Similarly, Class III lands are those which are more than 300m or more than 500m away from a main road. We chose as standard distances for our hypothetical plots the following values: Class I refers to a plot 50m from a main road, Class II is 200m away, and Class III is more than 500m away. To further distinguish the three categories, the surveyors included the possibility of flooding and poor water quality as related conditions. These are secondary aspects of land quality that brokers also include in their working definitions of the three classes of land.

In our analysis, we took class of land quality as derived from the brokers' use of the term to be a reasonable proxy for level of infrastructure availability. Therefore, the terms used in the survey have been redefined for the analysis: "High Infrastructure Level" replaces "Class I," "Medium Infrastructure Level" replaces "Class II," and "Low Infrastructure Level" replaces "Class III." Although this variable is seemingly only a measure of accessibility of a plot, in essence it is also a general measure of the quality of infrastructure provision. Types of infrastructure other than roads, which in other contexts would affect the value of a plot of land, appear not to be important considerations in Jakarta. There are a variety of reasons for this. Electricity, for example, is already available throughout the whole of DKI Jakarta (or at least in every area covered by our survey), whereas there is no closed sewerage system anywhere (households are essentially autonomous in this regard, using either pit latrines, septic systems, or the open drainage system for disposal of wastes). Household autonomy also characterizes water use, as more than 78 percent of Jakarta households obtain their water from wells. Only 14 percent rely upon the public water supply for drinking water, an indication of the limited extent of this facility [Struyk, et al., 1989]. Jakarta is well-served by an extensive low-cost public transportation network; as access to this system is directly related to the availability of roads, the infrastructure level variable provides a reasonable measure of this.

In order to test whether the variable of Infrastructure Level is adequate as a broad measure of infrastructure provision, we also asked the brokers whether or not certain types of infrastructure or urban services would be available at the various types of hypothetical plots which we were asking about. For this question we used nine types of facilities: piped water, garbage collection, drainage, sanitation (actually a second measure of the quality of drainage), electricity, paved roads, sidewalks, neighborhood security system, and proxim-

ity to public transportation. By breaking down the answers to this question by the Infrastructure Level variable (Table A1), we were able to arrive at a more detailed understanding of this variable.

In general, each of the three values (High, Medium, and Low) represents a lower level of neighborhood services relative to the preceding level. Piped water and sidewalks stand out as the only two services which are not available at the majority of High Infrastructure Level plots, whereas electricity and security are available everywhere, irrespective of Infrastructure Level. For the Low Infrastructure Level category, the striking drop-off in the availability of transportation, paved roads, and sidewalks relative to both of the other categories is its strongest distinguishing characteristic.

The nine types of infrastructure or services were also examined in a series of regression analyses, so as to determine their relative contribution to an estimation of land price. One result of these regressions is that only three facilities--paved roads, sidewalks, and public transportation--are useful as predictors of price. Differences in the accessibility of these facilities are already contained within the Infrastructure Level variable.

Table A1

A Comparison Between Infrastructure Level and Specific Types of Infrastructure Services

Percent of Surveyed Kelurahan Where Services are Available

Infrastructure Service	Infrastructure Level		
	High	Medium	Low
Piped Water	48	44	35
Garbage Collection	96	84	66
Drainage	94	76	55
Sanitation	85	70	51
Electricity	100	100	100
Paved Roads	98	62	12
Sidewalks	30	11	3
Security System	100	100	99
Public Transport	100	88	37

APPENDIX C: NOTES ON TENURE

There are a variety of forms of land tenure claim which are used in Jakarta. In addition to the five types of primary land rights established by the Basic Agrarian Law (BAL) in 1960, there are other categories which are used in practice to distinguish lands which have yet to be registered with the National Land Agency (Badan Pertanahan Nasional or BPN). In this survey, we sought to reduce this variety of land rights to three principal categories, designated here as "Registered" (i.e. registered with BPN), "Tax Receipt" ("Girik," in Indonesian), and "Weak Claim." These categories were arrived at after initial consultations with land brokers in various parts of the city, and are intended to reflect the most significant aspects of tenure claim as they affect land price and market activities.

The distinctions between these three categories encapsulate the primary difference between the types of land claim which exist in practice; nonetheless, there was some unavoidable variation in how these categories were used in the survey. For example, "Registered" is meant to convey the idea of the most secure obtainable claim to land by individual land owners, and for most of Jakarta this means a claim of Hak Milik (right of ownership) under the BAL. In certain kelurahan in the center of the city, however, the high degree of governmental ownership of land (Tanah Negara) means that the highest available right for individuals is Hak Guna Bangunan (HGB, right of building), which in relative terms is a weaker claim of ownership than Hak Milik. This is the case in seven of the 128 kelurahan in our sample. We cannot speculate as to whether or not land prices in these areas would increase if Hak Milik were available, but since these are also the kelurahan with some of the highest prices in the city, it is reasonable to assume that differences in premia between Hak Milik and HGB would be minor relative to the price differential between registered and unregistered lands.

A method which is often used for proving continuity of tenure when applying for an official land registration certificate is the use of tax receipts. Because of this, it is common for people in Jakarta to use tax receipts as a de facto proof of ownership. Brokers even use the term "Hak Girik"--literally "Tax Receipt Right"--when speaking of lands which are secured in this manner. Our working definition of this category is that a buyer of such land would have a strong enough claim to ownership through the accumulation of land tax receipts that he may apply to register the land with BPN.

Our third and lowest tenure category, "Weak Claim," is intended as a catch-all category for a variety of tenure claims which are weaker than Tax Receipt (i.e. that proof of ownership is insufficient for directly applying for a certificate from BPN). An example of such a claim is the common case where the only proof of ownership of a property is a sales receipt between buyer and seller. The use of this category presented a problem in 17 of the kelurahan in Kecamatan Pasar Rebo (East Jakarta), where land brokers insisted that lands could not change hands without there being a claim at least as strong as Girik.

APPENDIX D: INSTRUCTIONS FOR SURVEYORS

JAKARTA LAND MARKET STUDY

29 August 1989

Michael Leaf
Soenarto

Surveyors:

Bambang Tr.
Kusnindar
Parnosudijo
Rusydi Rusli
Singgih Praptanugraha

Questions for Broker Interviews

I.) The Research Process

A.) Methodology
B.) Variables

II.) Questions and Recording Sheets

I.) The Research Process

A.) Methodology

The purpose of this research is to determine the distribution of market prices of residential land in DKI Jakarta over the past three years. The target of this research is to compile as large a distribution of market prices as possible so as to be able to undertake an analysis of prices of land which are specifically for housing development. The areas targeted for study are the locations for housing development in the newly developing parts of DKI Jakarta. These locations will be chosen from the various kelurahan of the city.

The people we will be questioning are those who have wide experience with prices, land quality, and the administration of land sales: that is, market intermediaries or brokers. Brokers usually maintain connections with each other within specific locations of their work, such as one kelurahan or more. In every kelurahan office can be found land transaction records; however, these stated prices are usually lower than the true market prices. At these offices, you may also be able to obtain a list of names and addresses of brokers from the Lurah.

Kelurahan will be selected for study based upon an examination of maps, visual surveys, and information from the people being interviewed. Criteria for the selection of kelurahan will be whether or not they show signs of recent development of housing and whether empty land may still be found for the development of settlements.

After a list of kelurahan is selected and the names of brokers are obtained for each kelurahan, the surveyor will then contact the first person on the list, and ask him the set of qualifying questions. If his answers to these questions are satisfactory (indicating that he has worked as a land broker for a sufficient length of time, etc.), he will then be asked to appraise typical land plots with certain characteristics. If the broker's responses to the qualifying questions are unsatisfactory, he will not be asked the appraisal questions, and the next broker on the list will then be contacted. This process will continue until three land brokers have been independently interviewed in that kelurahan. The process will be repeated until more than 100 kelurahan are studied.

It is important that when a land broker is questioned, he understands that the plots which he is appraising are only typical plots that he is asked to imagine, and not real plots. If the broker believes that the interviewer wants to know the price of real lots, he may assume that the interviewer is interested in buying the land, and therefore the price which the broker gives may be inflated.

There are a number of different characteristics which distinguish the types of plots which will be asked about (as discussed below). However, for the sake of minimizing the variables which may affect the price of land, we should explain to the broker who is being interviewed that all plots which are asked about share the following standard characteristics:

1. That they are located on streets which only have residential uses, and no businesses.

2. That they are located in the middle of a block and not at a more expensive corner location.

3. The street width for all plots which are asked about is assumed to be approximately three meters.

4. There are no buildings existing on the plots.

5. A plot is purchased in a single payment, and not bought on credit extended by the seller.

After three brokers have been interviewed in a particular kelurahan, the middle value of the three responses will be chosen as the representative land price for that kelurahan, rather than calculating an arithmetic mean. The reason for this is that we can assume that, in at least a few cases, one of the brokers' responses may be exceptionally high or low (i.e. outliers). By choosing the middle value of the three brokers' responses, we avoid the negative effects that such outliers have upon the data, whereas calculating an arithmetic mean would include such biases.

When more than 100 kelurahan have been surveyed, the typical prices of land may be mapped and analyzed, relative to the characteristics (the X variables, below) which we have asked about in the interviews.

B.) Variables

Values for the following variables are to be obtained from these questions:

Y = Price of land (rupiah per m^2).

X1 = Location (distance from city center--Monas). This is a variable which will be based on the list of the selected kelurahan--that is, the location (kelurahan) where the broker operates. This information will be checked in the qualifying questions. The distance will be measured from a map of the city.

X2 = Plot Size. Values chosen for plot size are:

(1) $100m^2$,
(2) $1,000m^2$,
(3) $2,000m^2$.

X3 = Land Quality. From initial interviews, it has been determined that the quality of infrastructure which is available at a particular plot is largely not a consideration in determining price. The major exception to this is the accessibility of the plot (i.e. distance to a paved road). To some extent the quality of the plot is also determined by the plot's susceptibility to flooding and the quality of water which is available on the plot. Three classes of quality are used here; these generally correspond to classes of land quality which are used by land brokers in Jakarta. The usage of these classes by the brokers is informal, and undoubtedly the precise definitions of each will not be consistent throughout the city. Nonetheless, if we base our definitions of categories on those used by the brokers, communication during the interviews will be enhanced. The categories are defined as follows:

Class I: The plot is located within 50m of a paved road, and is near other plots which have already been developed. There is a low probability of flooding and good-quality water may be obtained on the plot.

Class II: The plot is located approximately 200m from the road, and there are fewer developed plots nearby. There is a greater likelihood of flooding (although it is still low), and usable water may still be obtained on the plot.

Class III: The plot is more than 500m from the main road, and there are rarely other developed plots nearby. There is a good likelihood that the plot will flood during the rainy season, and the quality of obtainable water may be less than satisfactory. (Note: this class of quality may not apply in all of the areas which are being surveyed.)

X4 = Tenure Type. There are three categories of tenure type which will be examined here. The distinction between the three categories is the strength of the buyer's ability to claim freehold (i.e. Hak Milik) status for the land. Among the various claims to land rights which exist in Indonesia, the official recognition of Hak Milik status may be surmised to be the claim to land which has the greatest effect on the price of land. The first category is a certificate from Agraria (BPN) which gives the buyer the most secure claim of Hak Milik status. The second category is the inclusion of sufficient Girik (tax receipt) certificates in the transfer of land so as to allow a claim of

Hak Milik status to be made on the land. This is referred to here as Hak "Girik." The third category consists of all other claims to land which are weaker than Hak Milik. In brief, the categories are:

(1) Hak Milik, which is guaranteed by a Certificate from Agraria.

(2) Hak "Girik," which is sufficient to attain Hak Milik status.

(3) Less than Hak Milik status.

II.) Questions

It will be necessary for the interviewer to have a conversation with the land broker, rather than asking a series of specific questions. There are too many different types of plots, so that it would be difficult to ask for information on each one separately. Not all of the combinations will make sense to the land broker (i.e. there may be no such thing as a $100m^2$ class III lot with an Agraria certificate in that kelurahan). Furthermore, we are asking for an appraisal of land value, and not an opinion; the answers that the land brokers give must be based upon knowledge derived from experience. Do not press the broker for an answer which you or they do not feel sure of. It is acceptable for squares on the recording sheet to be filled in with "Doesn't Know."

(An example of a conversational approach to getting at the information:) Since you are familiar with the prices of plots in (name of area of study), you are a good person to ask about the prices of certain types of plots for building houses on. If a typical buyer, one without connections such as family ties, came to a land seller in this area and wanted to buy a $100m^2$ plot of empty land, with a class III quality of land (give definition of quality classes as explained above), how much would he be expected to pay if he was not able to make a claim of Hak Milik? ... How much would he pay if he received sufficient "Girik" to make a claim of Hak Milik status? ... Or an Agraria certificate guaranteeing Hak Milik? ... How much would this same plot of land be worth if it had class II quality, but the buyer was not able to claim Hak Milik status? ... (This line of questioning would be repeated for each plot size, and then for each of the past two years [1988 and 1987].) The broker would then be asked about other kelurahan which he had said he had experience in.

APPENDIX E: LIST OF KELURAHAN SURVEYED

Jakarta Land Price Survey

Central Jakarta

Kecamatan	Kelurahan	Reference #
CEMPAKA PUTIH	CEMPAKA PUTIH BARAT	I-4-03
	CEMPAKA PUTIH TIMUR	I-4-02
GAMBIR	DURI PULO	I-7-06
	PETOJO UTARA	I-7-02
KEMAYORAN	SERDANG	I-5-04
MENTENG	CIKINI	I-2-03
	GONDANGDIA	I-2-04
SENEN	KWITANG	I-3-04
	PASEBAN	I-3-02
	SENEN	I-3-05
TANAH ABANG	BENDUNGAN HILIR	I-1-03
	KEBON MELATI	I-1-05
	KAMPUNG BALI	I-1-07
	KARET TENGSIN	I-1-02
	PETAMBURAN	I-1-04

North Jakarta

Kecamatan	Kelurahan	Reference #
CILINCING	CILINCING	II-5-04
	MARUNDA	II-5-03
	ROROTAN	II-5-02
	SEMPER BARAT	II-5-05
	SEMPER TIMUR	II-5-06
	SUKAPURA	II-5-01
KOJA	KELAPA GADING BARAT	II-3-01
	KELAPA GADING TIMUR	II-3-02
	PEGANGSAAN II	II-3-03
	TUGU SELATAN	II-3-04
	TUGU UTARA	II-3-05
TANJUNG PRIOK	KEBON BAWANG	II-2-06
	PEPANGGO	II-2-04
	SUNTER AGUNG	II-2-01
	SUNTER JAYA	II-2-02
	WARAKAS	II-2-03

East Jakarta

Kecamatan	Kelurahan	Reference #
CAKUNG	CAKUNG BARAT	V-6-06
	CAKUNG TIMUR	V-6-07
	PULO GEBANG	V-6-04
	UJUNG MENTENG	V-6-05
JATINEGARA	CIPINANG BESAR SELATAN	V-3-08
	CIPINANG BESAR UTARA	V-3-07
	CIPINANG MUARA	V-3-06
	PONDOK KELAPA	V-3-12
	PONDOK KOPI	V-3-15
KRAMAT JATI	CIPINANG MELAYU	V-2-12
	DUKUH	V-2-02
	HALIM PERDANA KUSUMA	V-2-11
	PINANG RANTI	V-2-03
MATRAMAN	KAYU MANIS	V-4-04
	UTAN KAYU SELATAN	V-4-03
	UTAN KAYU UTARA	V-4-02
PASAR REBO	BAMBU APUS	V-1-13
	BARU	V-1-08
	CEGER	V-1-15
	CIBUBUR	V-1-01
	CILANGKAP	V-1-03
	CIPAYUNG	V-1-11
	CIRACAS	V-1-10
	KALI SARI	V-1-07
	KAMPUNG GEDONG	V-1-18
	KELAPA DUA WETAN	V-1-05
	LUBANG BUAYA	V-1-14
	MUNJUL	V-1-04
	PEKAYON	V-1-06
	PONDOK RANGGON	V-1-02
	RAMBUTAN	V-1-16
	SETU	V-1-12
	SUSUKAN	V-1-17
PULO GADUNG	CIPINANG	V-5-02

South Jakarta

Kecamatan	Kelurahan	Reference #
CILANDAK	CIPETE SELATAN	IV-7-05
	LEBAK BULUS	IV-7-01
	PONDOK LABU	IV-7-02
KEBAYORAN BARU	CIPETE UTARA	IV-4-02
KEBAYORAN LAMA	BINTARO	IV-1-01
	GROGOL SELATAN	IV-1-10
	GROGOL UTARA	IV-1-11
	KEBAYORAN LAMA SELATAN	IV-1-04
	KEBAYORAN LAMA UTARA	IV-1-03
	PESANGGRAHAN	IV-1-05
	PETUKANGAN SELATAN	IV-1-06
	PETUKANGAN UTARA	IV-1-07
	PONDOK PINANG	IV-1-02
	ULU JAMI	IV-1-08
MAMPANG PRAPATAN	BANGKA	IV-3-01
	DUREN TIGA	IV-3-04
	KALI BATA	IV-3-02
	MAMPANG PRAPATAN	IV-3-10
	PELA MAMPANG	IV-3-09
	TEGAL PARANG	IV-3-08
PASAR MINGGU	CIGANJUR	IV-2-01
	CILANDAK TIMUR	IV-2-10
	JAGAKARSA	IV-2-03
	JATI PADANG	IV-2-08
	KEBAGUSAN	IV-2-07
	LENTENG AGUNG	IV-2-04
	PEJATEN BARAT	IV-2-11
	PEJATEN TIMUR	IV-2-12
	RAGUNAN	IV-2-09
	SRENGSENG SAWAH	IV-2-02
	TANJUNG BARAT	IV-2-05
SETIA BUDI	GUNTUR	IV-5-07
	KARET KUNINGAN	IV-5-03
	KUNINGAN TIMUR	IV-5-02
	MENTENG ATAS	IV-5-05
	PASAR MANGGIS	IV-5-06
	SETIA BUDI	IV-5-08
TEBET	KEBON BARU	IV-6-04
	MENTENG DALAM	IV-6-01
	TEBET BARAT	IV-6-02

West Jakarta

Kecamatan	Kelurahan	Reference #
CENGKARENG	CENGKARENG BARAT	III-2-07
	CENGKARENG TIMUR	III-2-06
	DURI KOSAMBI	III-2-02
	KALI DERES	III-2-08
	KAMAL	III-2-11
	KAPUK	III-2-05
	KEDAUNG KALI ANGKE	III-2-04
	PEGADUNGAN	III-2-09
	RAWA BUAYA	III-2-03
	SEMANAN	III-2-01
	TEGAL ALUR	III-2-10
GROGOL PETAMBURAN	KOTA BAMBU	III-3-04
	PAL MERAH	III-3-01
KEBON JERUK	JOGLO	III-1-01
	KEBON JERUK	III-1-08
	KEDOYA	III-1-10
	KELAPA DUA	III-1-04
	KEMBANGAN	III-1-11
	MARUYA ILIR	III-1-07
	MARUYA UDIK	III-1-06
	SRENGSENG	III-1-05
	SUKABUMI ILIR	III-1-03
	SUKABUMI UDIK	III-1-02

APPENDIX F: QUESTIONNAIRE

Qualifying Questions (concerning Broker's experience)

Interview Date _____ Name of Interviewer _____

Number _____ Name of Kecamatan _____

	Y	N
1. How long have you worked as a land broker? -- More than five years? ----------	☐	☐
2. Approximately what percentage of your income was derived from your work as a broker within Jakarta between July 1988 and July 1989? -- More than 50%? ----------	☐	☐
3. Approximately what percentage of your income was derived from your work as a broker within Jakarta between July 1987 and July 1988? -- More than 50%? ----------	☐	☐
4. Approximately what percentage of your income was derived from your work as a broker within Jakarta between July 1986 and July 1987? -- More than 50%? ----------	☐	☐
5. Are the majority of the lands you deal with used for building houses or for other uses? -- Majority for building houses? ----------	☐	☐
6. Are the majority of lands you deal with empty land or plots with buildings or houses? What percentage of the land sales you have been involved with are truly empty land? -- More than 50% ----------	☐	☐

Interviewer: If all the questions were answered "Yes", proceed with the interview. If there was a question which was answered "No", do not continue the interview.

Questions for ascertaining the locations of brokers operations

Interview Date _____ Name of Interviewer _____

Number _____ Name of Kecamatan _____

---

1. In which kelurahan in Jakarta did you work as a land broker between July 1988 and July 1989? Please list on the spaces below.

Kelurahan _____

_____

_____

_____

_____

2. In which kelurahan in Jakarta did you work as a land broker between July 1987 and July 1988? Please list on the spaces below.

Kelurahan _____

_____

_____

_____

_____

3. In which kelurahan in Jakarta did you work as a land broker between July 1986 and July 1987? Please list on the spaces below.

Kelurahan _____

_____

_____

_____

_____

Interviewer: Proceed with a set of appraisal questions for each kelurahan which is listed for all three years.

Interview Date _____ Name of Interviewer _____

Number _____ Name of Kecamatan _____

Name of Kelurahan _____

PLOT SIZE 100 m2 PRICE: x Rp. 1000

1989

	Land Quality		
Tenure (land right)	Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

1988

	Land Quality		
Tenure (land right)	Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

1987

	Land Quality		
Tenure (land right)	Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

Interview Date _____ Name of Interviewer _____

Number _____ Name of Kecamatan _____

Name of Kelurahan _____

PLOT SIZE 1000 m2 PRICE: x Rp. 1000

1989

Tenure (land right)	Land Quality Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

1988

Tenure (land right)	Land Quality Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

1987

Tenure (land right)	Land Quality Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

Interview Date _____ Name of Interviewer _____

Number _____ Name of Kecamatan _____

Name of Kelurahan _____

PLOT SIZE **2000** m2 PRICE: x Rp. 1000

1989

	Land Quality		
Tenure (land right)	Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

1988

	Land Quality		
Tenure (land right)	Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

1987

	Land Quality		
Tenure (land right)	Class I	Class II	Class III
Agraria Certificate			
Girik Receipts			
Weak Claim			

Interview Date _____ Name of Interviewer _____

Number _____ Name of Kecamatan _____

Name of Kelurahan _____

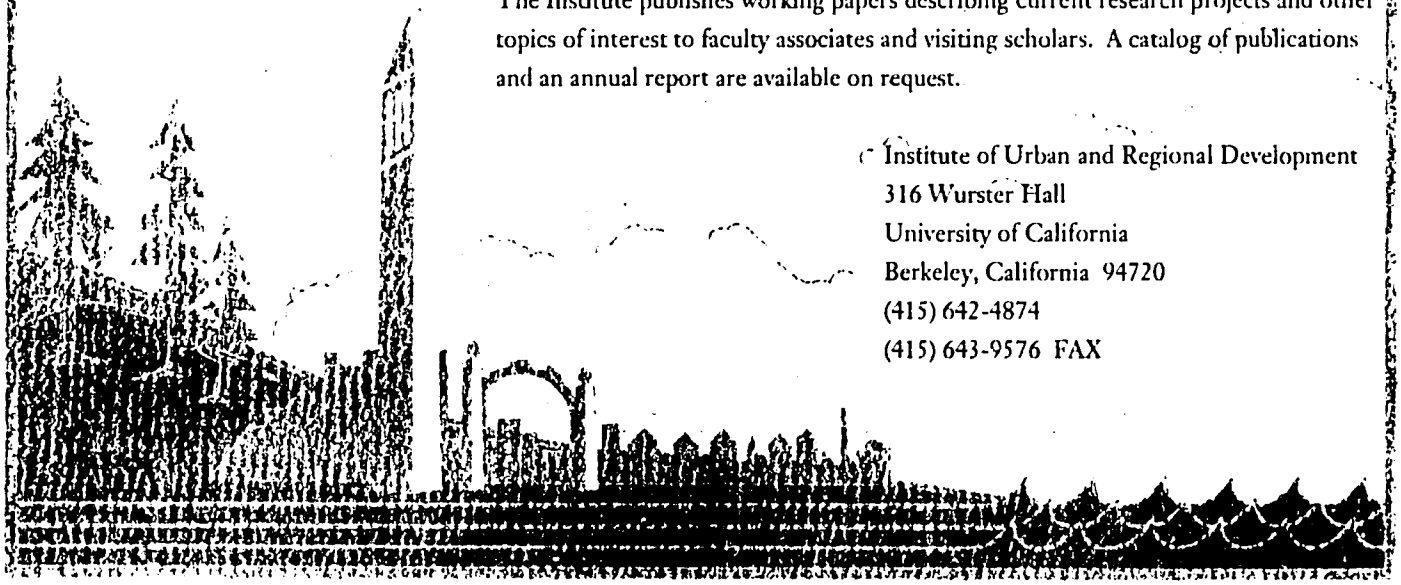
I would like to ask you about the types of infrastructure and facilities which are available at the location of these plots of land.

Type of Facility	Land Quality	Y	N
1. Piped water (Public supply)	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
2. Organized garbage collection	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
3. Sanitation	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
4. Electricity	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
5. Paved roads	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
6. Sidewalks	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
7. Sufficient drainage	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
8. Neighborhood security system	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐
9. Nearby public transportation	Class I	☐	☐
	Class II	☐	☐
	Class III	☐	☐

The Institute of Urban and Regional Development (IURD) serves faculty and students of the University of California at Berkeley, conducting research into processes of urban and regional growth and decline, and effects of governing policies on patterns of development. Institute research is supported by federal, state, and local government agencies and by private foundations. Current research is directed to regulation of urban growth and land use, here and in the Third World; social and economic factors shaping urban life; impacts of changing economic trends, including the emerging biotech industry; evolving patterns of suburbanization and central area reconstruction; housing policies (local, statewide, national, and international); transportation alternatives; and improvements in methods of analysis, evaluation, and planning.

The Institute maintains Berkeley's Environmental Simulation Laboratory (ESL), where potential effects of major urban development projects are assessed using small-scale, three-dimensional models to project environmental impacts of various development scenarios. Research into international economic policy issues takes place at the Berkeley Roundtable on the International Economy (BRIE). The University-Oakland Metropolitan Forum brings together local community and business leaders in a partnership with the University to improve the quality of life in the East Bay region of Northern California.

The Institute publishes working papers describing current research projects and other topics of interest to faculty associates and visiting scholars. A catalog of publications and an annual report are available on request.



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