Housing and Government Policy in the Global Economy: The Cases of Korea and the US

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I. Introduction

For the past two decades, housing prices have surged through much of the developed world, and more recently these increases have accelerated. Sustained price increases of this sort across many economies in housing markets, which are local markets, are unusual. For the US, in particular, the recent gains represent a major paradigm shift. There has not been a previous period when housing price increases exceeded CPI gains for six years in a row in US history. We also consider the price run up in Korea where prices have increased steadily at rates exceeding inflation for decades until the Asian financial crisis and they are once again increasing dramatically. While evidence suggests that prices are rising for housing across many nations, the magnitude of the increase varies considerably across countries and even within countries, across cities. We consider the sources of this run up in housing prices and possible government responses.

II. Basic Economic Models

Basic economic theory can provide insights into the factors behind rising prices and differentially rising prices within markets that are subject to similar demand conditions. In particular, theory and empirical evidence suggest that while housing price change occurs naturally over time in response to demand increases, it is supply conditions that are all important in explaining the magnitude and volatility of recent trends. In fact, as noted by Malpezzi and Mayo (1997), housing demand parameters are remarkably stable and predictable across countries and places; supply parameters vary much more.

Economic models demonstrate the role of supply response to positive demand shocks in determining how much prices will rise. As Exhibit 1 illustrates, with inelastic supply, little supply response is observed and prices increase. In the elastic case, shown, in Exhibit 2, the supply of housing expands to match the increase in demand; hence, prices do not increase much or at all. On the other hand, in the inelastic case, prices may rise a great deal.

Moreover, markets that are characterized by inelastic supply in the short run are likely to be volatile. For example, when markets are restrained by regulation, in the face of increasing prices, governments may initiate supply increases. As illustrated by Exhibit 3, the sudden supply surge results in a housing price crash. Inelastic supply also can induce “speculation,” which in turn adds to volatility. With sharp initial price increases, speculation, defined as investment driven by

optimism about future prices based on extrapolation of past appreciation, takes off. Without price rises, in the case of elastic supply, there are no dramatic price spikes to set off investment demand based on speculation that the future will recap the past.

Malpezzi and Wachter[1] show that a lagged supply response to price changes and speculation are sufficient to generate cycles. Moreover the inelasticity of supply is shown to be strongly related to the volatility of prices.. Markets with more responsive regulatory systems or fewer natural constraints (from physical geography), will experience less volatility.

Many studies show the impact of the regulatory environment on housing prices,[2] and there are also a number of studies that measure the resulting supply elasticity[3] For the US, the evidence is that long run supply elasticities are high.[4] In fact, Muth and Follain cannot reject the hypothesis that long-run U.S. supply curves are perfectly flat. Malpezzi and Maclennan argue (and present estimates consistent with) high long run supply responsiveness, but they also point out that full adjustment can take a decade or more.[5] In Korea[6], a strict regulatory environment has inelasticized supply. Many studies[7] have documented the especially convoluted Korean regulatory system and Malpezzi and Mayo (1997) have shown that this leads to a very inelastic housing supply. At some point, as prices skyrocket and shortages become more apparent, the Korean government responds as it did with the Two Million Houses Program in 1990. This has the effect of shifting an inelastic supply curve to the right in a series of discrete jumps. Exhibit 3 illustrates.

A world in which government responds to rising housing prices by one time programs to get the market moving, as in Korea's or Sri Lanka's Two Million Houses Program, can be characterized as occasionally shifting an inelastic supply curve to the right. This leads to a boom and bust cycle. Reform measures that tackle the root causes of inelastic supply have the effect of flattening the supply curve and moderating the boom and bust cycle, reducing risk for investors.

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[1] Malpezzi and Wachter, The Role of Speculation in Real Estate Cycles," forthcoming, *Journal of Real Estate Literature*

[2] Pollakowski and Wachter (1990), Segal and Srinavisan (1985), Black and Hoben (1985), Rose (1989), Shilling, Sirmans and Guidry (1991), Malpezzi (1996), Malpezzi, Chun, and Green (1998), Malpezzi (1999) and Riddiough (1997). International studies include Angel (2000), Evans (1999) and Monk and Whitehead (1995) as well as Bramley (1999), Angel and Mayo (1996), and Malpezzi (1990).

[4] See *Follain (1979), Muth (1960), Stover (1986), Smith (1976), and Malpezzi and Maclennan (2001)*

[5] Of course, it bears repeating, since the thrust of some of this research is often misinterpreted, that regulation *per se* is neither good nor bad. What matters is the cost and benefits of particular regulations under specific market conditions. Regulations need to be put to the cost-benefit test, as any other private or public economic activity.

[6] Much of this discussion of Korea is taken from Malpezzi and Wachter 2005

[7] such as Kim (1993), Hannah, Kim and Mills (1990), and Green, Malpezzi, and Vandell (1992)

III. Global house price trends in recent years and their underlying determinants

The period of the early 2000s has been witness to a global housing boom. (See Exhibits 4 and 5.) Using our calculations, the average global growth rate in housing prices from 2000-2004 was 10%, adjusted for inflation, as evidenced by housing price changes in the 13 nations[8] surveyed by the *Economist*[9]. This doubled the 1995-2000 average annual rate of increase of 5% and more than doubled the 3 % 1980-1995 average.

These findings indicate that housing price appreciation in the period from 1995 to 2004 far exceeded appreciation in earlier periods from 1980 to 1995. Even so earlier rates of appreciation were also high and these high rates of appreciation have accelerated over time.

The major factor in the global house price run-up is the major decline in worldwide interest rates. (See Exhibits 6-9) From 1980 on, average interest rates[10] for these same developed economies, tracked using prime borrowing rates, declined somewhat from an average high of 15% in 1980 to 13% in 1990, with the decline accelerating to an average of 4.4% in 2004. Decreases in interest rates lower borrowing costs and drive funding from lower interest bearing bonds to real estate investment vehicles, including housing. Interest rate declines have continued, across many economies, even with rising GNP growth rates in recent years. Thus, both increased housing affordability and incentives have driven the demand for housing, along with GNP increases. Real estate and housing has been "blessed" by the double beneficence of expanding economies and a low cost of funds. Although the interest rate decreases tend to be uniform

[8] The countries covered are Spain (ES), Ireland (IE), the United Kingdom (UK), the Netherlands (NL), Belgium (BE), the United States (US), Japan (JP), France (FR), Canada (CA), Italy (IT), Australia (AU), Sweden (SE), and Germany (DE). These indices were given as a percentage change from one year to another, and the given periods were 1980-2001, 1995-2002, 1997-2004, 2000-2001, 2001-2002, and 2003-2004. Using the principle of forward rates and the formula $1+f_{m,n} = 1+r_n / 1+r_m$ (where $f_{m,n}$ is the forward rate starting m years from now and ending n years from now), we were able to isolate the growth rates for the periods presented. An example of our methodology for doing so is when we were trying to isolate the 1980-1995 period. We had the data for 1980-2001, 1995-2002, and 2001-2002; therefore, we first found the rate of growth from 1980-2002 by multiplying one plus the rate from 1980-2001 by one plus the rate from 2001-2002. We then divided one plus this rate by one plus the rate from 1995-2002 to obtain the growth rate from 1980-1995. For each country, we deflated the housing price index to arrive at the inflation-adjusted real price index. The source of the inflation data was the "International Financial Statistics" website at http://ifs.apdi.net/imf/ifsbrowser.aspx?branch=ROOT.

[9] Survey source: "Finance And Economics: Betting the house; Property prices**,"** March 6, 2003, "Leaders: Homing in on the risks; House prices and the world economy," June 3, 2004 and "Finance And Economics: Hair-raising; Global house prices," June 3, 2004, from *The Economist.*

[10] Interest rates are noted as "Interest rate, banks prime lending, percent per annum, period average" from the following source: "United Nations Statistics Division Common Database" at http://unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp.

within an economy not all housing markets, even within the same country, have equally participated in price gains.

Country and city specific supply side factors are important in explaining the differentials in house price run-ups. (See Exhibits 10-13.) This is dramatically evident in the systematically higher rates of house price appreciation rates in cities (where supply of developable land is limited) relative to national rates of increase. The fact that city price rises in almost every country have exceeded nation-wide price rises is an unnoticed but important global trend. Indeed this trend holds for the past two decades as well as for the most recent period.

The explanation is found in greater supply constraints in these cities and in the greater demand for centrality, which by its nature is supply constrained. Demand is increasing for cities participating in the expanding global economy.[11] In these prime urban areas, housing prices are likely to have been initially higher than in the surrounding countryside or secondary cities, due to high density and scarcity of developable land. Thus demand is increasing precisely where supply is limited and where prices are already high, which makes price trends in markets with supply limitations more salient for national pricing outcomes and as a policy concern. It is the combination of the rise in demand for housing and developable land in increasingly important centers of economic activity, that are part of global networks, and the fact that these centers are supply constrained that may explain both global house price run-ups and the systematic nation/city differentials in price outcomes that are observed.

This result is evident for the US as well. There is wide variation in house price increases across regions. In particular, there is a major difference, demonstrated in exhibits 14 through 25, between rates of increase in coastal cities (New York, Boston, San Francisco, and Los Angeles) and inland cities (Phoenix, Indianapolis, Las Vegas)[12]. These differences are related to increasing

[11] Global cities are characterized by cosmopolitan populous gatherings of people which play an instrumental role in the functioning of the world economy. These cities, with an elite membership, are interconnected and serve as global centers for a variety of industries including finance. These cities form partnerships to facilitate the trans-border flow of capital and knowledge. The reciprocity and synergies achieved by these tight liaisons are conducive to collaborative development.

In global cities the partnerships are complemented by the close-knit agglomeration of educated, entrepreneurial, and a research intensive population within each of these areas. Each of these cities, functions as a 'primate city', with the ability to amass a large population and a centralization of knowledge and research. These cities house main institutions, ministries, corporate headquarters, and universities. The impact of fusing the people from a variety of industries, backgrounds, and perspectives is the emergence of innovation. Therefore, each of these cities functions as an innovative unit and when partnered with the other global cities they are able to achieve a cohesive and paramount level of development.

[12] P and S in the diagrams taken from Evenson represent dynamic time-paths of house price and housing stock, respectively.

demand for housing in areas with restricted supply and to the supply-side conditions in these growing cities themselves. Differences are related to demand evoking different supply responses. This is demonstrated by the supply response simulation tables included for different markets calculated by Evenson (2003). In fact, OFHEO repeat-sale price data demonstrate that in many inland markets, even though they are growing, there has been little to no price increase over the past several decades.

Housing Prices, adjusted for quality, have kept pace with inflation nationally in the US. The growth rates of these indices have been similar, as shown in exhibit 26 over this roughly 20-year period; Nonetheless, in 6 of the seven years since 1997, appreciation in the housing component of CPI has exceeded the growth in the overall CPI index, a major departure in historical patterns. Only in recent years have housing price increases exceeded the inflation rate, and almost all of this increase is due to price increases in the regions of the country that are supply constrained.[13]

Korean Housing Prices

House price trends for Korea are clearly impacted by the Asian financial crisis in 1997 (See Exhibit 27). Thus, as expected, over the 1990s, the rate of house price appreciation in the 13 developing countries tracked by the E*conomist* survey exceeds that of Korea, but the spatial patterns are similar. As elsewhere, price gains are strongest in the major city, Seoul. We may point out, however, that housing prices in Korea and even in Seoul have not gone up out of proportion, relative to other countries (See Exhibits 28-29.).

IV. Global and Capital Markets: Explaining the Trends

To explain the links among the global factors of interest rate decreases, economic activity increases, and housing price outcomes, we turn to economic concepts. DiPasquale and Wheaton (1996) demonstrate these concepts with a four quadrant model shown in exhibit 30. The logic of this model states that if interest rates decline, prices will increase, because investors are now willing to pay more for an opportunity that continues to offer the same return. Therefore, each additional decrease in the interest rate will increase the price of an asset in the short run assuming and because the revenue stream remains the same in the short run. Conversely, an

[13] For more discussion, see IMF / BIS Conference Volume, forthcoming, 2005

increase in interest rates will cause an increase in price because investors will require a greater amount of money per dollar invested because the treasury market has become more attractive. When an interest decline occurs in the market, investors in real estate are immediately willing to accept a lower return on an investment. This translates into an immediate increase in prices because rents cannot adjust immediately (leases are long term). This phenomenon will be an inviting factor for investors, and this will result in an increase of the supply of stock. With increased supply, competition will force rents to decline in the long run. If rents decline in the long run - the price will shift downwards to maintain the requisite ratio of prices to rents.

With rents constant, asset prices increase, but supply increases will drive rents down. Higher prices invoke more supply as long as they are above construction costs, and new supply drives down rent levels, and as a result asset prices. In the long run, asset prices may remain somewhat higher than they were originally, depending on the elasticity of supply. If supply is fully elastic, then asset prices return to their initial levels in the long run. If supply is inelastic, then asset price levels decline but do not return to their original level.

In the graph, we use the DiPasquale & Wheaton four quadrant model to illustrate real estate market interactions. In the DiPasquale[14] & Wheaton model, a decline in interest rates immediately affects the upper left portion of the model causing a decline (shift of the ray to the left) in the asset market valuation line. The reason the line shifts is because it is derived from the algorithm of Price (P) = Revenue (R) / Interest Rates (I).

The shift in demand in the asset market valuation line impacts the remainder of model as well as the individual market valuation. When interest rates decrease the implied square of intersection lowers and widens (because a lower amount of rent yields a higher price than before.) The intuition states that increased prices will motivate more suppliers into the market thus creating an increased demand for construction services. The increased construction will result in an increased amount of stock. This relates directly back to the graph in the upper right hand corner that states with an increased level of stock, rents will decrease because demand hasn't increased, therefore a rent adjustment occurs. This demonstrates not only the interconnectivity of the entire model but the impact of interest rates on all aspects ranging from price to construction costs to stock level to rents.

The DiPasquale and Wheaton model focuses on the long run effects, but the differences in short run and long run effects are important. Thus the immediate impact of an interest rate shift may mislead those who take the initial price rise to be the long run effect. Markets will adjust both to the decline in interest rates and to higher prices by increasing the supply of real estate which will dampen price rises. The result is that the initial demand-led positive impact on real estate prices is moderated. Thus, the prime conclusion from this economic model is that the housing boom of the early 2000s is destined not to last. Housing prices will moderate, with local factors influencing the depth and timing of this moderation.[15]

There are two major demand factors in current global house price appreciation besides interest rate declines. These are the worldwide GDP increases (See Exhibit 31) and the continuing importance of globalization and the rise of global cities. As a percentage of the overall global economy, international trade has continued to increase its relative importance. This globalization has been led by a new class of global cities

Global cities are cities that play major roles in the world economy, especially as centers for the "cross-border flow of capital and goods." Sassen[16] demonstrates that these cities have become global centers for finance, servicing, and management, and they are interconnected in an international network. As has been explained in the literature the greater the quantity and rapidity of information flows, the greater the need for personal, trustworthy, face-to-face interaction - that is, for real *places*. [17]

[15] The model can also be used to demonstrate the impact of an increase in the cost of capital on real estate prices. Reversing the model shows that the initial impact is to decrease housing prices or slow their increase. But this doesn't last. As supply responds to the higher cost, rents or for homeowners, user costs, are driven up. The important result of an increase in capital cost is to increase the cost of housing for the user. The analysis of this effect is highly relevant to the consideration of the impact of a tax on real estate as is being proposed in Korea., as discussed below.

[16] 1991 and 2003

[17] Global cities, are characterized by cosmopolitan populous gatherings of people which play an instrumental role in the functioning of the world economy. These cities, with an elite membership, are interconnected and serve as global centers for a variety of industries including finance. These cities form partnerships to facilitate the trans-border flow of capital and knowledge. The reciprocity and synergies achieved by these tight liaisons are conducive to collaborative development.

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In an increasingly globalized world and in a world where knowledge is increasingly important, the centers of interconnected economic activity will grow in strength. These centers are growing because their centers are increasingly productive. That is, as knowledge and globalization increase, so will the demand for interconnected global cities. As the new urban economic models predict, such cities demonstrate increasing returns to scale and contribute to the productivity of their economies. This analysis leads to a more specific question: Why are housing prices increasing in global cities and what does this mean for Seoul?

As the centers of global activity grow, global cities appear to become more powerful as attractors of economic activity. Global centers grow with the growth of their economy and in addition with the growth in international commerce as a whole. The force behind the demand for these centers is that they are centers of commerce, and they are the places of significant agglomeration economies that also allow for crucial person-to-person interaction that is necessary for knowledge, creation, and innovation.

As economies develop, knowledge creation, as a service industry, becomes more dominant – which is an additional driver of demand for centrality. Seoul as a leading global city is part of this international network and thus is subject to these demand forces. The primary reason for increased demand in Seoul, as in other central cities, is that the density of activity yields increasing returns to scale, which further provides a positive feedback loop that only fuels an ongoing housing boom. An effect of this increasingly significant agglomeration is increased productivity which further drives overall country gross national product, and fuels housing price growth at its foundation.

Thus, while we have focused on the impact of an interest rate decrease, given its importance in recent macro-economic trends, the increase in GNP and globalization are secular forces that are likely to persist, although not steadily, in the long run. This drives increases in economic activity and the demand for real estate and, in particular, urban real estate. The result as demand increases is higher rents, higher asset prices and eventually new supply which will moderate housing prices, leaving them higher than where they started but not at their highest levels. Thus again the short run and long run price outcomes of an increase in demand differ.

How high prices go due either to an increase in economic activity or an interest rate decline is determined by the responsiveness of supply, or as measured by economists, the market's supply elasticity. The less responsive or elastic supply, the greater is the spike in prices. A key factor in

supply elasticity is determined by government policy and that is the extent to which regulatory barriers limit supply responsiveness, to which we now turn.

V. Government Policy

In the face of the recent increases in house prices, what are available policy options, what policies are being called for by citizens, advocacy groups, and the media, and what steps are governments taking? I will draw on the US experience to comment on these questions and then contrast this with the new policy direction in Korea. I will close with thoughts on why differences exist in policy response and policy positions by the press and media as well as the public.

In the United States, federal housing policy is focused on home ownership. Stabilizing the price of housing is not a policy goal. It is assumed that housing prices are the outcome of market forces, which cannot be controlled by governments. Thus, despite the unprecedented increases in housing prices, there is today no federal housing policy goal of stabilizing housing prices. Nor has there been such a goal in the past. And despite political change, it is very unlikely that this policy of no policy is likely to change. Rather, federal housing programs in the US are focused in recent decades on demand side support for housing for low-income households through vouchers and on homeownership support for households of all income levels. In particular, there is a current and historical mandate to increase homeownership and to create an "ownership society," a mandate that spans the political spectrum.

Pro-homeownership policies that the federal government has put into place include tax advantages and housing finance support. Tax advantages include the deductibility of mortgage interest payments from federal tax obligations and exemption from federal taxes on capital gains for most homeowners. Tax benefits accrue mostly to mid and upper income homeowners, since others are likely to take the standard deduction.

While the effect of housing finance support is to increase homeownership at all income levels, there are policies in place that are targeted specifically to increase homeownership among lower income households through the provision of increased access to mortgages for homeownership to this demographic group, identified, in the US, as the underserved,

Stabilizing local housing prices is not a goal of local housing policies either. While it is not the policy of local communities to decrease housing prices, implicitly many local communities do try to increase housing prices. What local governments do is control the supply of developable land. They do so through planning and land use regulation; which in the US occurs mostly on the local level, thereby providing local governments control over developable land supply. The goal of local government, in brief, is to maximize the welfare of their citizen voters, who tend to be, by a wide margin, homeowners. Local governments benefit homeowners by maximizing their localities' aggregate property value. Since local services are to a significant extent paid for by local property tax revenues, by maximizing aggregate property values, local governments can provide more services while maintaining or decreasing local tax rates. For most communities the way to maximize aggregate property values and maximize the welfare of their citizens is to increase the supply of developable land. Therefore, in the US, local governments often compete to provide developable land. This makes the supply of developable land elastic and also makes the supply of housing, which relies on the supply of developable land, elastic.

Some communities (often by combining together in regional entities which may be state enabled), however, do restrict supply. Some do so because they have monopoly-like power, since their locality has some amenity like proximity to the coast (such as communities in the State of California) which cannot easily be reproduced. Others value "quality of life," amenities such as open space and low density development.

The attempt to restrict supply in the local community often works but at the same time causes population spillovers to the communities which can and do expand to accommodate increased demand. Prominent examples include Phoenix Arizona, Boise, Idaho and Las Vegas, Nevada which are growing rapidly because they are accommodating the demand that California communities cannot supply.

Thus, to the question of whether local policy attempts to control housing prices, the answer is paradoxically, if anything, that localities attempt to raise housing prices, when they can through restrictive policies, and that decreasing prices is not on the political landscape. Increasingly, localities may act together to impose region-wide and state-wide growth controls, which may raise local housing prices. They are driven to do so in part because locally elected politicians respond to the interests of their electorate, who are primarily homeowners. In any case, decreasing housing prices is the goal of neither local nor federal housing policy.

In the face of the major run-up in housing prices in many US cities, it is interesting to ask whether there have been changes in the stance of federal housing policy. In fact, the federal housing policy environment is quite stable and, with the exceptions budget discipline, funding cutbacks and calls for increased oversight for the government sponsored agencies, Fannie Mae and Freddie Mac, there are no major changes to note. In particular, there is no change in the firm belief that federal policy has no role in controlling housing prices.

Given the lack of new federal policy initiatives, it is of interest to consider the response of the national media and the general public to the run-up in housing prices in the US. Are there calls from the general public or the media for policy action? Have house price increases drawn media attention? In short, the answer to the former is no. The answer to the latter is that media attention is widespread in local markets where high and rising prices are a factor. In these markets, the major issue that the media address is whether home buyers should buy now or wait. Neither the national nor local media seek to pressure governments into taking policy action to limit house prices. Why? First, house prices are viewed as market outcomes and not effectively subject to government manipulation and this is a factor. Second, high homeownership is a factor and, for many, increased homeownership affordability is an additional factor. Thus for many households, ownership is more affordable in the US today than ever.

This is in part due to mortgage rate declines which have accompanied interest rate decreases. And to some extent it is because house price increases are regional phenomena, and there are markets where housing is eminently affordable. Moreover because most households are homeowners they are participating in these price run-ups and are protected against increases in rents. In short, access to homeownership has increased with increasing prices and is driving the increasing prices. There is no political outcry to address rising prices, and there is no demand for governments to counter the price rises. There is widespread acceptance that prices are the outcome of markets and that they cannot be decreased, only suppressed, and the very suppression will limit supply response.

Korea has responded to its housing price boom in three ways: by increasing the cost of capital for real estate, by placing controls on housing transactions, and by episodic increases in construction activity. Conceptually, these either do not work or work in the short run, but only in the short run. We have already discussed the negative impact of “stop and go” supply policies. We turn now to considering the impacts of the first two policy approaches.

A wealth tax on property may result in housing price decline in the short run but it is also likely to result in less building. A decline in asset prices has an effect of dampening construction because buildings aren't replaced as developers have less incentive to continue to build, and housing prices will recover in the medium term. Over this time period, demand increases but supply doesn't, so prices increase. However, housing prices may not recover completely if demand remains constrained beneath what it was originally. This is an unlikely event in a dynamic economy like Korea; thus in Korea's strong economy, this housing price decline and moderation is unlikely to last because economic growth will continue, although housing prices will be lower, to the extent housing demand is lower, than it otherwise would have been. What will persist, however, is a higher annual cost of homeownership.

Price controls as a solution are sure to backfire. Supply becomes constrained, decreasing the availability of housing, and transactions will also decline. As a result of both, there will be a decrease in general economic activity associated with housing demand. In fact, overall economic growth is likely to be dampened as housing activity is constrained.

Policies that suppress demand work in the short run only and boomerang in the long run. Policies that decrease the affordability of housing and homeownership are counter to the intended goals and policies that increase the cost of the supply of housing, while decreasing investor demand in the short run ultimately will increase the cost of housing as well. There is no way to remand the laws of supply and demand; rather, policies need to work to increase the responsiveness of supply[18] and to protect households by encouraging homeownership.

[18] Of course what is necessary is an evaluation of both the costs and benefits of regulation.

Demand Shocks with Inelastic Supply: Boom and Bust

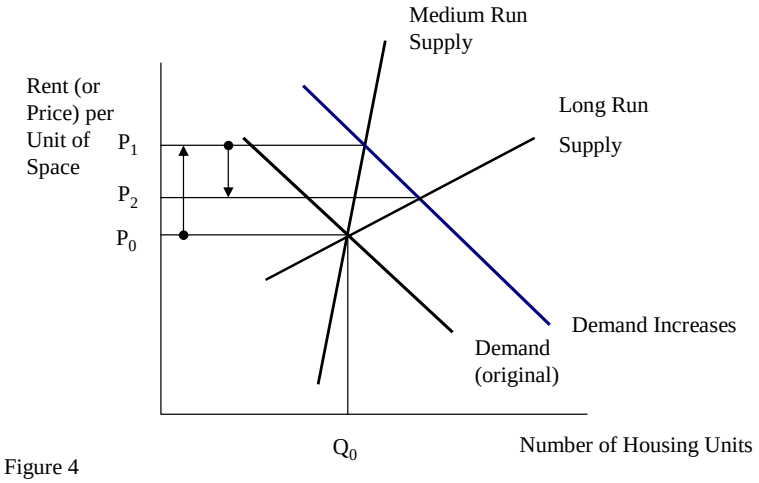


Figure 4

Exhibit 1 - Malpezzi and Wachter, 2005

Demand Shocks with Elastic Supply: Lower Price Shocks, Less Volatility

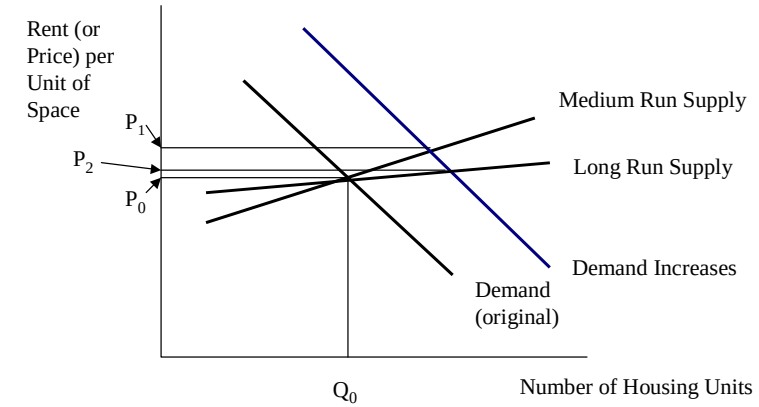


Figure 5

Exhibit 2 - Malpezzi and Wachter, 2005

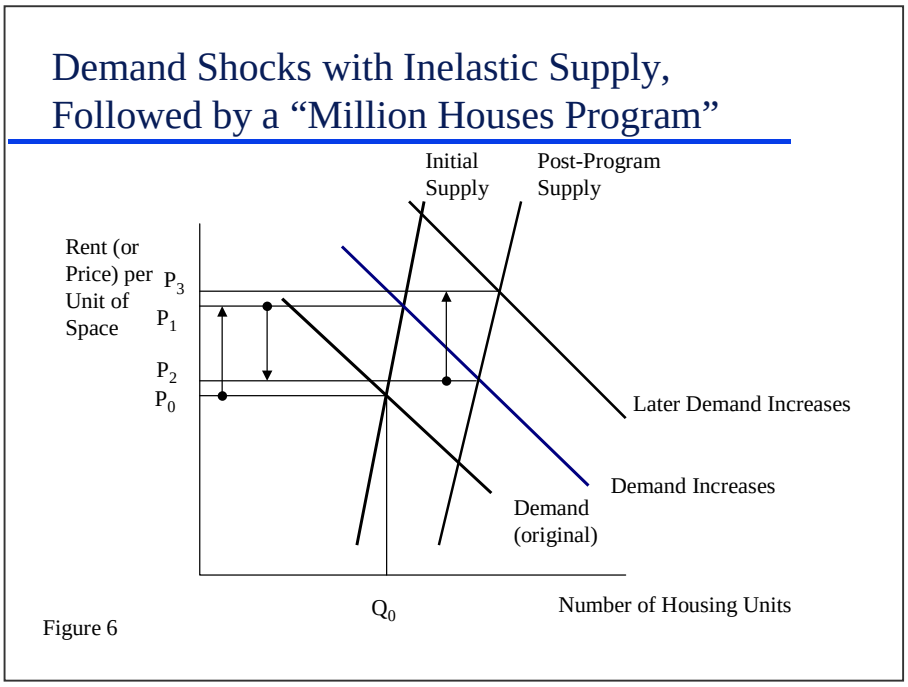


Exhibit 3 - Malpezzi and Wachter, 2005

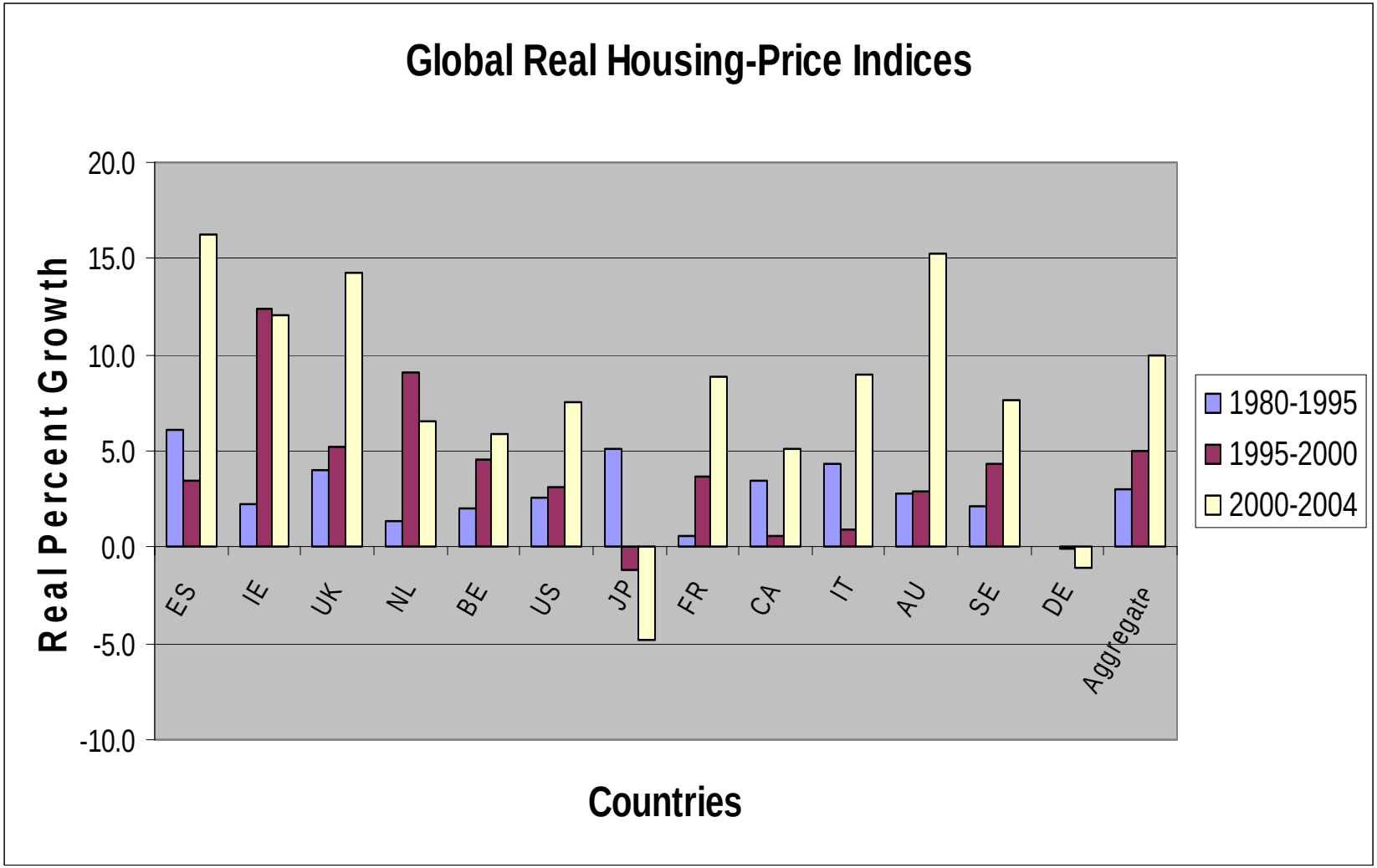


Exhibit 4 - Note: Real Percent Growth is annualized

Country	Rate of Change		
	1980-1995	1995-2000	2000-2004
Spain	6.1	3.5	16.26
Ireland	2.2	12.4	12.10
United Kingdom	4.0	5.2	14.25
Netherlands	1.4	9.1	6.45
Belgium	2.0	4.5	5.87
United States	2.6	3.2	7.52
Japan	5.2	-1.1	-4.86
France	0.6	3.7	8.89
Canada	3.5	0.6	5.10
Italy	4.3	0.9	8.96
Australia	2.8	2.9	15.26
Sweden	2.1	4.4	7.60
Germany	0.0	0.0	-1.11
Aggregate	3.0	5.0	10.0

Exhibit 5 - Global Real Housing Price Indices

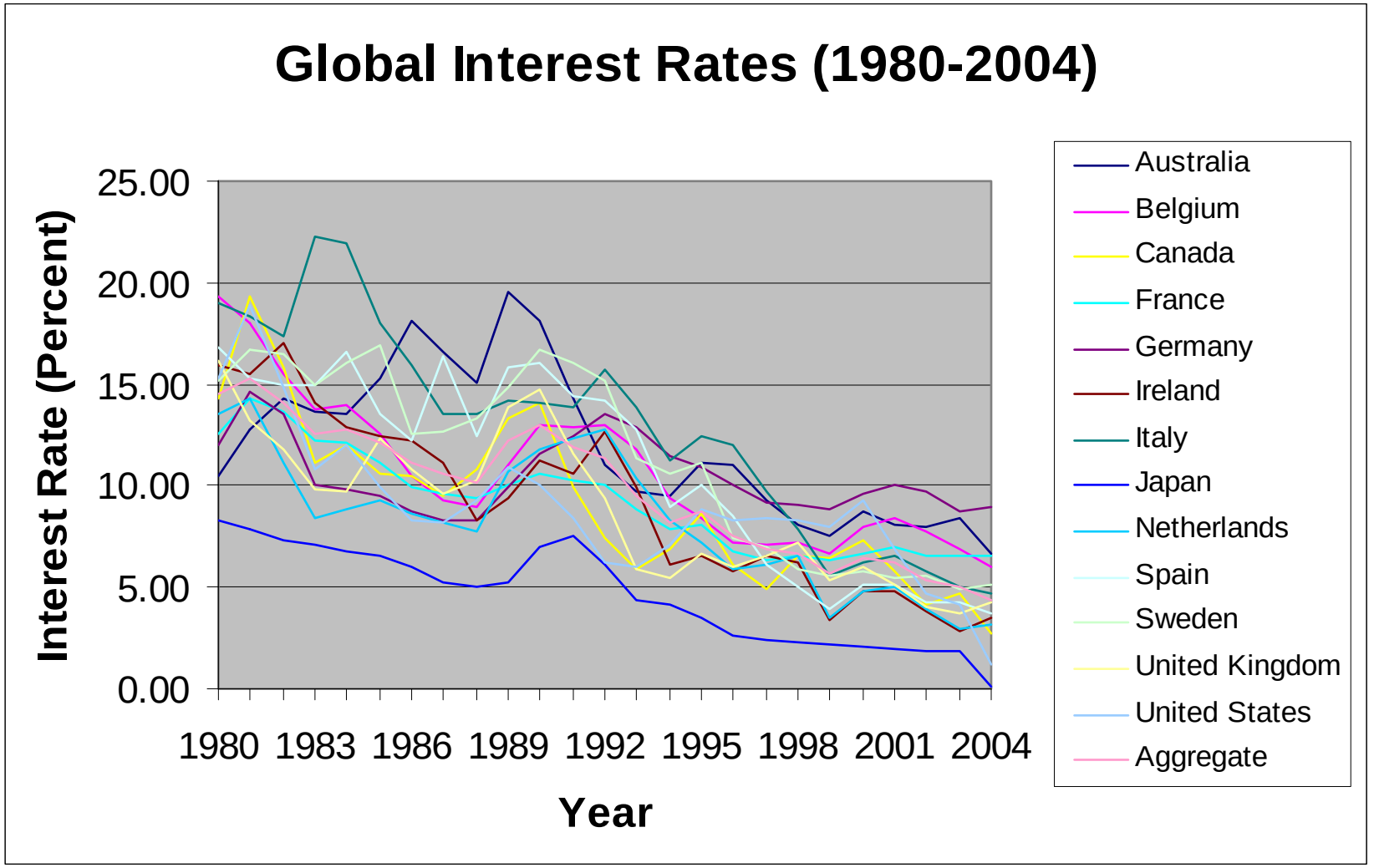

Global Interest Rates (1980-2004)
Interest Rate (Percent)
25.00
20.00
15.00
10.00
5.00
0.00
1980 1983 1986 1989 1992 1995 1998 2001 2004
Year
Australia
Belgium
Canada
France
Germany
Ireland
Italy
Japan
Netherlands
Spain
Sweden
United Kingdom
United States
Aggregate

Exhibit 6

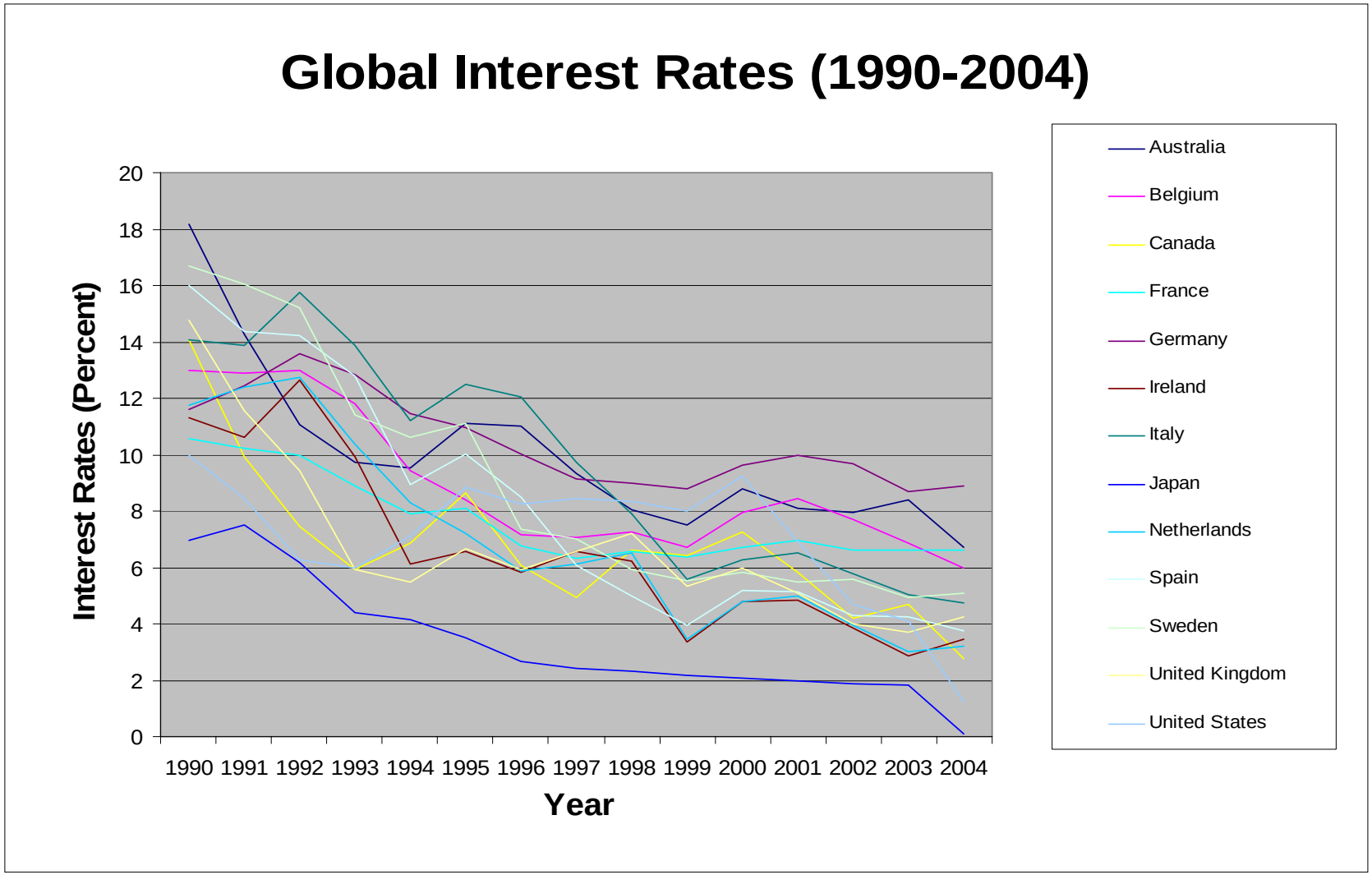

Global Interest Rates (1990-2004)
Interest Rates (Percent)
20
18
16
14
12
10
8
6
4
2
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004
Year
Australia
Belgium
Canada
France
Germany
Ireland
Italy
Japan
Netherlands
Spain
Sweden
United Kingdom
United States

Exhibit 7

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Australia	18.16	14.27	11.05	9.71	9.55	11.12	10.99	9.31	8.03	7.51	8.78	8.12	7.95	8.41	6.70
Belgium	13.00	12.87	13.00	11.81	9.41	8.41	7.16	7.06	7.25	6.71	7.97	8.45	7.70	6.88	5.98
Canada	14.06	9.93	7.47	5.93	6.87	8.64	6.06	4.95	6.6	6.43	7.27	5.81	4.2	4.68	2.75
France	10.57	10.21	9.99	8.89	7.89	8.11	6.76	6.34	6.55	6.35	6.7	6.97	6.6	6.6	6.60
Germany	11.59	12.46	13.59	12.85	11.47	10.94	10.01	9.12	9.01	8.8	9.63	10.00	9.69	8.68	8.90
Ireland	11.29	10.62	12.65	9.93	6.13	6.55	5.84	6.57	6.21	3.34	4.77	4.83	3.83	2.84	3.48
Italy	14.09	13.9	15.76	13.86	11.22	12.47	12.05	9.74	7.88	5.58	6.26	6.52	5.77	5.02	4.72
Japan	6.95	7.53	6.15	4.41	4.13	3.50	2.65	2.44	2.32	2.16	2.06	1.96	1.86	1.82	0.10
Netherlands	11.75	12.39	12.75	10.39	8.29	7.20	5.89	6.12	6.5	3.45	4.79	5.00	3.95	3.00	3.21
Spain	16.00	14.37	14.22	12.77	8.94	10.04	8.49	6.07	5.01	3.94	5.17	5.16	4.3	4.25	3.75
Sweden	16.69	16.05	15.2	11.4	10.64	11.11	7.38	7.01	5.94	5.53	5.82	5.47	5.58	4.92	5.11
United Kingdom	14.75	11.54	9.41	5.91	5.47	6.68	5.95	6.58	7.2	5.33	5.97	5.08	4.00	3.68	4.25
United States	10.00	8.46	6.25	6.00	7.13	8.82	8.27	8.44	8.35	7.99	9.23	6.92	4.67	4.12	1.21
Aggregate	12.99	11.89	11.35	9.53	8.24	8.74	7.50	6.90	6.68	5.62	6.49	6.18	5.39	4.99	4.37

Exhibit 8 - Global Interest Rates

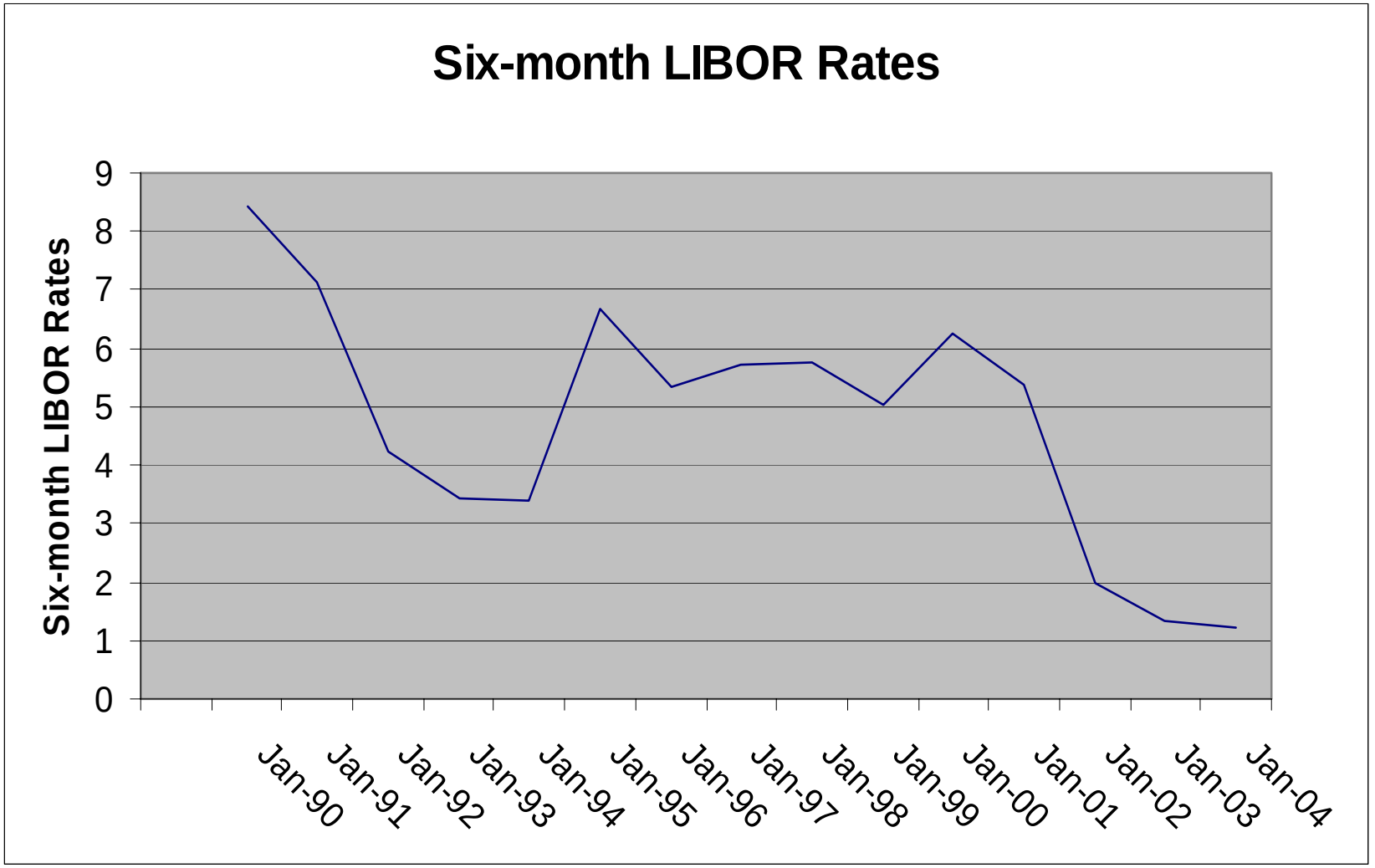
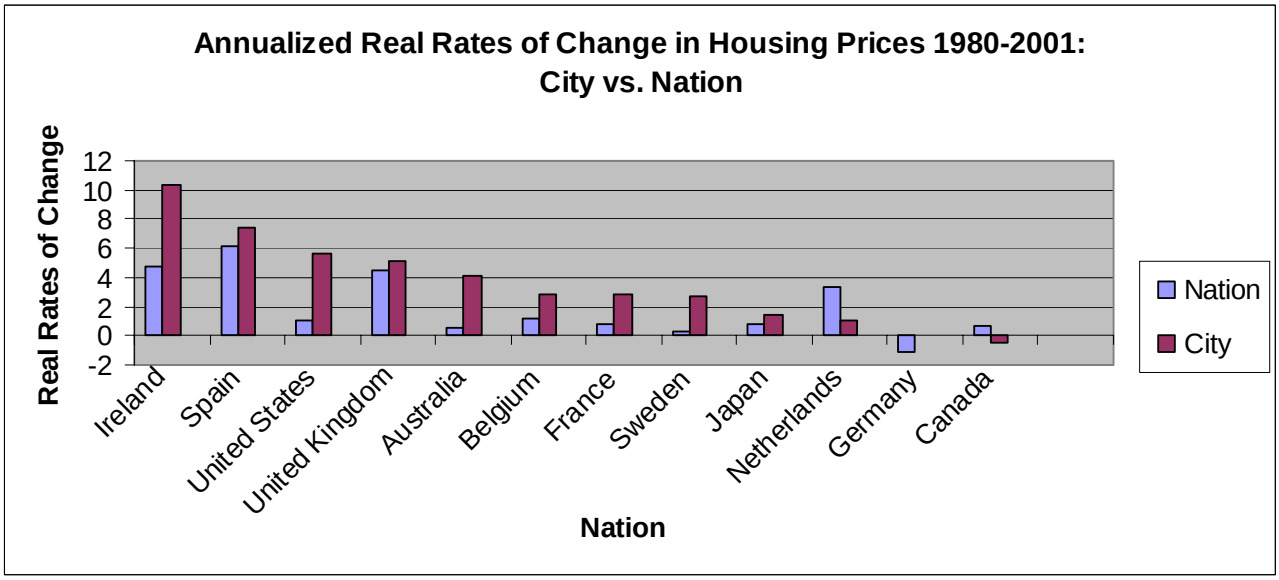

Six-month LIBOR Rates
Six-month LIBOR Rates
9
8
7
6
5
4
3
2
1
0
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04

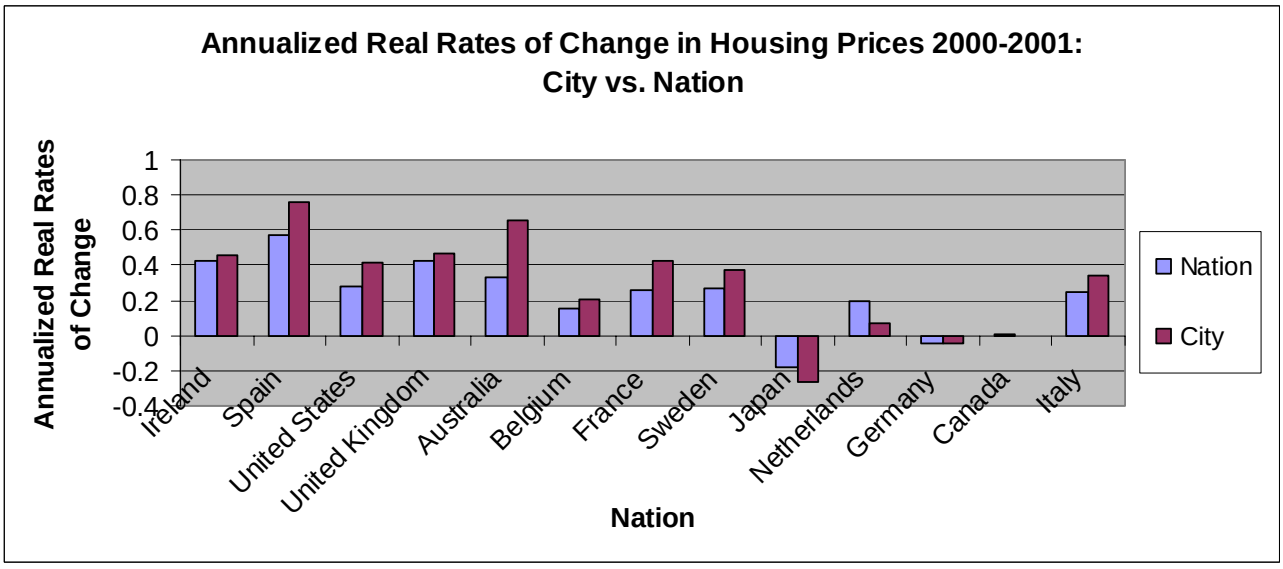
Exhibit 9

City, Country	National Rate		City Rate	
	1980-2001	2000-2001	1980-2001	2000-2001
Dublin, Ireland	95	8.6	207	9.2
Madrid, Spain	124	11.4	149	15.2
New York, United States	20	5.6	112	8.4
London, United Kingdom	89	8.5	103	9.3
Sydney, Australia	10	6.6	83	13.1
Brussels, Belgium	23	3.0	58	4.1
Paris, France	15	5.1	58	8.6
Stockholm, Sweden	6	5.3	54	7.5
Tokyo, Japan	15	-3.6	30	-5.3
Amsterdam, Netherlands	66	4.0	20	1.5
Frankfurt, Germany	-21	-0.9	0.0	-1.0
Toronto, Canada	13	0.2	-9	-0.1
Milan, Italy	13	5.0	N/A	6.8

Exhibit 10 - Real Rates of Change in Housing Prices: City vs. Country

Source: http://www.economist.com/displaystory.cfm?story_id=1057057

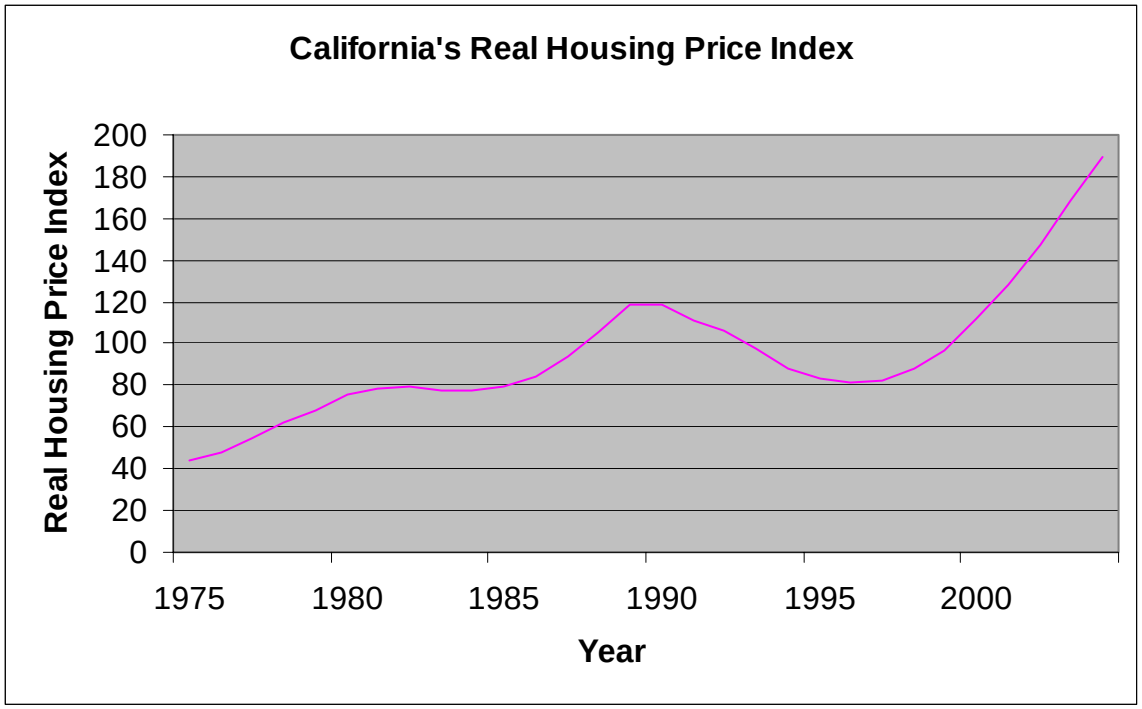


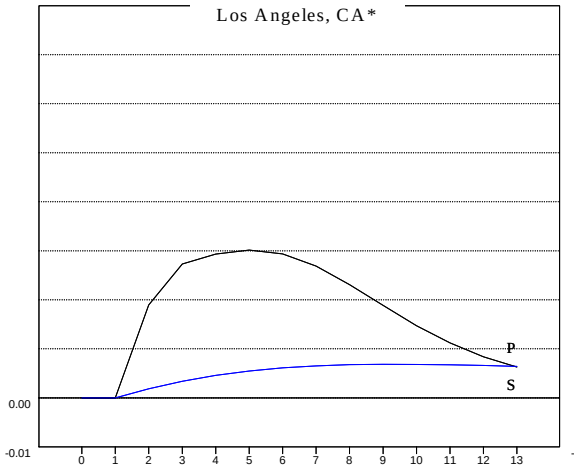


Exhibits 11 and 12

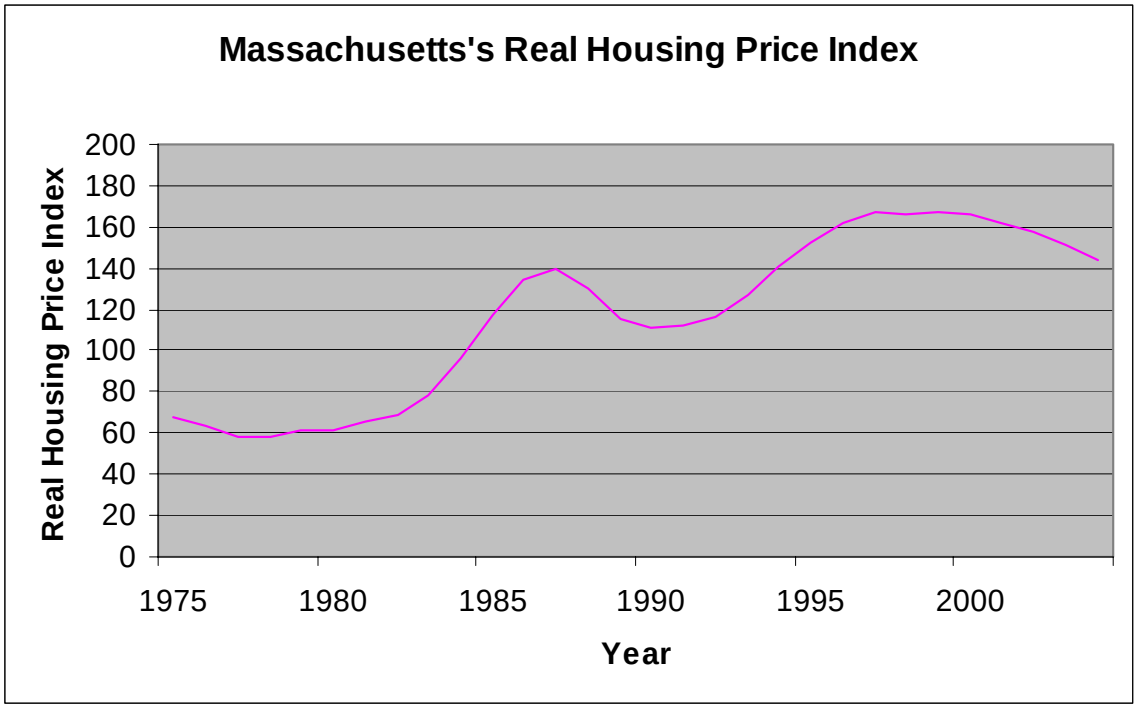
City, Country		Dublin, Ireland	Madrid, Spain	New York, United States	London, United Kingdom	Sydney, Australia	Brussels, Belgium	Paris, France	Stockholm, Sweden	Tokyo, Japan	Amsterdam, Netherlands	Frankfurt, Germany	Toronto, Canada	Milan, Italy	AVERAGE
National Rate	1980-2001	4.75	6.20	1.00	4.45	0.50	1.15	0.75	0.30	0.75	3.30	(1.05)	0.65	0.65	1.80
	2000-2001	0.43	0.57	0.28	0.43	0.33	0.15	0.26	0.27	(0.18)	0.20	(0.05)	0.01	0.25	0.23
City Rate	1980-2001	10.35	7.45	5.60	5.15	4.15	2.90	2.90	2.70	1.50	1.00	-	(0.45)	N/A	3.60
	2000-2001	0.46	0.76	0.42	0.47	0.66	0.21	0.43	0.38	(0.27)	0.08	(0.05)	(0.01)	0.34	0.30

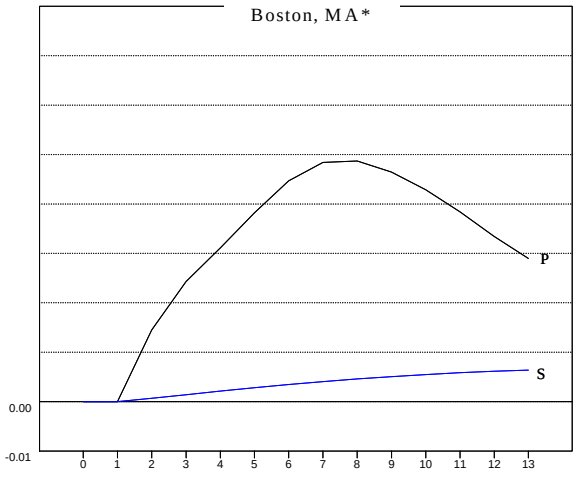
Exhibit 13 - City vs. Country



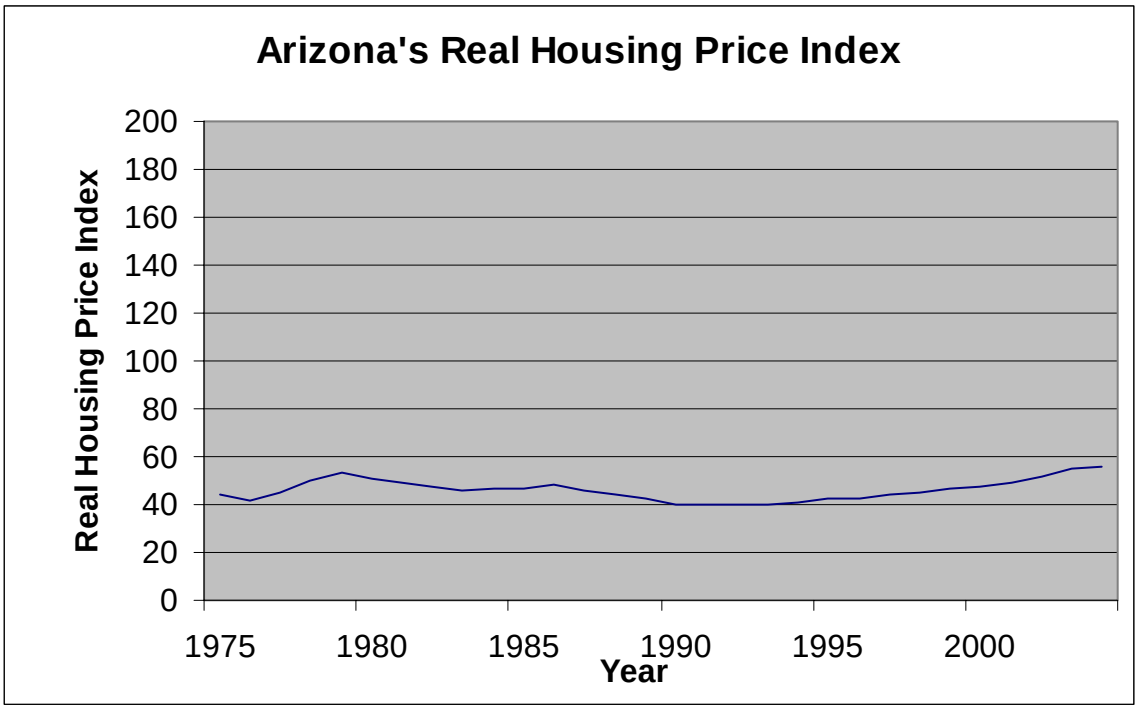


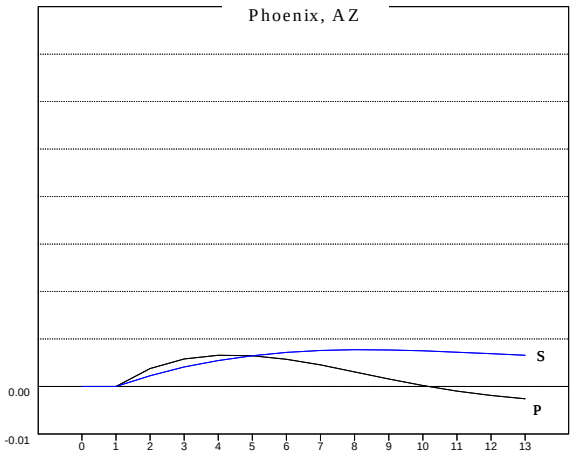
Exhibits 14 (OFHEO) and 15 (Evenson 2003)



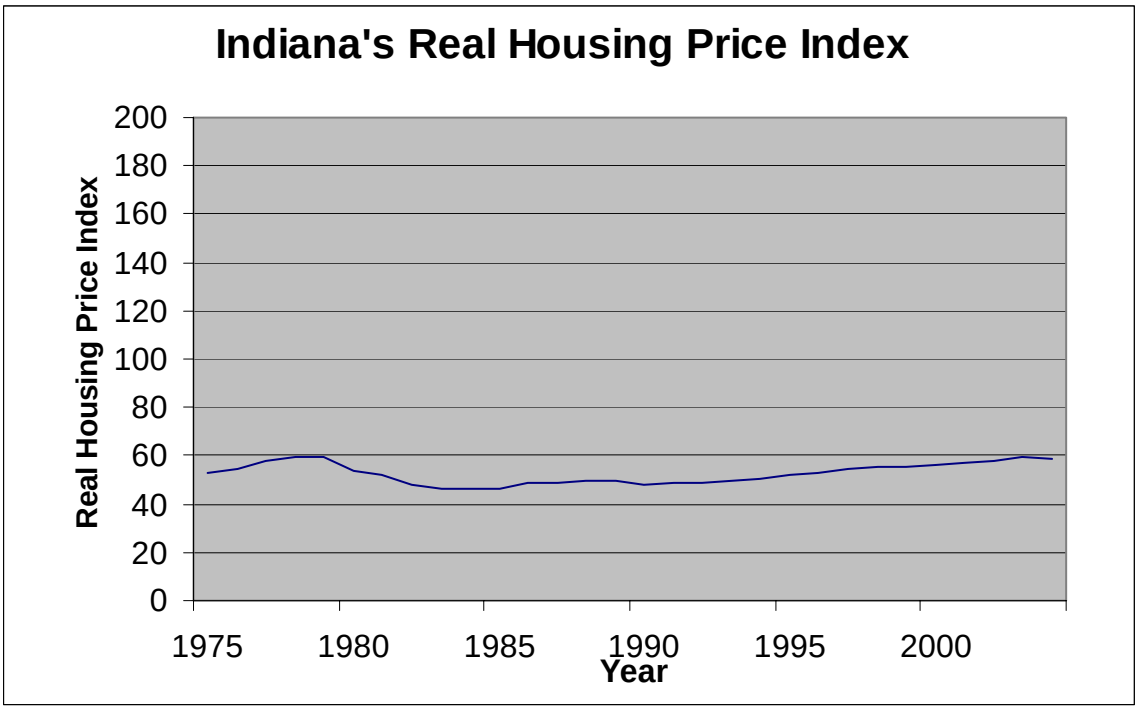


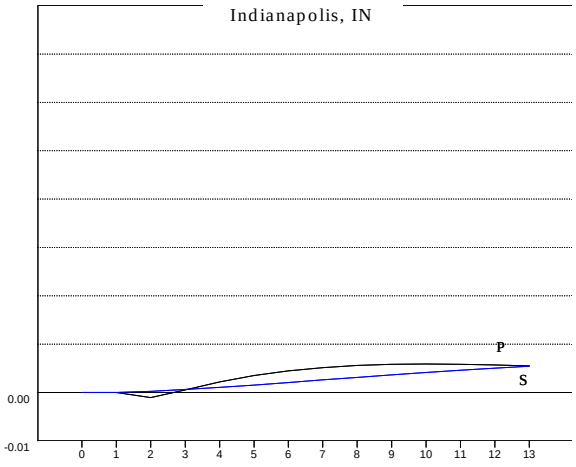
Exhibits 16 (OFHEO) and 17 (Evenson 2003)



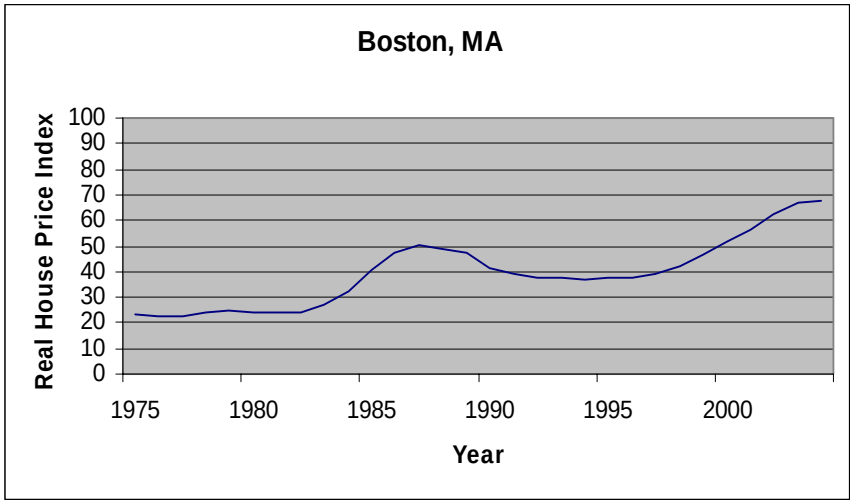


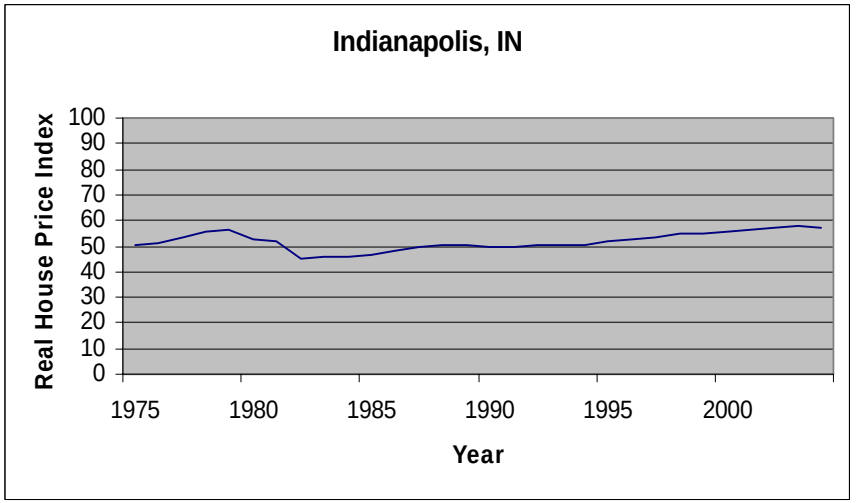
Exhibits 18 (OFHEO) and 19 (Evenson 2003)

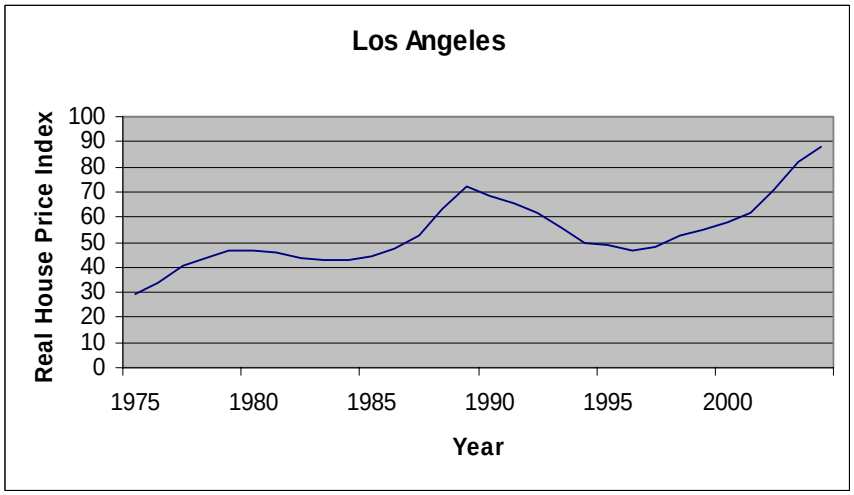


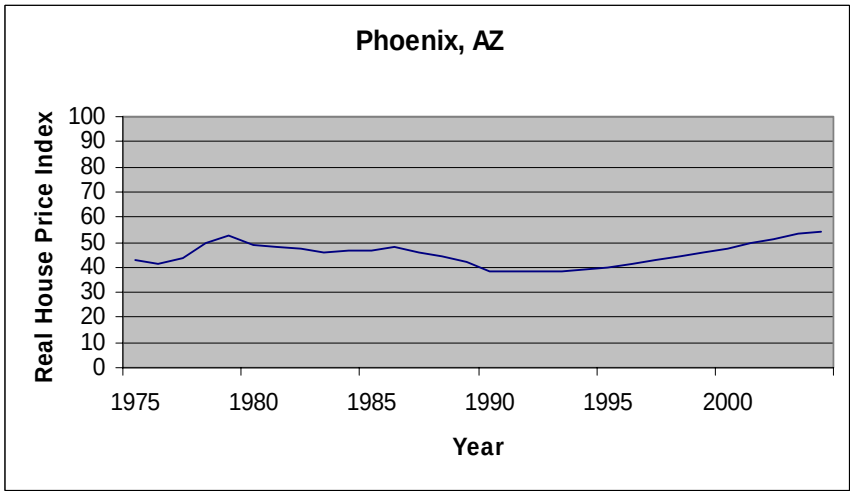


Exhibits 20 (OFHEO) and 21 (Evenson 2003)









Exhibits 22-25 (OFHEO)

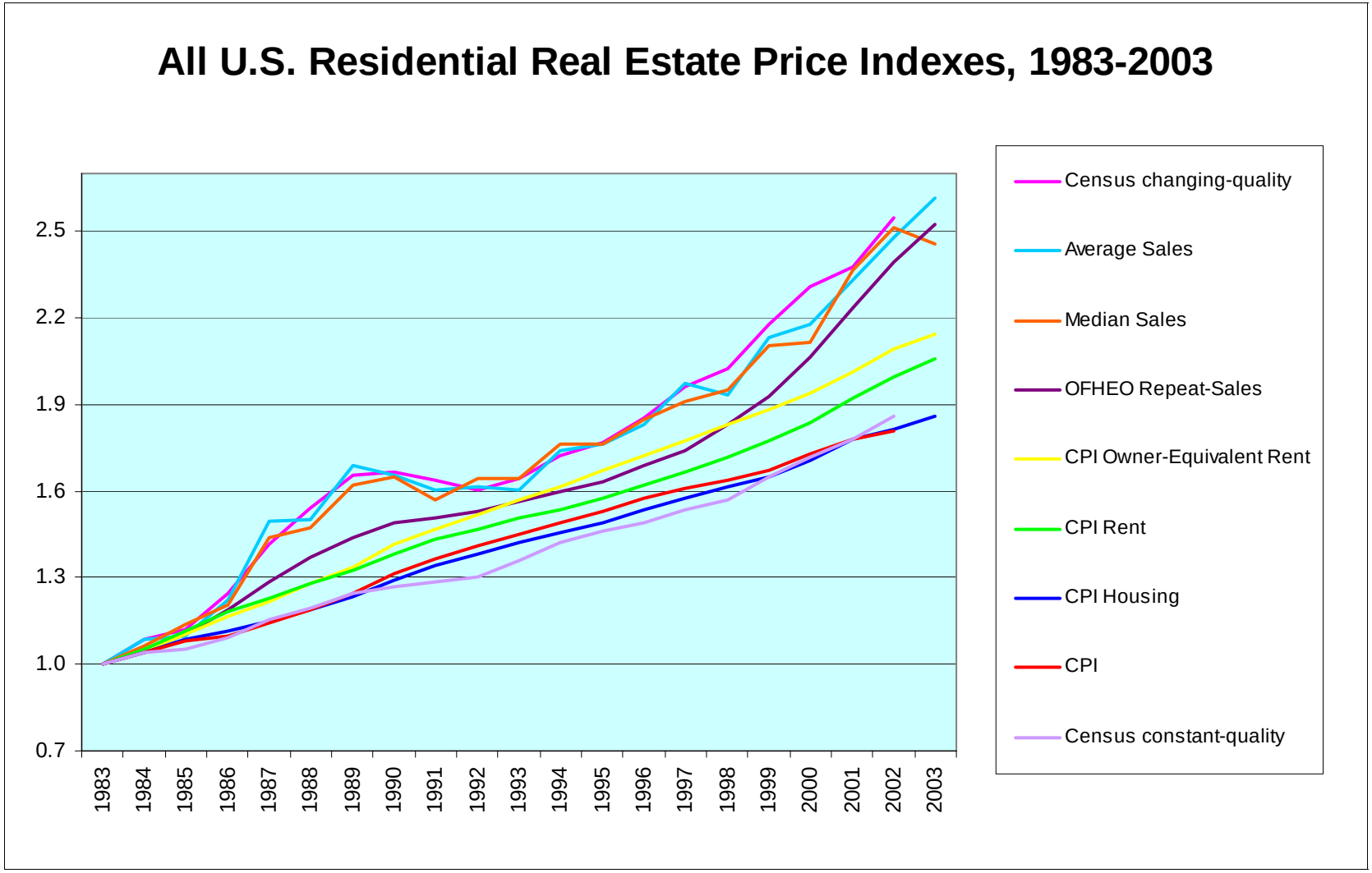
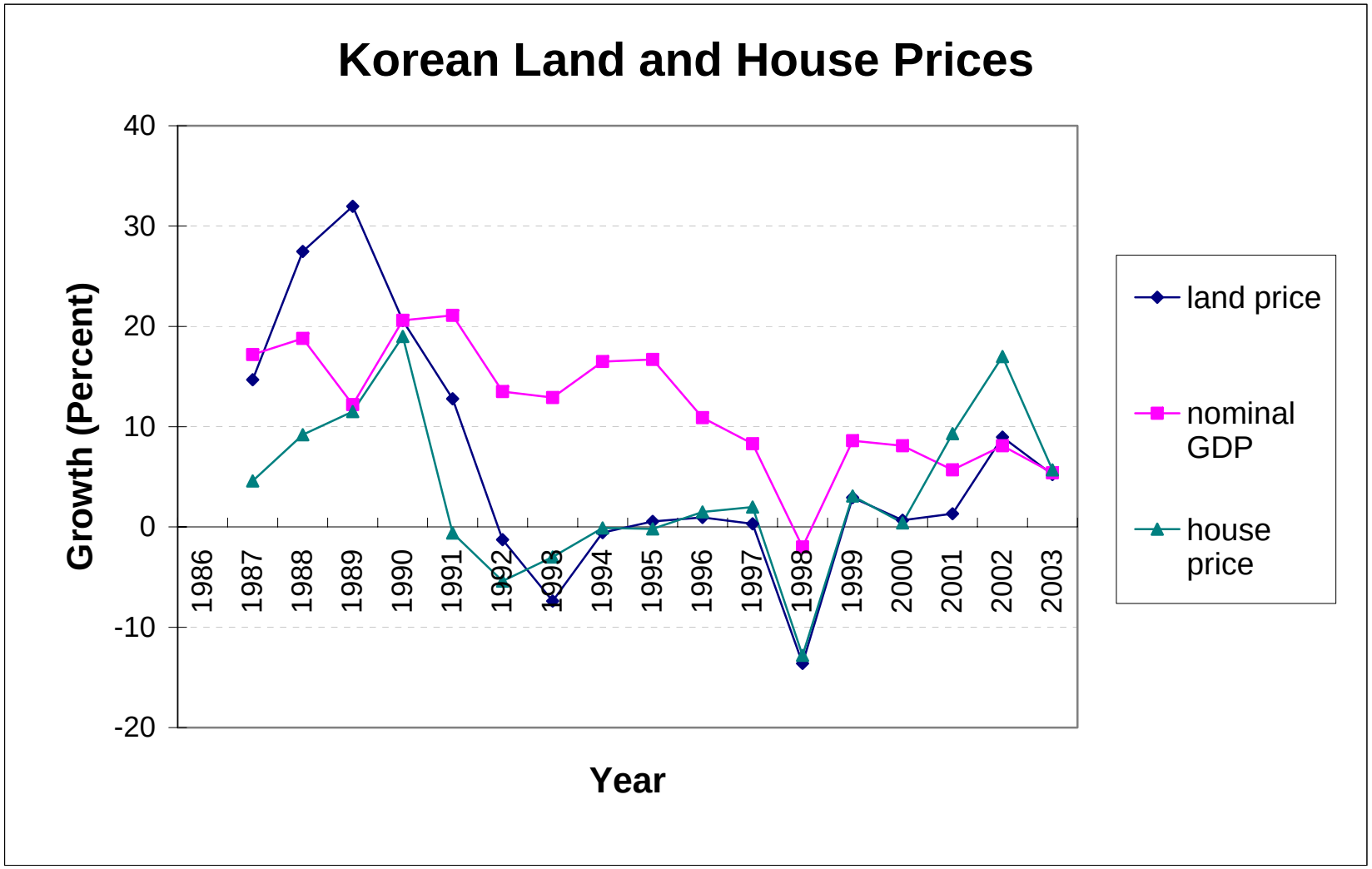


Exhibit 26 (Case and Wachter 2005)

Exhibit 27 - Korea – Crisis of 1997

Source: Kim (2004)



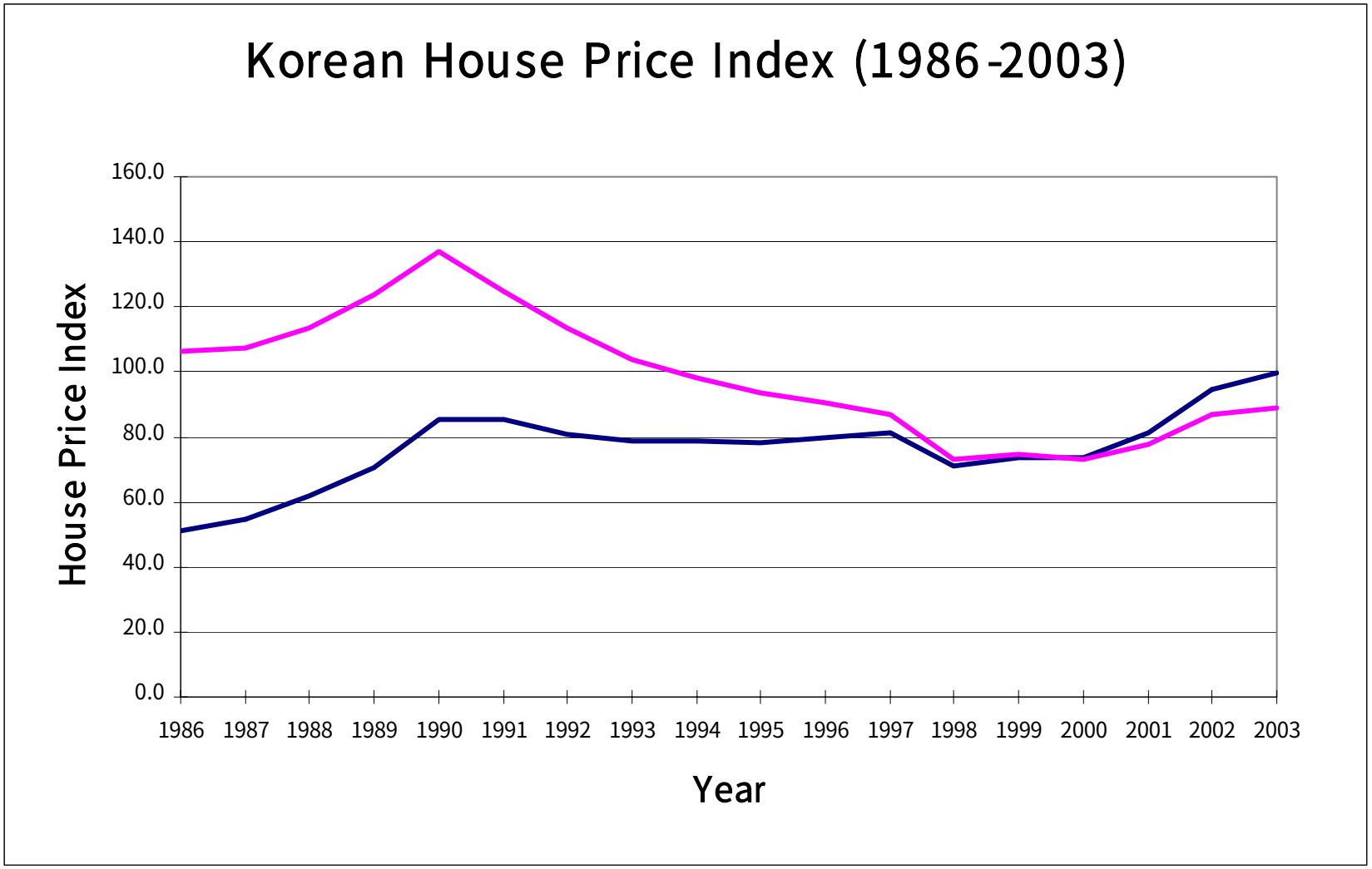


Exhibit 28 - House price index in Korea since 1986

Nominal (blue), Real (pink)

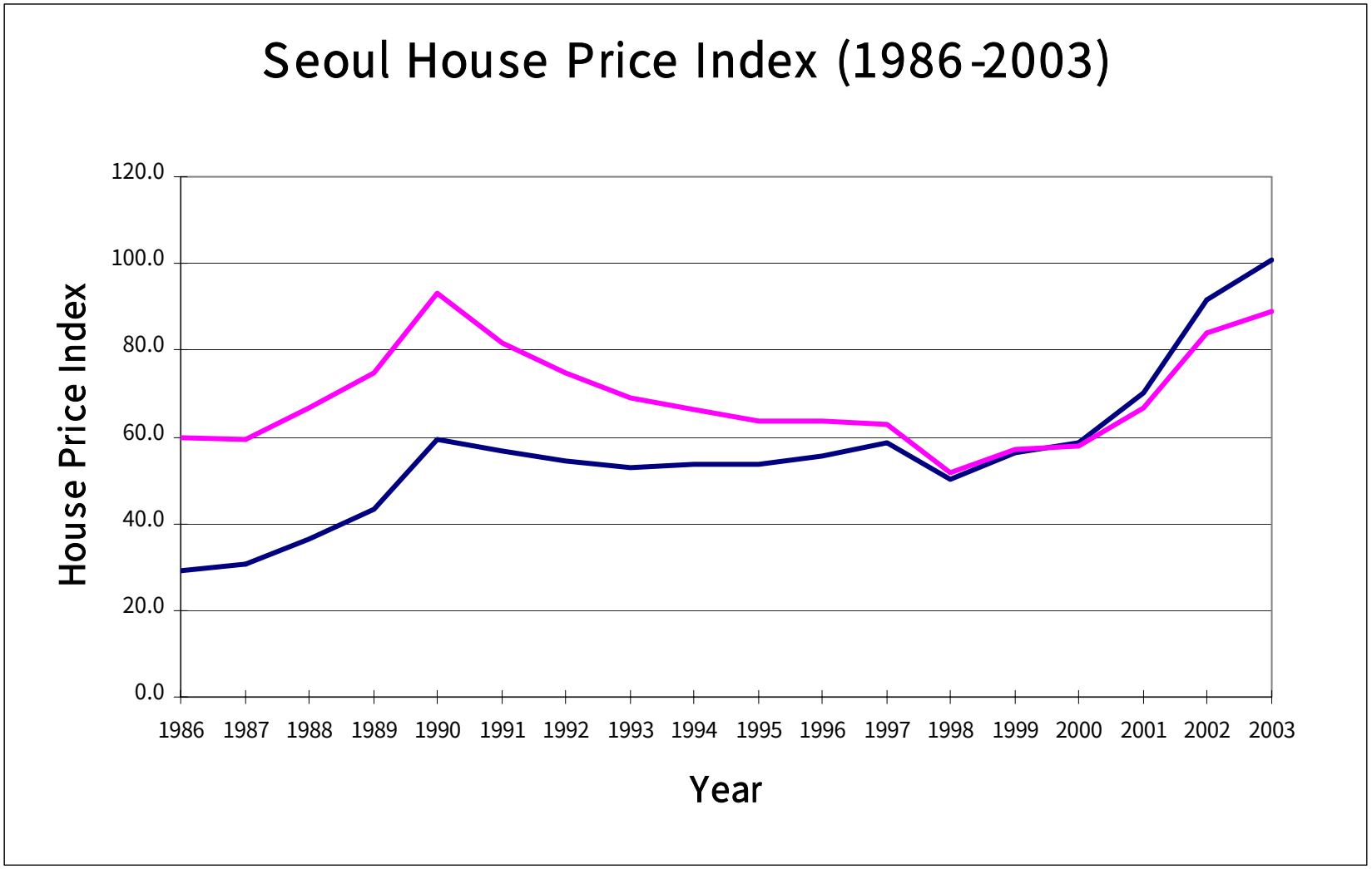


Exhibit 29 – House price index in Seoul since 1986

Nominal (blue), Real (pink)

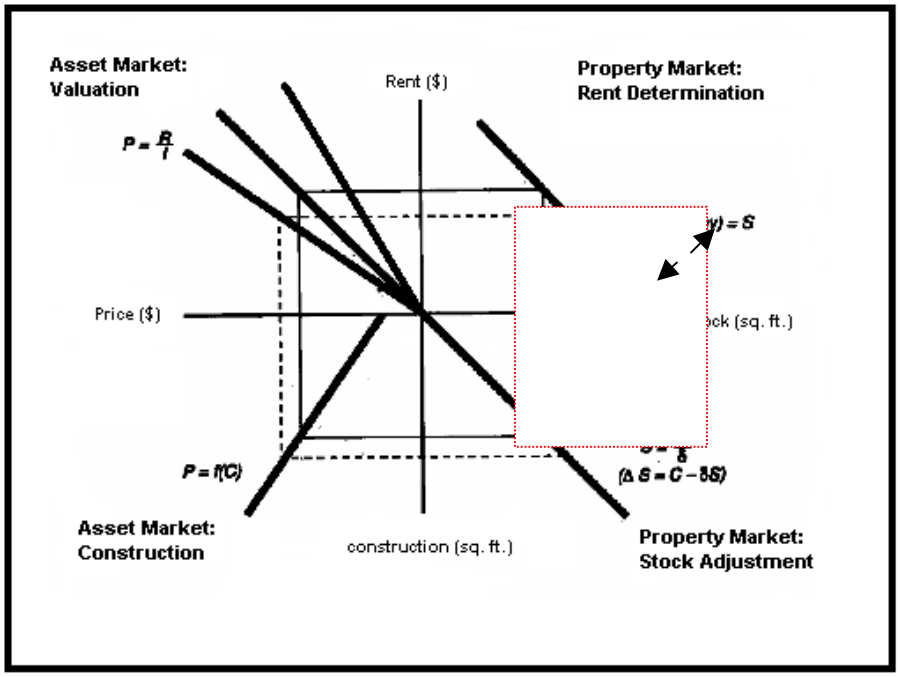


Exhibit 30
The impact of a decrease in interest rates (black) and increase in real estate rates (red) (asset demand shift) upon the DiPasquale & Wheaton model and the peripheral aspects involving real estate.

Year(s)	Interest Rates
1990 - 2000	3.3%
2000	4.7%
2001	2.3%
2002	3.0%
2003	3.2%
2004	4.1%

Exhibit 12 - World GNP Growth Rates

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