The Price and Quantity of Land by Legal Form of Organization in the United States*

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Abstract: I develop estimates of the value, price and quantity of land owned by each of the major legal forms of organization in the United States. "Land" stands for all aspects of a developed property (location, amenities, option value, etc.) such that the market value of the property is worth more than the replacement cost of the structures. The estimates I produce are necessary ingredients in the production of a fully integrated set of economic accounts for the United States as described by Jorgenson and Landefeld (2006). The estimates also contribute to our understanding of the behavior of the aggregate price of land. A key result of this paper is that the price of land in residential use historically has very different historical patterns than the price of land in commercial use.

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1 Introduction

While the topic of "land" has been central in the field of urban economics for quite some time, the role of land as an input into production of non-farm goods and services has, until recently, been largely ignored by macroeconomists. The recent housing boom and subsequent bust in housing prices and production has brought a renewed interest about the aggregate relationships of land, housing, and production. Research by Davis and Heathcote (2005) and Iacoviello and Neri (2008) suggest that land plays an important role in accounting for aggregate fluctuations in house prices and residential investment. Kiyotaki et. al. (2007) show that the value of land may play an important role in the redistribution of wealth that can occur in response to productivity shocks.[1] And, a recent set of papers have evaluated the role of housing (and, by extension, land) in the pricing of all assets. These papers document that a relative shortage and/or an abundance of housing can significantly impact the returns on all assets.[2]

A second literature has emerged in parallel that documents trends and cycles to the aggregate price of land in non-farm use. Measurement of trends and changes to the price of land in the aggregate was a topic of some importance in the early days of the construction of the National Income and Product Accounts.[3] However, papers on this topic disappeared for about 40 years:

[1]Davis and Heathcote (2005) show that the presence of land in the production of housing helps to explain the relative volatility of residential investment and house prices. Iacoviello and Neri (2008) include land as a factor of housing production to quantify the contribution of shocks to monetary policy to fluctuations in house prices. Other papers that study macroeconomic fluctuations with a model where land plays an intrinsic role are Chakraborty (2008) and Iacoviello (2005).

[2]See Chu (2008), Davis and Martin (2008), Lustig and Van Nieuwerburgh (2006), and Piazzesi et. al. (2007) for example.

[3]For example, see Goldsmith (1955, 1962), Grebler et. al. (1956), Hoyt (1933), Keller (1939), Kuznets (1946), Whitten and Adams (1931), Wickens (1941), and Winnick (1953). The appendix of Davis and Heathcote (2007) summarizes the contributions (with respect to land) of each of these papers.

Prior to the papers of Barker (2007), Barker and Sa-Aadu (2004), Case (2007), Davis and Heathcote (2007), and Davis and Palumbo (2007), the last paper published on measurement of the price of land in the aggregate was by Manvel in 1968.[4]

Accurate measures of the price of land in the aggregate are important for two distinct but related reasons. First, macroeconomic models of aggregate fluctuations that include land as a factor of production make predictions about the equilibrium path for the price of land. The price of land moves about in these models in response to exogenous productivity and monetary shocks. Thus, the model's full set of predictions can not be tested without data on the price of land. Second, an effort is underway by researchers to produce a fully integrated and internally consistent set of economic accounts for the United States, as documented by Jorgenson and Landefeld (2006). In the revised and expanded accounts, data on the price and quantity of non-produced but valued inputs, such as land, are necessary to fully reconcile the value of the reproducible capital stock – as measured by the Bureau of Economic Analysis (BEA) in its Fixed Asset accounts – with wealth, as measured by the Federal Reserve Board in its Flow of Funds Accounts (FFA). In the FFA, wealth includes the value of all assets, reproducible and non-reproducible.

With this in mind, in this paper I estimate the price and quantity of land in the aggregate, but organized by legal form of organization. That is, in this paper I construct estimates of the price and quantity of land in the following four non-farm sectors: Households and non-profits, non-corporate business, non-financial corporate business, and financial corporate business. These prices and quantities are required for the expanded economic accounts of the United States, as envisioned by Jorgenson and Landefeld.

[4]See the appendix to Davis and Heathcote (2007) for a description of the Manvel paper.

2 Data and Methods

Two primary data sources are used to measure the value, price, and quantity of land: The Flow of Funds Accounts of the United States (FFA), published by the Federal Reserve Board of Governors, and the "Fixed Asset Tables," published by the Bureau of Economic Analysis (BEA) at the U.S. Department of Commerce.[5]

The appendix describes the specific calculations made in each sector in more detail, but generally speaking the following procedure is used to measure the value, price, and quantity of land in each of the following sectors: Households and Nonprofits, Nonfarm Noncorporate Business ("noncorporate"), and Nonfarm Nonfinancial Corporate Business ("nonfinancial corporate"). First, information in the balance sheet tables of the FFA (B.100, B.102, B.103) is used to measure the value of land. The FFA publishes quarterly end-of-period estimates of the market value of real estate (inclusive of land and structures) and on the replacement cost of structures. As in Barker (2007), Case (2007) and Davis and Heathcote, it is assumed that the market value of land in sector i at time t, $p^l_{t,i}\ l_{t,i}$, is equal to the market value of real estate, $p^r_{t,i}\ r_{t,i}$, less the replacement cost of structures, $p^s_{t,i}\ s_{t,i}$. In other words:

$$p^r_{t,i}\ r_{t,i} \;=\; p^l_{t,i}\ l_{t,i} \;+\; p^s_{t,i}\ s_{t,i} \qquad (1)$$

$$\rightarrow\ p^l_{t,i}\ l_{t,i} \;=\; p^r_{t,i}\ r_{t,i} \;-\; p^s_{t,i}\ s_{t,i}\ . \qquad (2)$$

The p variables stand for price-per-unit, i.e. $p^r_{t,i}$ is the price per unit of real estate in sector i as of time t. The other variables are quantities, for example $r_{t,i}$ is the quantity of real estate in sector i as of time t. All variables are end-of-period estimates.

[5]The main web page for the FFA accounts is *http://www.federalreserve.gov/releases/z1/* and the main web page for the Fixed Asset Tables of the BEA is *http://www.bea.gov/national/FA2004/index.asp*.

As an example of these calculations, Figure 1 shows a screen shot of the first 13 and last 10 lines of the coded version of Table B.100 from the FFA, "Balance Sheet of Households and Nonprofit Organizations." The market value of real estate owned by households and nonprofit organizations is reported on line 3 and the replacement cost of structures owned by households and nonprofit organizations can be computed as the sum of lines 43 (residential) and 47 (nonresidential). According to the data in this figure, the market value of land owned by households and nonprofit organizations as of December 31, 2007 was $6.9 trillion, equal to the market value of real estate ($22.8 trillion) less the replacement cost of structures ($16.0 trillion).

For the next step in each sector, capital gains held to real estate, structures, and land are computed. Capital gains earned to real estate are available in the Net Worth Tables in the FFA (R.100, R.102, R.103).[6] Figure 2 shows FFA table R.100 in its entirety: According to this table, the reported capital gain to real estate held throughout 2007 in the household and non-profit sector is $-1,456 billion. Denote the capital gains to real estate earned in period t in sector i as $\Delta p^r_{t,i}\ r_{t-1,i}$.

To estimate capital gains on the replacement cost of structures – that is, changes in the replacement cost of structures due to the changes in the cost of rebuilding those structures – a price index for structures is computed using data from tables 4.1, 4.2, 5.1, and 5.2 of the BEA Fixed Asset Tables. Tables 4.1 (nonresidential) and 5.1 (residential) report current costs and Tables 4.2 and 5.2 report quantity indexes. Price indexes are constructed by dividing the current costs by the quantity indexes.[7] The capital gains accruing to structures in period t, $\Delta p^s_{t,i} s_{t-1,i}$, are estimated as growth of the price index for structures from period $t-1$ to period t multiplied by the lagged

[6]The capital gains discussed in this section and throughout this paper are not realized gains for income-tax purposes, but are the result of mark-to-market accounting based on current prices.

[7]The data in the Fixed Asset Tables are annual estimates. I convert to quarterly using quarterly price indexes available in Table 5.3.4 of the National Income and Product Accounts (NIPA). See the appendix for details.

value of the replacement cost of structures, as reported in the Balance Sheet Tables of the FFA:

$$\Delta p^s_{t,i}\ s_{t-1,i} \quad = \quad \left(\frac{p^s_{t,i}}{p^s_{t-1,i}} \ - \ 1 \right) p^s_{t-1,i}\ s_{t-1,i} \tag{3}$$

This computation is consistent with the end-of-period reporting of market values in the FFA.[8]

Capital gains accruing to land in period t are estimated as the difference of capital gains to real estate and capital gains to the replacement cost of structures,

$$\Delta p^l_{t,i}\ l_{t-1,i} \quad = \quad \Delta p^r_{t,i}\ r_{t-1,i} \ - \ \Delta p^s_{t,i}\ s_{t-1,i}\ . \tag{4}$$

Later in this section, I discuss the assumptions required such that equation (4) holds, that is, such that the capital gains to land can be measured as the difference of the capital gains to real estate and the capital gains to structures.

To build the price index for land, the growth rate of land prices between periods t and $t+1$ is computed as the capital gain for land in period t divided by the market value of land in period $t-1$:

$$\frac{\Delta p^l_{t,i}\ l_{t-1,i}}{p^l_{t-1,i}\ l_{t-1,i}} \quad = \quad \frac{p^l_{t,i}}{p^l_{t-1,i}} \ - \ 1\ . \tag{5}$$

This equation holds because $\Delta p^l_{t,i}\ l_{t-1,i}$ can be rewritten as $\left(p^l_{t,i}\ /\ p^l_{t-1,i} \ - \ 1 \right) p^l_{t-1,i}\ l_{t-1,i}$. A land price index that preserves these growth rates is then constructed with an arbitrary normalization of $p^l_{t,i} = 1.0$ in 2000:Q2. The land quantity index is computed as the market value of land divided by the price index for land. This quantity index is also normalized to equal 1.0 in 2000:Q2.

It is reasonable to ask under what conditions this measurement system produces accurate results. It turns out that there are two related conditions. First, the nominal value of real estate must always be equal to the sum of the nominal replacement cost of structures and the nominal value of land, as

[8] I also assume the annual price indexes for structures reported in the BEA Fixed Asset Tables are end-of-year estimates.

per equation (1). Second, the growth rate of the price per unit of real estate, $p^r_{t,i} \,/\, p^r_{t-1,i}$, (inclusive of land and structure) must be able to be written as a weighted average of growth of the price per unit of land $p^l_{t,i}/\, p^l_{t-1,i}$ and the price per unit of structures $p^s_{t,i} \,/\, p^s_{t-1,i}$ such that

$$\frac{p^r_{t,i}}{p^r_{t-1,i}} \;=\; w^l_{t-1,i}\left(\frac{p^l_{t,i}}{p^l_{t-1,i}}\right) \;+\; w^s_{t-1,i}\left(\frac{p^s_{t,i}}{p^s_{t-1,i}}\right)\;. \tag{6}$$

where $w^l_{t-1,i}$ is the fraction of the value of real estate accounted for by the value of land, such that

$$w^l_{t-1,i} \;=\; \frac{p^l_{t-1,i}\; l_{t-1,i}}{p^r_{t-1,i}\; r_{t-1,i}} \tag{7}$$

$$\text{and}\quad w^s_{t-1,i} \;=\; \left(1 - w^l_{t-1,i}\right) \;=\; \frac{p^s_{t-1,i}\; s_{t-1,i}}{p^r_{t-1,i}\; r_{t-1,i}}\;. \tag{8}$$

The second line above directly follows from (1).

Note that equation (6) embeds the same assumptions as in the CPI, but applied to real estate. In the CPI, the change in the price of a basket of two goods is the weighted average of changes of the price of each of the goods, where the weights are the expenditure shares. Here, the two goods are land and structures, the bundle of land and structures is real estate, and the expenditure share of land is the fraction of the value of real estate accounted for by the market value of the land.

To see how equations (1) and (6) are both necessary for the validity of the measurement in this paper, subtract 1.0 from both sides of equation (6) to yield

$$\left(\frac{p^r_{t,i}}{p^r_{t-1,i}} \;-\; 1\right) \;=\; w^l_{t-1,i}\left(\frac{p^l_{t,i}}{p^l_{t-1,i}} \;-\; 1\right) \;+\; w^s_{t-1,i}\left(\frac{p^s_{t,i}}{p^s_{t-1,i}} \;-\; 1\right)\;. \tag{9}$$

Given the definitions of $w^l_{t-1,i}$ and $w^s_{t-1,i}$, multiplying both sides of (9) by $p^r_{t-1,i} r_{t-1,i}$ yields

$$\left(\frac{p^r_{t,i}}{p^r_{t-1,i}} \;-\; 1\right) p^r_{t-1,i}\; r_{t-1,i} \;=\; \left(\frac{p^l_{t,i}}{p^l_{t-1,i}} \;-\; 1\right) p^l_{t-1,i}\; l_{t-1,i} \;+\; \left(\frac{p^s_{t,i}}{p^s_{t-1,i}} \;-\; 1\right) p^s_{t-1,i}\; s_{t-1,i}\;, \tag{10}$$

which can be rewritten as

$$\Delta p^r_{t,i}\; r_{t-1,i} \;=\; \Delta p^l_{t,i}\; l_{t-1,i} \;+\; \Delta p^s_{t,i}\; s_{t-1,i}\;. \tag{11}$$

Equation (4) directly follows. Thus, the measurement system used in this paper will be accurate as long as (a) the nominal value of real estate is always equal to the sum of the nominal replacement cost of structures and the nominal value of land and (b) the growth rate of the price of real estate is equal to a weighted average of the growth rates of the price of structures and the price of land, with the weights equal to expenditure shares.

Data on the value of real estate and capital gains accruing to real estate are not available in the FFA for the Nonfarm Financial Corporate Business Sector ("Financial Corporate"). To estimate the value and price of land in this sector, two assumptions are made. First, it is assumed that land's share of real estate in this sector is identical to that of the nonfinancial corporate business in every period. Data on the replacement cost of structures in the Financial Corporate sector is available in the BEA Fixed Asset Tables, so this first assumption pins down the value of land and real estate in this sector. Second, the price index for real estate for the financial corporate sector is assumed to be the same as for the nonfinancial corporate sector. This assumption, when combined with data on the price of structures in the financial corporate sector, allows for the estimation of capital gains accruing to real estate. Given these estimates of capital gains and the market value of real estate, the time-series of growth rates of land prices and a price index for land that is consistent with these growth rates is computed.

It is possible that land's share of the value of real estate is higher in the financial corporate sector than in the nonfinancial corporate sector, since banks and other financial corporations may be more likely to locate in the central parts of cities. If true, the estimates of the value of land and real estate held in the financial corporate sector that are reported in this paper will be too low.

The potential bias to capital gains to real estate is ambiguous since these capital gains also depend on the growth rate of the price of real estate, which is unobserved.[9]

3 Results

In this section, the main results about the price and quantity of land in each sector are described. After the relative magnitudes of land values are documented, discussion focuses on three characteristics of land in each sector: Land's share of the value of real estate, changes in the real price per unit of land, and changes in the real quantity index for land. Based on these results, two conclusions are drawn: First, across sectors, the price and quantity indexes for land have quite different patterns. Second, within each sector, the price and quantity of land have changed significantly over time. In summary, the analysis shows that the price and quantity indexes for land used for residential purposes have very different historical trends and cycles than the price and quantity indexes for land used for commercial purposes.

The full set of quarterly data over the 1952:1 - 2007:4 period of the values, price indexes, and quantity indexes for real estate, structures, and land in the household and nonprofit sector, the noncorporate sector, the nonfinancial corporate sector, and the financial corporate sector are available at *http://morris.marginalq.com/land_sector.html*.

Figure 3 graphs the nominal value of land in billions of dollars in each of the four sectors on a log scale. Generally speaking, the value of land in all sectors has been increasing over time, although the most striking feature of the graph is that land lost almost all of its value in the corporate sectors between 1989 and 1995. Summing over all four sectors, the value of land has increased from $140 billion in 1952:Q1 to $12.4 trillion at year-end 2007. Since about 1960, the value of land

[9] Independently measuring the value of land and real estate held by the financial corporate sector is outside the scope of this paper, but is an interesting direction for future research.

has been greatest in the household and nonprofit sector ($6.9 trillion, 2007:Q4) and smallest in financial corporate sector ($327 billion, 2007:Q4).[10] Figure 4 shows the percentage of the value of land in the aggregate that is owned by the household and nonprofit sector. Speaking generally, this percentage trended upward from 1952 through the early 1990s. Some of this trend is attributable to the increase in the rate of homeownership from the 1950s through the mid-1970s: Between 1950 and 1980, the homeownership rate increased from 55.0% to 66.4%.[11] The trend continued until the mid-1990s as the value of land held in the corporate sector fell sharply between 1990 and 1995. The share of land in the aggregate owned by the household and nonprofit sector has fallen considerably recently, from a peak of 72-1/2 percent at year-end 1993 to just over 55 percent at the end of the sample.

Figure 5 graphs the value of land as a fraction of the value of real estate in each of the sectors. Land's share of value has roughly the same pattern in the household and nonprofit sector and the noncorporate sector; averaging over both sectors, it has risen gradually over time, from about 15 percent of value in the 1950s to about 35 percent of value in 2005. This behavior for land's share of value roughly coincides with the findings of Davis and Heathcote (2007), who find land's share

[10]The estimate that the value of land is smallest in the financial corporate does not critically depend on the assumption that land's share of the value of real estate is identical in the nonfinancial and financial corporate sectors. In 2007:Q4, land accounted for 27 percent of the value of real estate in the nonfinancial corporate sector. As long as land's share of value was less than 72 percent in the financial corporate sector in 2007:Q4, then the value of land in the financial corporate sector was less than the value of land in the nonfinancial corporate sector.

[11]Reference: *http://www.census.gov/hhes/www/housing/census/historic/ownrate.html.* Note that the decline in the percent of the value of land owned by the household sector in 1974 seems implausible, but is a direct consequence of the data in the FFA. The FFA reports that the value of real estate owned by the household sector fell by $11 billion from 1973:Q4 through 1974:Q2. The FFA data indicate the replacement cost of structures increased by $70 billion over this same time period. If these data are accurate, the value of land fell by $81 billion over this three-quarter period, from $314 billion to $233 billion.

of house value for residential structures of about 13 percent in the 1950s, but estimate land's share of value to be closer to 40 percent after 2000.

Land's share of the value of real estate in the corporate sector has a very different pattern – it is roughly stable at 27 percent or so until 1989, falls to almost zero by 1995, and then rises rapidly after 1995 such that by year-end 2007 it is again almost 27 percent. The loss in the value of land and decline in the value of real estate attributable to land in the corporate sector in the early 1990s seems too large to be accurate. In section 4, I discuss reasons why the measured decline in the value of land in this sector may be inaccurate. That said, these results are consistent with anecdotes from the Boston market at that time. Case (2007) writes the following about commercial property in the Boston market, "By 1992 the commercial real estate market was almost nonliquid . . . One could argue that the implicit value of land was negative. For example, in 1992 the Wang Tower in Lowell Massachusetts, a well-built, one-million-square-foot office building with good accessibility, sold for $525,000, at $0.52 per square foot." For comparison, in Table 6.8 of the same paper, Case (2007) reports that that new construction of Class A office space was $170 per-square foot in 1992.

Assuming that households own land used for residential purposes and corporations own land largely for nonresidential purposes, figure 5 is suggestive that the price of land in residential and nonresidential uses have very different histories.[12] A closer examination of land's share in the noncorporate sector also suggests this to be the case. Unlike the other sectors, the FFA accounts allow for a separate calculation of the price and value of land in nonresidential and residential use in

[12]Corporations such as Real Estate Investment Trusts (REITs) may own apartment buildings, so this is not an entirely accurate assumption. However, the share of real estate owned by the corporate sector and in residential use as a proportion of all real estate owned by the corporate sector is likely very small. The BEA in its detailed Fixed Asset tables reports that as of year-end 2007, the replacement cost of residential structures owned by the corporate sector is $150 billion. In comparison, the replacement cost of all structures owned by the corporate sector, residential and nonresidential, is about $7,200 billion.

the noncorporate sector. Figure 6 shows land's share of the value of real estate for residential (solid line) and nonresidential (dotted line) land owned by the noncorporate sector. A quick comparison of figures 5 and 6 suggests that, with respect to land's share of the value of real estate, nonresidential land in the noncorporate sector is quite similar to that in the corporate sector. Further, land's share of residential land in the noncorporate sector has the same upward trend and roughly the same scale as that of the household and nonprofit sector. The noncorporate sector, in sum, behaves like the household and nonprofit sector because most of the value of land in the sector is in residential use: It reflects apartment units owned by individuals and partnerships.[13]

Figure 7 shows the inflation-adjusted price index of land in each sector, with 2000:Q2 set to 1.0 in each case.[14] These price indexes share similar historical patterns with the land-share data of Figure 5. The log scale of the graph hides some important trends and variation in the data. The most striking fact is that the real price of land owned by households and nonprofits and noncorporate businesses increased by 38.3 and 26.6 times, respectively, over the entire 1952-2007 period. For some perspective, this is greater than the change in real per capita personal disposable income over this period (an increase of a factor of 3.4, from $8,384 in 1952:Q1 to $28,636 in 2007:Q4) and greater than the change in the real price of stocks in the S&P (an increase of a factor of 9.3 from 1952 through year-end 2007).[15] The real price of land in the nonfinancial corporate sector

[13]For example, of the $2.8 trillion value of land owned by the noncorporate sector in 2007:Q4, $2.3 trillion is in residential use.

[14]The nominal price indexes for land are deflated using the BEA price index for total personal consumption. This price index is listed in line 1 of Table 2.3.4 of the National Income and Product Accounts, available at *http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N.*

[15]Data on real per capita disposable income is available in line 27 of Table 2.1 of the National Income and Product Accounts. Data on the nominal price of the S&P is taken from Professor Robert Shiller's web site, *http://www.econ.yale.edu/s̃hiller/data.htm.* The nominal S&P increased from 24.19 in January, 1952 to 1479.22 in December, 2007, a change of a factor of 61.2. According to data from the NIPA, overall consumer prices increased

increased by a factor of three over this entire period, but with considerable variation: The price more than doubled between 1952 and 1989, lost 97 percent of its value between 1989 and 1995, and then increased so rapidly that it surpassed its 1989 value by mid-2007. The history of the price of land in the financial corporate sector is qualitatively similar.

Figure 8 shows the quantity indexes for land in each sector, with 2000:Q2 set to 1.0 in each case as before. The top panel shows the quantity indexes for land for the household and noncorporate sectors and the bottom panel shows the quantity indexes for land for the nonfinancial and financial corporate sectors. Focusing attention to the top panel, speaking generally, the quantity index for land in the household sector remained roughly constant until the mid 1970s, after which the quantity index fell by about 15 percent.[16] The quantity index in the noncorporate sector shows a very different pattern: It declined dramatically between 1960 and 1963, and, roughly speaking, has remained approximately constant since then. The bottom panel of this figure shows the quantity indexes for the corporate sectors. The estimates imply that the quantity of land used by the corporate sector has increased by 62 percent in the case of nonfinancial corporate sector and increased by a factor of 7.8 in the case of the financial corporate sector.[17] The increase in the quantity of land in both sectors is almost uniform over the 1952-2007 period except for two periods where the quantity indexes of land fell: 1974-1975 and 1994-1999.

by a factor of 6.6 over this period, explaining the total real change to the price of stocks in the S&P of 9.3. Of course the cumulative real return to both assets is higher than reported: Both assets pay dividends, cash in the case of the S&P and rental services in the case of land.

[16]The relatively small "wiggles" in the quantity index for land owned by the household and nonprofit sector likely reflect small amounts of measurement error somewhere in the measurement system. This possible measurement error is noticeable in this graph because of the limited range of the series.

[17]This remarkable increase in the quantity index for land in the financial sector may be related to changes in the number of banks: The number of FDIC-insured commercial bank offices increased from 18,278 in 1950 to 86,150 in 2007, an increase of a factor of 4.7. See the FDIC web site for details, *http://www2.fdic.gov/hsob/index.asp.*

4 Discussion of Results

The FFA accounts are not constructed for the purposes of deriving price- and quantity- indexes for land; they are derived to provide estimates of wealth. It just so happens that data in the FFA can be used (along with some other data from the BEA Fixed Asset Tables) to back out price and quantity indexes for land. This section therefore attempts to determine which results of the last section seem reasonable and which do not.

A natural place to start is to compare the estimates of the price and quantity of land owned by households with the results published by Davis and Heathcote (2007) on the price and quantity of land in residential use. Figure 9 compares the price and quantity series. The Davis and Heathcote quarterly data start in 1975, explaining the sample range of the graphs in this figure.[18] The top panel shows the real price indexes. The price series are similar after 1985, but behave very differently over the 1975-1985 period. In the Davis and Heathcote data, the red dotted line, the real price of land is flat over this period; the FFA-based index, the blue sold line, triples. The bottom panel compares the real quantity indexes. Over the 1975-2007 period, the quantity index from the Davis and Heathcote data is increasing at a roughly constant rate of 0.8 percent per year. In contrast, the quantity index derived in this paper for the household sector has been falling by about 0.5 percentage points per year throughout this period.

Based on this analysis, it seems that the FFA assigns too much of the change in the value of land held in the household sector to changes in prices and thus capital gains and not enough to changes in quantity. It seems unlikely that land owned by households for residential has fallen, as residential investment (and conversion of farm land to residential use) has continued somewhat unabated throughout this period. That said, the homeownership rate fell from 64.9% to 63.5% from

[18] The Davis and Heathcote data are available for download at *http://morris.marginalq.com/landdata.html*. The data graphed in figure 9 are from the "Macromarkets/CSW" link of that web page.

mid-1975 through year-end 1984. When this is considered along with other factors (for example, many homeowners moved into condominiums in this period), the decline in the quantity index over these years may be explainable.

In contrast to land in residential use, little is known about the price and quantity of land in commercial use. Therefore, for the case of land in the corporate sectors, and the nonresidential land in the noncorporate sector, the results in this paper cannot be compared to those of any previous studies.[19] As mentioned earlier, the behavior of the value and price of land in the corporate sectors over the 1990-2000 period seemed questionable. It may be the case that the sum of the nominal value of the land and the replacement cost of the structure is not equal to the market value of the real estate during this period – perhaps because the price of commercial real estate declined very rapidly in the early 1990s.

As an illustrative example for why this might be true, consider a world in which real-estate developers and households assume that (a) the prices of land, structures, and real estate are fixed over time, (b) structures can not be altered once they are built, and (c) structures do not depreciate. Suppose that in each period t developers actively create new real estate by combining structures and land according to the production function

$$r_{t,i} \;=\; s_{t,i}^{1-\alpha}\; l_{t,i}^{\alpha} \;, \tag{12}$$

where $0 < \alpha < 1$. Denote the market prices of a unit of real estate, structures, and land as $p^r_{t,i}$, $p^s_{t,i}$, and $p^l_{t,i}$ respectively. Developers maximize profits by choosing the quantity of structures and land to maximize the following profit function:

$$\max_{s_{t,i},l_{t,i}} \;\left[p^r_{t,i}\; r_{t,i} \;-\; p^s_{t,i}\; s_{t,i} \;-\; p^l_{t,i}\; l_{t,i}\right] \;. \tag{13}$$

[19] Haughwout et. al. (2008), use data on individual land-sales produced by the CoStar Group to construct a land-price index for commercial land in New York City starting in 1999.

Profit maximization implies that

$$(1-\alpha)\ p^r_{t,i}\ r_{t,i} \quad = \quad p^s_{t,i}\ s_{t,i} \tag{14}$$

$$\text{and} \quad \alpha\ p^r_{t,i}\ r_{t,i} \quad = \quad p^l_{t,i}\ l_{t,i}\ . \tag{15}$$

Equations (14) and (15) imply the following results: (a) when built optimally, the value of real estate is exactly equal to the sum of the cost of the inputs,

$$p^r_{t,i}\ r_{t,i} \quad = \quad p^s_{t,i}\ s_{t,i}\ +\ p^l_{t,i}\ l_{t,i}\ , \tag{16}$$

(b) developed real estate has an optimal ratio of land to structures of

$$\frac{l_{t,i}}{s_{t,i}} \quad = \quad \left(\frac{\alpha}{1-\alpha}\right)\left(\frac{p^s_{t,i}}{p^l_{t,i}}\right)\ , \tag{17}$$

and (c) the price per unit of real estate is given by the following function of the price per unit of structure and price per unit of land,

$$p^r_{t,i} \quad = \quad (1-\alpha)^{-(1-\alpha)}\ \alpha^{-\alpha}\ \left(p^s_{t,i}\right)^{1-\alpha}\ \left(p^l_{t,i}\right)^{\alpha}\ . \tag{18}$$

Equation (18) is derived as follows: I substitute equation (12) into equation (15) for $r_{t,i}$, divide both sides of the resulting equation by $\alpha\ s^{1-\alpha}_{t,i}\ l^{\alpha}_{t,i}$ and then substitute for $(l_{t,i}/s_{t,i})^{1-\alpha}$ using equation (17).

Now imagine that this economy experiences a one-time unanticipated permanent shock to the price of land, such that at the start of time $t+1$ the new price of land $p^l_{t+1,i}$ is less than the old price of land: $p^l_{t+1,i} < p^l_{t,i}$. For simplicity, suppose the price of structures does not change, $p^s_{t+1,i} = p^s_{t,i}$. After this shock, each previously developed parcel will now have "too much" structure in place given the new relative prices of land and structures, such that

$$p^l_{t+1,i}\ l_{t,i} \quad = \quad \left(\frac{k\ \alpha}{1-\alpha}\right) p^s_{t+1,i}\ s_{t,i}\ , \tag{19}$$

with $0 < k < 1$. Denote the amount of real estate that $l_{t,i}$ and $s_{t,i}$ produces as

$$r_{t,i} \;=\; s_{t,i}^{1-\alpha}\; l_{t,i}^{\alpha} \;. \tag{20}$$

The question is, what is the value of expression (21)?

$$p^{r}_{t+1,i} r_{t,i} \;-\; \left(p^{s}_{t+1,i}\; s_{t,i} \;+\; p^{l}_{t+1,i}\; l_{t,i}\right) \;. \tag{21}$$

Note that at the new relative prices, the price of real estate as of $t+1$ has the expression

$$p^{r}_{t+1,i} \;=\; (1-\alpha)^{-(1-\alpha)}\;\; \alpha^{-\alpha}\; \left(p^{s}_{t+1,i}\right)^{1-\alpha}\; \left(p^{l}_{t+1,i}\right)^{\alpha} \;. \tag{22}$$

Using equations (22) and (20), equation (21) becomes

$$(1-\alpha)^{-(1-\alpha)}\;\; \alpha^{-\alpha}\; \left(p^{s}_{t+1,i}\; s_{t,i}\right)^{1-\alpha}\; \left(p^{l}_{t+1,i}\; l_{t,i}\right)^{\alpha} \;-\; \left(p^{s}_{t+1,i}\; s_{t,i} \;+\; p^{l}_{t+1,i}\; l_{t,i}\right) \;. \tag{23}$$

Inserting equation (19) and reducing yields

$$\left(p^{s}_{t+1,i}\; s_{t,i}\right) \left[(1-\alpha)^{-(1-\alpha)}\;\; \alpha^{-\alpha}\; \left(\frac{k\;\alpha}{1-\alpha}\right)^{\alpha} \;-\; \left(1 \;+\; \frac{k\;\alpha}{1-\alpha}\right)\right] \tag{24}$$

$$= \left(p^{s}_{t+1,i}\; s_{t,i}\right) \left[\frac{k^{\alpha}}{1-\alpha} \;-\; \frac{k\;\alpha}{1-\alpha} \;-\; 1\right] \;. \tag{25}$$

Note that the term in brackets is always less than 0 when $0 < k < 1$:

$$\frac{k^{\alpha}}{1-\alpha} \;-\; \frac{k\;\alpha}{1-\alpha} \;-\; 1 \;<\; 0 \tag{26}$$

and thus as of period $t+1$, the value of real estate built in period t or earlier will be less than the sum of the replacement cost of the structures and the nominal value of land at the new relative prices:

$$p^{r}_{t+1,i} r_{t,i} \;-\; \left(p^{s}_{t+1,i}\; s_{t,i} \;+\; p^{l}_{t+1,i}\; l_{t,i}\right) \;<\; 0 \;. \tag{27}$$

To understand why equation (26) holds, note that (a) when $k = 1$, the term in brackets is equal to zero; (b) when $k = 0$, the term in brackets is equal to -1; and (c) the function is strictly increasing with k for $0 < k < 1$. This last point holds because the derivative of (26) with respect to k is

$$\frac{\alpha}{1-\alpha}\left[\frac{1}{k^{1-\alpha}} \;-\; 1\right] \;>\; 0 \qquad \text{for} \;\; 0 < k < 1 \;. \tag{28}$$

A simple example might help clarify intuition for when we would expect the measured value of land to be less than zero, and why.[20] Suppose demand is high for apartments, and developers bid up land prices and build apartments up to the point where marginal revenue equals marginal cost. The ratio of land to structures will be as shown in equation (17). Apartments sell for \$100,000 each and the replacement cost of an apartment not including the land is \$60,000. Now suppose, completely unexpectedly, that the demand disappears. The apartments remain, but land values will plummet (say to zero), since no one wants to develop any more land. After this demand shock, apartments sell for \$50,000. The replacement cost is still \$60,000, but if equation (16) is assumed to hold, then the estimated value of the land will be negative \$10,000. Thus, equation (16) does not hold, since the true land value of zero.

This idea is suggestive that the value of land reported in the corporate and noncorporate sectors between 1990 and 1995 may be too low (and also suggests that growth in land prices between 1995 and 2007 may be overestimated). This idea can also explain why researchers measuring the value of land as a residual occasionally assign a negative value to land, especially in "declining" MSAs.[21] Suppose that equation (17) describes the optimal ratio of land to structures at all points in time. For any given parcel, $l_{t,i}$ is fixed, at least in the short term. In situations when the price of land is rising, an owner of existing real-estate can maintain an optimal land-structures ratio by upgrading or adding on to the existing structure. However, if the relative price of land falls, and the physical quantity of structures can not be reduced rapidly enough (via depreciation), then owners of real estate will be left with an inoptimal land-structures ratio, i.e. the k in equation (19) will be strictly

[20]This example was suggested to me by one of the anonymous referees in his or her report.

[21]See Glaeser and Gyourko (2005) or Davis and Palumbo (2007), for example.

< 1. In this scenario, the true value of land will be greater than the market value of the housing less the replacement cost of the structure.

This analysis naturally leads to two open questions for future research. First, it seems important to understand the conditions under which the nominal value of real estate is not equal to the sum of the properly measured replacement cost of structures and the nominal value of land. Based on the results of Glaeser and Gyourko (2005) and Davis and Palumbo (2007), and the intuition from the model of this section, it seems that equation (16) is most likely to be violated in situations where the price of real estate has fallen rapidly and relatively little new development of real estate is occurring. Second, it should be determined if land can have negative value. For example, land can contain hazardous waste that might be very costly to clean up. If the law allows for free disposal – that is, if owners can abandon their land and be absolved of any liability from property or waste remaining on the land – then the value of land is bounded from below by zero. If owners of land do not have free disposal, and if land can have negative value as a result, then the growth rate of the price of land is not always a well-defined concept.

5 Conclusion

In this paper, I use data from the Flow of Funds and the BEA Fixed Asset Tables to derive estimates of the value, price, and quantity of land for the household and nonprofit sector, the nonfarm noncorporate business sector, the nonfarm nonfinancial corporate sector, and the financial corporate sector. These estimates are necessary ingredients in the production of a fully integrated set of economic accounts for the United States as described by Jorgenson and Landefeld (2006). The estimates also fill in a gap in our knowledge about the behavior of land prices in the aggregate, and researchers can use these data to determine the set of factors that influence land value. While some aspects of the price and quantity estimates are not exactly consistent with previous research or intuition, one striking result that seems robust is that the price and quantity of land in residential use has very different time-series properties than the price and quantity of land in commercial use. Based on the results of this paper, an important area of future research is the development of an aggregate price index for land in commercial use that is derived from different data sources.

References

[1] Barker, David, and Jay Sa-Aadu, 2004, "Is Real Estate Becoming Important Again? A neo-Ricardian Model of Land Rent," Real Estate Economics 32, 33-53.

[2] Barker, David, 2007, "Urban Land Rents in the United States," In *Proceedings of the 2006 Land Policy Conference: Land Policies and Their Outcomes*, edited by Gregory K. Ingram Dale and Yu-Hung Hong. Lincoln Institute of Land Policy Press.

[3] Case, Karl E., 2007, "The Value of Land in the United States: 1975-2005," In *Proceedings of the 2006 Land Policy Conference: Land Policies and Their Outcomes*, edited by Gregory K. Ingram Dale and Yu-Hung Hong. Lincoln Institute of Land Policy Press.

[4] Chu, Yongquiang, 2008, "An Intertemporal Capital Asset Pricing Mode2l with Owner-Occupied Housing," Mimeo, University of South Carolina.

[5] Davis, Morris A. and Jonathan Heathcote, 2004, "The Price and Quantity of Residential Land in the United States," Federal Reserve Board of Governors, Finance and Economics Discussion Series, 2004-37.

[6] Davis, Morris A. and Jonathan Heathcote, 2005, "Housing and the Business Cycle," International Economic Review 46, 751-784.

[7] Davis, Morris A. and Jonathan Heathcote, 2007, "The Price and Quantity of Residential Land in the United States," Journal of Monetary Economics 54, 2595-2620.

[8] Davis, M. and Robert F. Martin, 2008, "Housing, House Prices, and the Equity Premium Puzzle," Mimeo, University of Wisconsin.

[9] Davis, Morris A. and Michael G. Palumbo, 2007, "The Price and Quantity of Residential Land in Large U.S. Cities," Journal of Urban Economics 63, 352-384.

[10] Glaeser, Edward L. and Joseph Gyourko, 2005, "Urban Decline and Durable Housing," Journal of Political Economy 113, 345-375.

[11] Goldsmith, Raymond (1955), "A Study of Saving in the United States," Princeton University Press.

[12] Goldsmith, Raymond (1962), "The National Wealth of the United States in the Postwar Period," A Study by the NBER, Princeton University Press.

[13] Grebler, L., Blank. D., and L. Winnick (1956), "Capital Formation in Residential Real Estate, Trends and Prospects," Princeton University Press.

[14] Haughwout, Andrew, Orr, James, and David Bedoll, 2008, "The Price of Land in the New York Metropolitan Area," Federal Reserve Bank of New York Current Issues in Economics and Finance, Second District Highlights 14.

[15] Hoyt, Homer (1933), "One Hundred Years of Land Values in Chicago," University of Chicago, reprinted by Beard Books, Washington DC, 2000.

[16] Iacoviello, Matteo, 2005, "House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle," American Economic Review 95, 739-764.

[17] Iacoviello, Matteo and Stefano Neri, 2008, "Housing Market Spillovers: Evidence from an Estimated DSGE Model," Mimeo, Boston College.

[18] Jorgenson, Dale W. and J. Steven Landefeld, 2006, "Blueprint for Expanded and Integrated U.S. Accounts – Review, Assessment, and Next Steps," In *A New Architecture for the U.S. National Accounts*, edited by Dale W. Jorgenson, J. Steven Landefeld, and William D. Nordhaus. The University of Chicago Press.

[19] Keller, E. (1939), "A Study of the Physical Assets, Sometimes called Wealth, of the United States, 1922-1933; a Primer of Economics: an Essay in Adult Education," Bureau of Economic Research, University of Notre Dame.

[20] Kiyotaki, N., Michaelides, A. and K. Nikolov, 2007, "Winners and Losers in Housing Markets," Mimeo, London School of Economics.

[21] Kuznets, S. (1938), "The Measurement of National Wealth," in Studies in Income and Wealth, Volume 2. National Bureau of Economic Research.

[22] Kuznets, S. (1946), "National Product Since 1869," National Bureau of Economic Research.

[23] Lustig, H. and S. Van Nieuwerburgh, 2006, "Can Housing Collateral Explain Long-Run Swings in Asset Returns?" Mimeo, UCLA.

[24] Manvel, A. D. (1968), "Land Use in 106 Large Cities," in Three Land Research Studies, prepared for the consideration of the National Commission on Urban Problems, Washington, DC. Research Report No. 12.

[25] Piazzesi, M., Schneider, M. and S. Tuzel, 2007, "Housing, Consumption, and Asset Pricing," Journal of Financial Economics, 83, 531-569.

[26] Whitten, R., and T. Adams (1931), "Neighborhoods of Small Homes," Harvard University Press.

[27] Wickens, D. (1941), "Residential Real Estate, its Economics Position as Shown by Values, Rents, Family Incomes, Financing, and Construction, Together with Estimates for All Real Estate," Publications of the National Bureau of Economic Research, no. 38.

[28] Winnick, L., (1953), "Wealth Estimates for Residential Real Estate, 1890-1950." Ph. D. dissertation, Columbia University.

6 Appendix

This appendix details the exact calculations made in each sector.

6.1 Households and Non-profits

For the household and nonprofit sector, I compute the market value of land using data from Table B.100 of the FFA – I set it equal to the market value of real estate, line 3, less the replacement cost of structures, the sum of lines 43 (residential) and 47 (nonresidential).

I set the capital gains to land in this sector equal to the capital gains on holdings of real estate, line 10 of FFA Table R.100, less an estimate of the capital gains on the replacement cost of structures (that is, the change in the replacement cost of structures due solely to changes in building costs). I construct an estimate of the capital gains on the replacement cost of structures in three steps. First, I compute the time-series of growth rates of structures prices for owner-occupied residential structures (line 43 of FFA Table B.100) and non-residential structures owned by nonprofit organizations (line 47). Then, given these price indexes, I compute the capital gains or losses to each of these two types of structures. I set capital gains to the replacement cost of structures in this sector as the sum of these two estimates of capital gains.

To create the two price indexes, I divide current-cost estimates of the stock, line 14 (owner-occupied residential) of Fixed Asset Table 5.1 and line 51 (nonprofit non-residential) of Fixed Asset Table 4.1 by the appropriate quantity index, lines 14 and 51 of Tables 5.2 and 4.2.[22] This yields annual price indexes. I convert these annual price indexes to quarterly price indexes using information from the National Income and Product Accounts (NIPA). NIPA table 5.3.4 reports price indexes for all residential structures and, separately, all nonresidential structures. For the case of owner-occupied residential, I use the NIPA residential price index to do the quarterly interpolations; and, for nonprofit non-residential, I use the NIPA nonresidential structures price index. In these interpolations, the pattern of the quarterly growth rates from the NIPA price indexes is maintained, but (if necessary), the quarterly growth rates are adjusted until the overall yearly growth of the resulting quarterly index is identical to overall yearly growth of the original annual price index.

6.2 Noncorporate Business

For the nonfarm noncorporate business sector, I compute the market value of land as the market value of real estate in this sector, line 3 of Table B.103, less the replacement cost of structures in this sector, the sum of lines 32 (residential) and 33 (nonresidential) of Table B.103. Line 11 of FFA Table R.103 reports the capital gains on holdings of real estate for the noncorporate business sector. I set the capital gains to land as capital gains on holdings of real estate less an estimate of capital gains on the replacement cost of structures.

[22] Fixed Asset Tables 4.1 and 5.1 report the "Current Cost Net Stock" of nonresidential fixed assets and residential fixed assets, respectively; Tables 4.2 and 5.2 report the respective chain-type quantity indexes. In each case, I divide the current cost net stock by the quantity index to yield a price index.

To construct an estimate of the capital gains on the replacement cost of structures, I use essentially the same procedure as with the household and non-profit sector. Growth in the residential price index for this sector is constructed as a weighted average of growth of price indexes derived from lines 3, 6, 8, and 17 from Tables 5.1 and 5.2. The weights are given by relative shares of replacement cost. For example, as of year-end 2007 the weights are constructed assuming the replacement cost of residential structures is computed as tenant-occupied residential (line 17, \$3740.6), less corporate-owned residential (line 3, \$153.5), less non-profit owned residential (line 6, \$196.9), and less government-owned residential (line 8, \$153.3). Similar to the residential price index, growth in the non-residential price index is constructed as the weighted average of growth in the price indexes derived from various lines in Tables 4.1 and 4.2. I assume the replacement cost of non-residential structures in this sector is constructed as total noncorporate structures (line 33) less the sum of noncorporate farm structures (line 36), nonprofit structures (line 51), and household-owned (line 54).

6.3 Nonfinancial Corporate Business

Data on the market value of real estate (line 3) and the replacement cost of structures (lines 33 and 34) owned by the nonfarm nonfinancial corporate business sector are available in FFA Table B.102. Data on capital gains on holdings of real estate in this sector are available in line 13 of FFA Table R.102. I compute capital gains to the replacement cost of structures using the same procedure as with the previous sectors: For the price index for structures, I use line 3 of Fixed Asset Tables 5.1 and 5.2 (residential) and line 30 of Fixed Asset Tables 4.1 and 4.2 (nonresidential).

6.4 Financial Corporate Business

Data on the value of real estate in the Nonfarm Financial Corporate Business Sector (hereafter called the "Financial Corporate Business" sector) is not publicly available in the FFA accounts. For this sector, I use the following procedure:

1. I determine the replacement cost, price index, and capital gains accruing to nonresidential structures owned by the financial corporate business sector[23] using data from line 27 of BEA Fixed Asset Tables 4.1 and 4.2.

2. I assume that land's share of the value of real estate in this sector is identical to that of the nonfinancial corporate business sector.

3. I assume that the price index for real estate for the financial corporate business sector is the same as for the nonfinancial corporate business sector. Given this assumption, and given the estimates of the market value of real estate from the previous assumption, I compute capital gains to real estate.

Finally, I compute the capital gains to land as the difference of capital gains to real estate and capital gains to structures. Given the capital gains to land and the market value of land, I compute the price index for land.

[23] I assume the financial corporate business sector does not own any residential structures.

Figure 1: Top and Bottom Lines of B.100 from FFA, Coded Tables

B.100 Balance Sheet of Households and Nonprofit Organizations (1)

Billions of dollars; amounts outstanding end of period, not seasonally adjusted

			2004	2005	2006	2007
1	**FL152000005**	**Assets**	**63153.4**	**69566.2**	**75045.0**	**76549.1**
2	FL152010005	Tangible assets	23963.9	27124.7	28061.2	27092.4
3	FL155035005	Real estate	20199.8	23184.7	23952.9	22820.8
4	FL155035015	Households (2,3)	18616.9	21368.1	21890.6	20487.9
5	FL165035003	Nonprofit organizations	1582.9	1816.6	2062.3	2332.8
6	FL165013265	Equipment and software owned by nonprofit organizations (4)	199.3	214.2	230.8	246.2
7	FL155011005	Consumer durable goods (4)	3564.8	3725.8	3877.4	4025.5
8	FL154090005	Financial assets	39189.5	42441.5	46983.9	49456.7
9	FL154000005	Deposits	5789.6	6179.2	6793.8	7351.5
10	FL153091003	Foreign deposits	57.5	59.9	65.2	78.2
11	FL153020005	Checkable deposits and currency	356.1	230.0	202.3	77.4
12	FL153030005	Time and savings deposits	4472.0	4940.0	5408.8	5839.4
13	FL153034005	Money market fund shares	904.1	949.2	1117.5	1356.4
42	**FL152090005**	**Net worth**	**52120.6**	**57384.8**	**61591.2**	**62169.9**
		Memo:				
		Replacement-cost value of structures:				
43	FL155012305	Residential	11997.5	13431.2	14387.2	14593.2
44	FL155012603	Households	11545.1	12942.0	13877.9	14085.3
45	FL135012603	Farm households	281.0	302.5	312.5	310.9
46	FL165012603	Nonprofit organizations	171.4	186.7	196.8	196.9
47	FL165013665	Nonresidential (nonprofits)	1062.1	1179.0	1284.8	1358.7
48	FA156012005	Disposable personal income	8680.9	9062.0	9640.7	10170.5
49	*/ FA156012005	Household net worth as percentage of disposable personal income	600.4	633.3	638.9	611.3
50	FL155035065	Owners' equity in household real estate (10)	10781.3	12495.7	12024.8	9947.6
51	*/ FL155035015	Owners' equity as percentage of household real estate (11)	57.9	58.5	54.9	48.6

(1) Sector includes farm households.
(2) At market value.
(3) All types of owner-occupied housing including farm houses and mobile homes, as well as second homes that are not rented, vacant homes for sale, and vacant land.
(4) At replacement (current) cost.
(5) Syndicated loans to nonfinancial corporate business by nonprofits and domestic hedge funds.
(6) Value based on the market values of equities held and the book value of other assets held by mutual funds.
(7) Net worth of noncorporate business (table B.103, line 31) and owners' equity in farm business and unincorporated security brokers and dealers.
(8) Includes loans made under home equity lines of credit and home equity loans secured by junior liens, shown on table L.218, line 22.
(9) Liabilities of nonprofit organizations.
(10) Line 4 less line 33.
(11) Line 50 divided by line 4.

Figure 2: R.100 from FFA, Coded Tables

R.100 Change in Net Worth of Households and Nonprofit Organizations

Billions of dollars; not seasonally adjusted

			2004	2005	2006	2007
1	**FR152090005**	**Change in net worth (1)**	**5417.3**	**5264.2**	**4206.3**	**578.7**
2	FU155060005	Net investment	479.3	56.0	-17.0	393.6
3	FU155061005	Net physical investment	641.1	666.0	676.5	575.5
4	FU155050005	Capital expenditures	1581.7	1702.9	1717.2	1656.4
5	FU156300005	- Consumption of fixed capital	940.6	1036.8	1040.7	1080.9
6	FU155000005	Net financial investment	-161.8	-610.1	-693.5	-181.9
7	FU154090005	Net acquisition of financial assets	995.8	539.6	578.9	743.4
8	FU154190005	- Net increase in liabilities	1157.6	1149.7	1272.5	925.3
9	FD158000005	Holding gains on assets at market value (2)	4877.2	5157.9	4218.9	271.1
10	FD155035005	Real estate	2194.1	2551.6	299.5	-1455.8
11	FD153064105	Corporate equities	974.8	930.9	1911.4	864.6
12	FD153064205	Mutual fund shares	296.7	193.8	416.2	237.2
13	FD152090205	Equity in noncorporate business	775.6	977.4	637.5	275.4
14	FD153054005	Life insurance and pension fund reserves	635.9	504.2	954.3	349.7
15	FD158100005	Holding gains on assets at current cost (2)	-22.2	-39.7	-43.3	-50.2
16	FD155011005	Consumer durable goods	-22.1	-40.0	-44.8	-51.2
17	FD165013265	Equipment and software	-0.1	0.2	1.5	1.0
18	FU158090005	Other volume changes (3)	83.1	90.1	47.8	-35.7
		Memo:				
19	FL152090005	Net worth outstanding (4)	52120.6	57384.8	61591.2	62169.9
20	FA156012005	Disposable personal income	8680.9	9062.0	9640.7	10170.5

(1) Sum of net investment (line 2), holding gains (lines 9 and 15), and other volume changes (line 18).
(2) Calculated as change in amount outstanding less net purchases during period.
(3) Consists of the difference between series for consumption of fixed capital published by BEA and statistical discontinuities.
(4) Table B.100, line 41.

Figure 3: Nominal Value of Land by Sector, 1952:1 - 2007:4, Log Scale

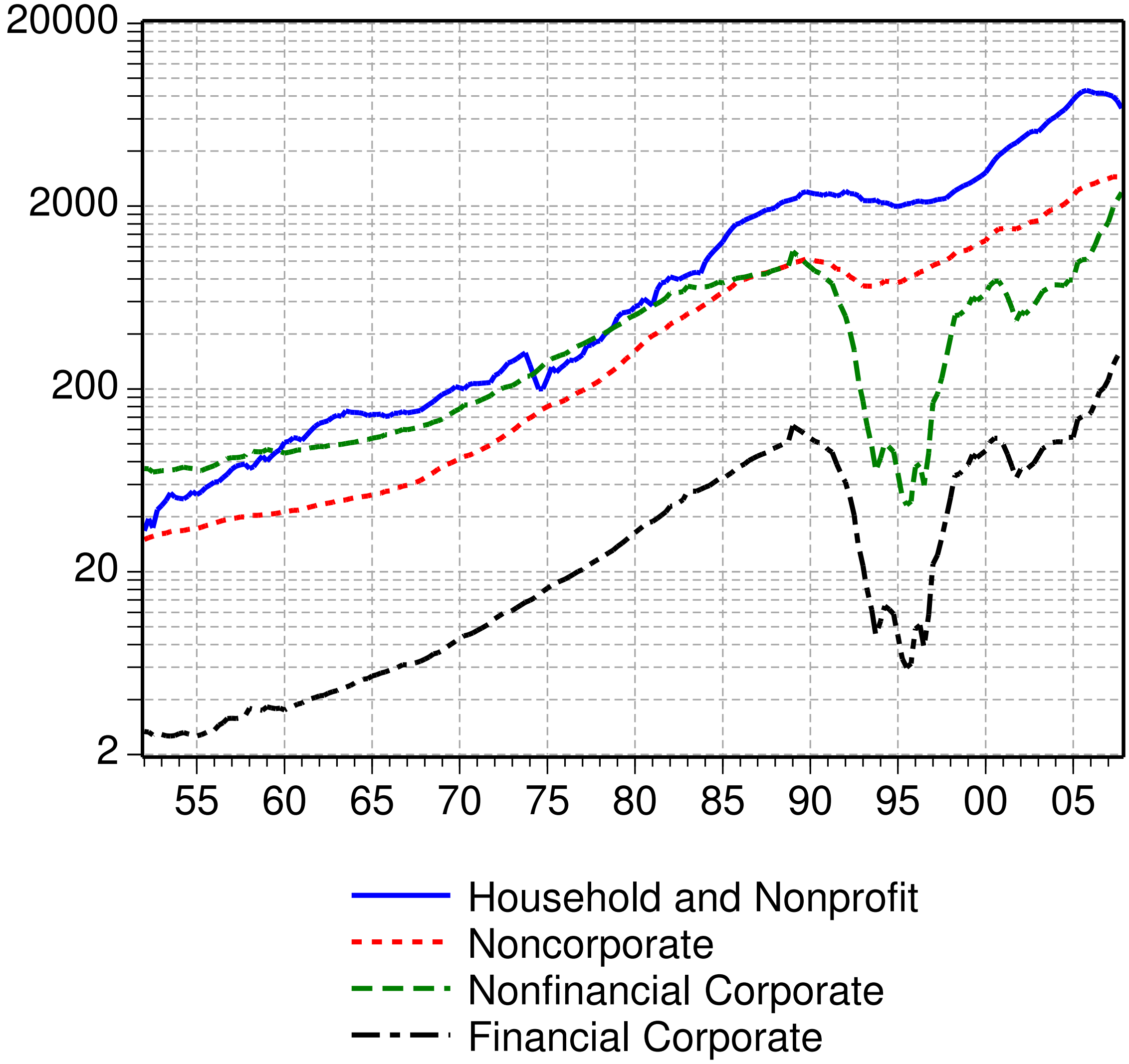


Figure 4: Percent of Land (by Value) Owned by Household and Nonprofit Sector, 1952:1 - 2007:4

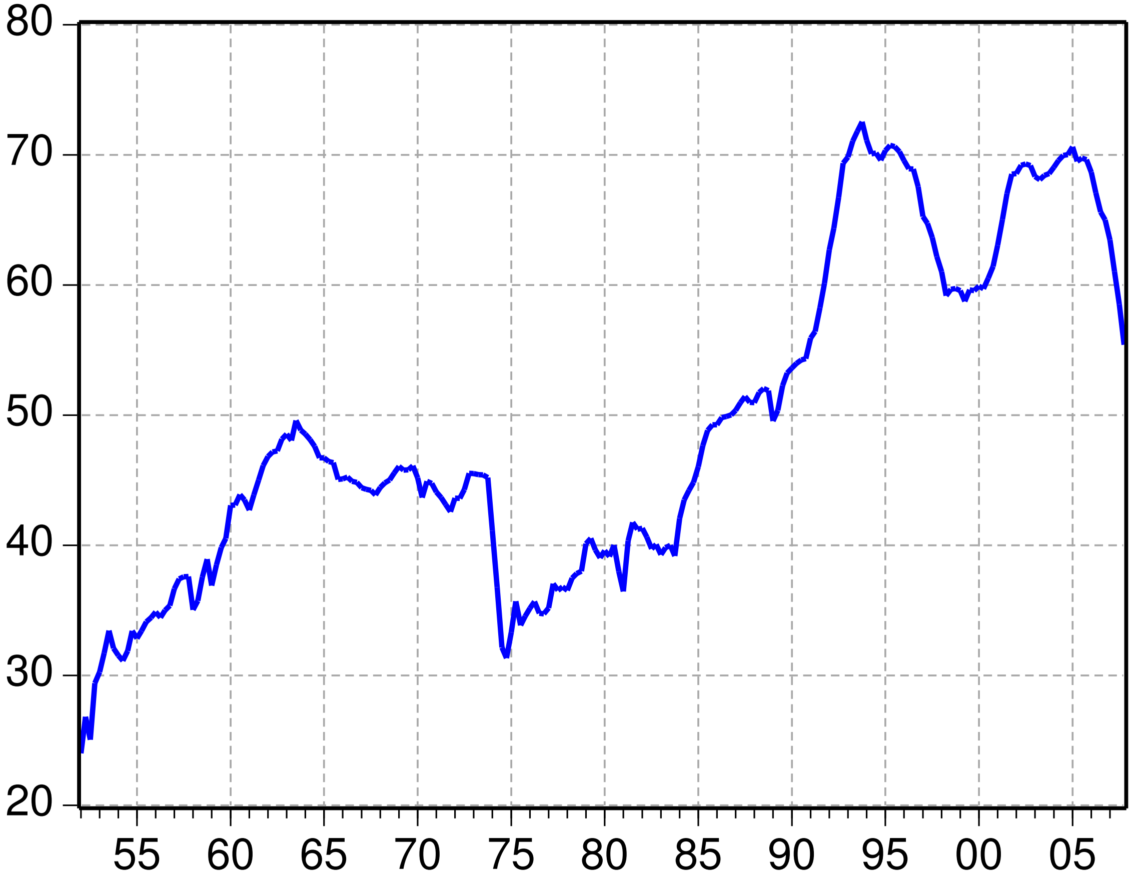


Figure 5: Land's Share of the Value of Real Estate, 1952:1 - 2007:4

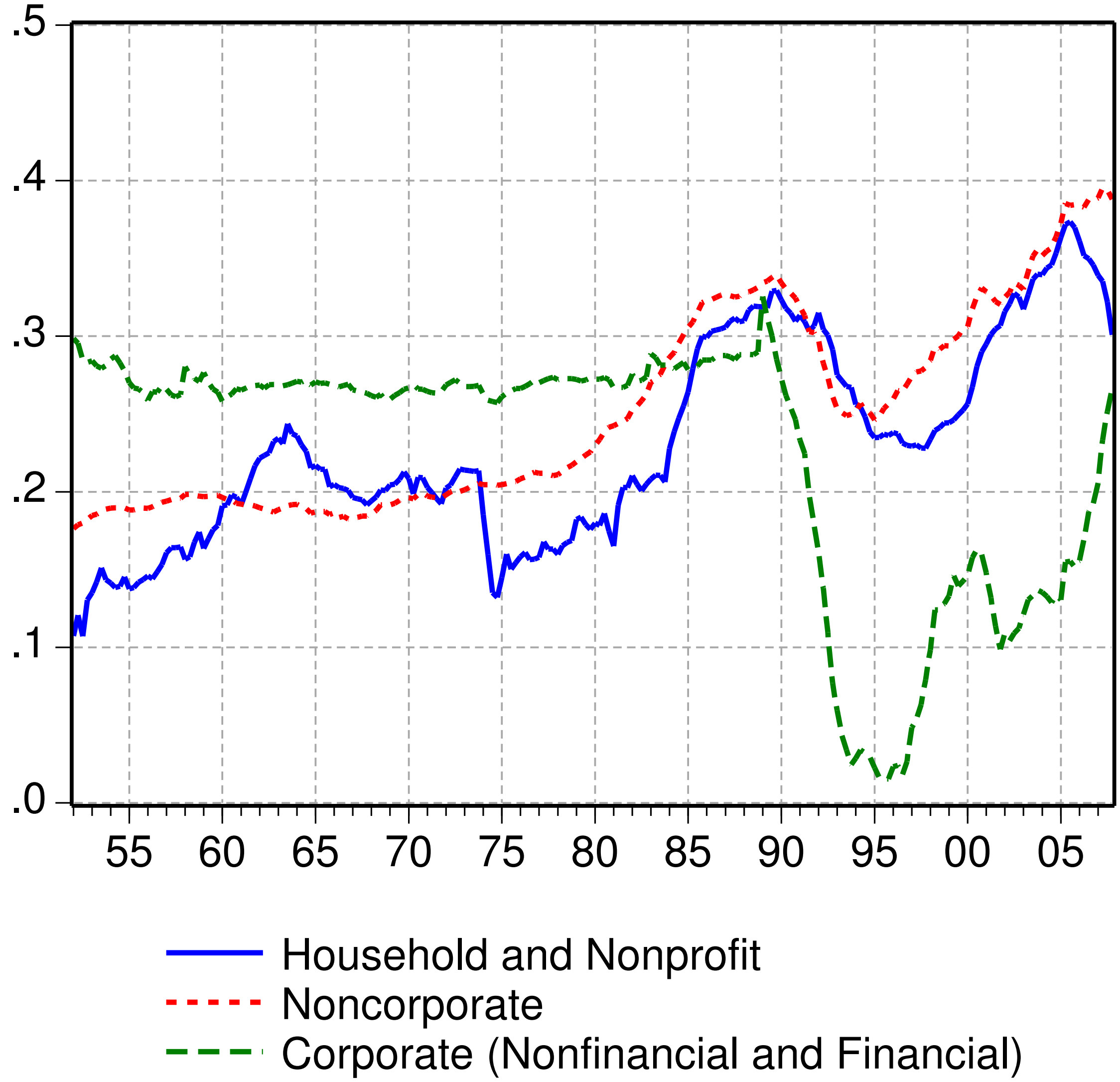


Figure 6: Land's Share of the Value of Real Estate, Noncorporate Detail, 1952:1 - 2007:4

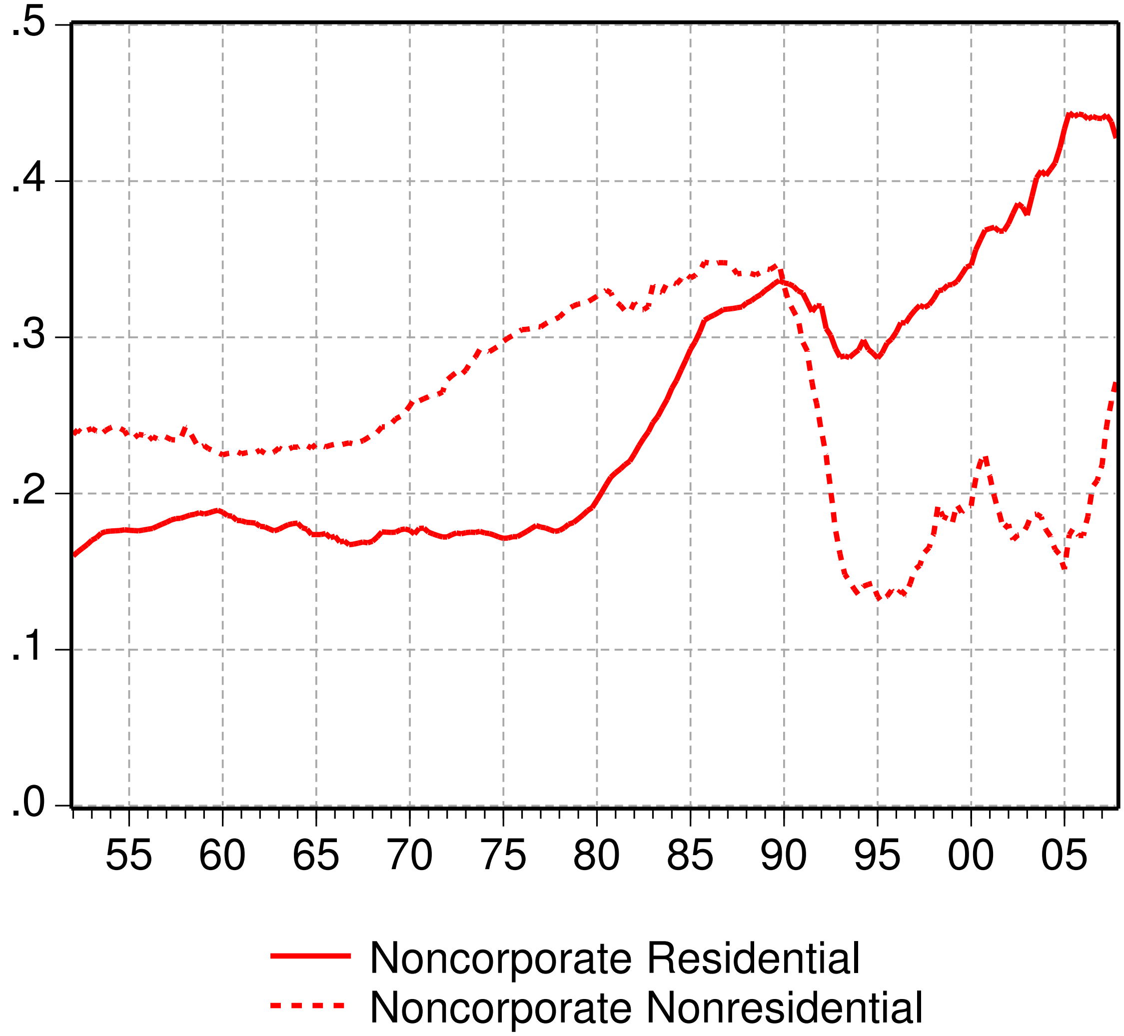


Figure 7: Real Price Index for Land (2000:Q2 = 1.0), Log Scale, 1952:1 - 2007:4

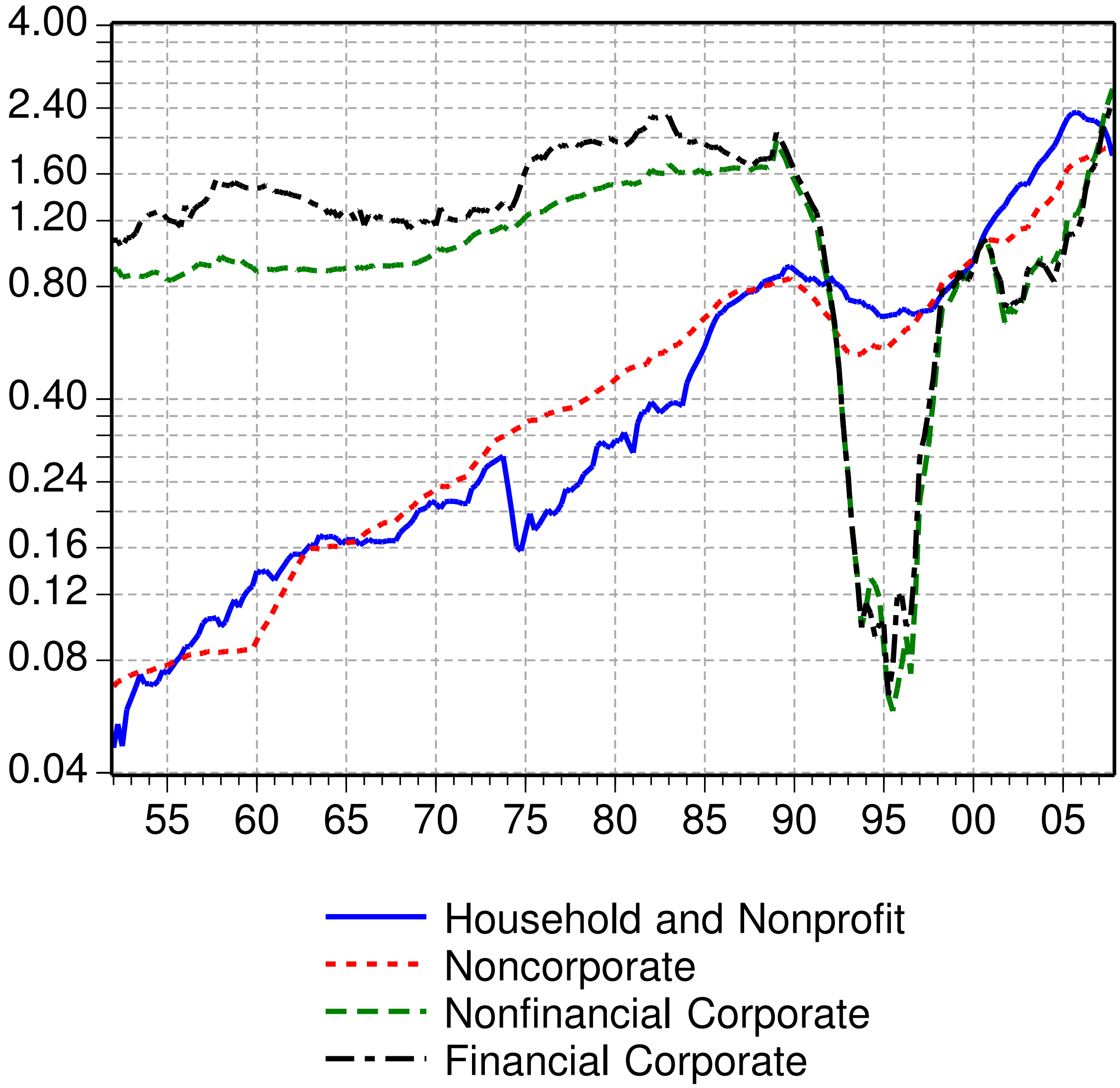
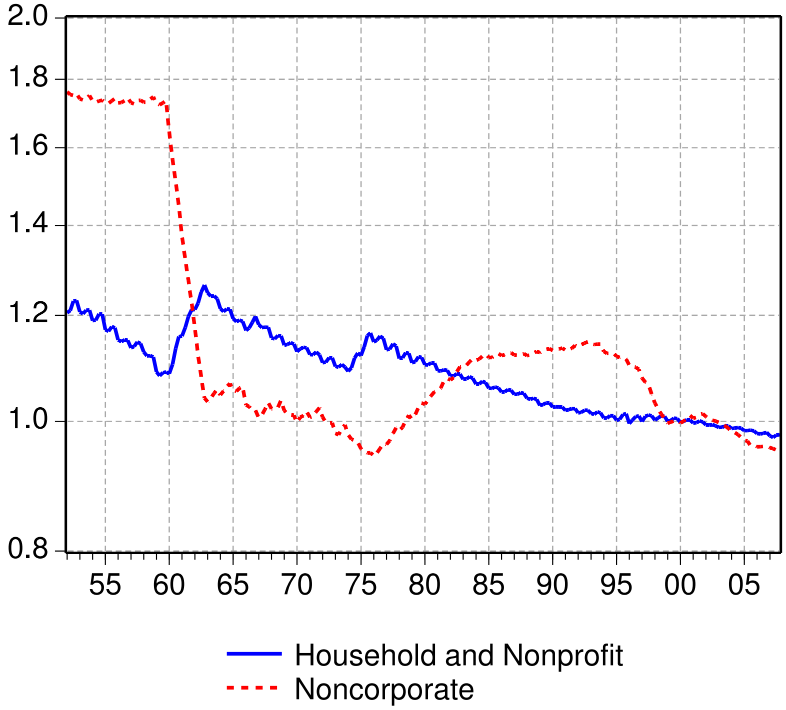


Figure 8: Quantity Indexes for Land (2000:Q2 = 1.0), Log Scale, 1952:1 - 2007:4



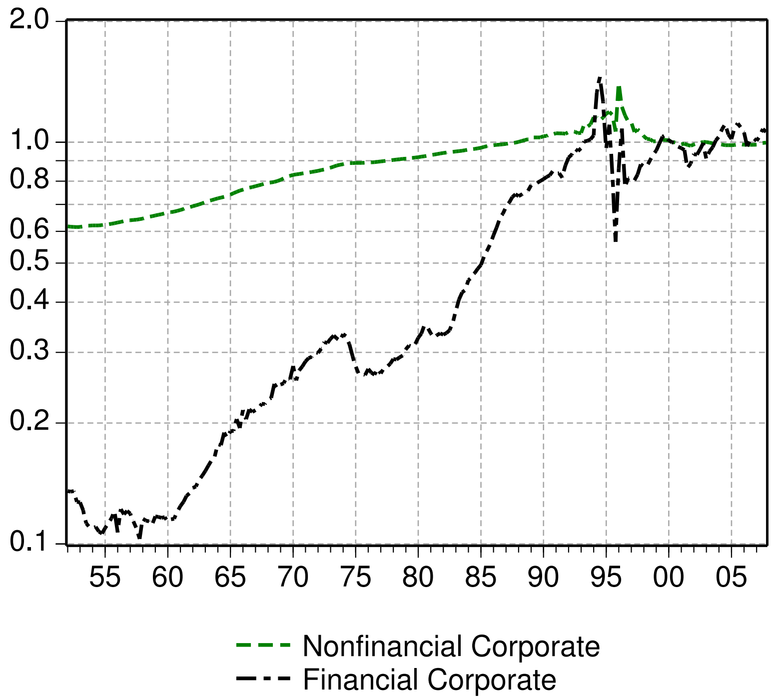


Figure 9: Real Price and Quantity Indexes for Residential Land (2000:Q2 = 1.0), Log Scale, 1975:1 - 2007:4