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RENTAL ADJUSTMENT AND VALUATION OF REAL ESTATE IN OVERBUILT MARKETS: FUNDAMENTAL VERSUS REPORTED OFFICE MARKET VALUES IN SYDNEY AUSTRALIA

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ABSTRACT

Real estate markets are periodically plagued by excess supply, rent concessions and few arms-length transactions. During such periods, valuation is problematic. The model presented here requires the forecasts of future vacancy rates, and equilibrium and actual rental rates. Vacancy rate forecasts of market participants are obtained, the equilibrium rental rate is specified as the cost of capital, and a rental adjustment equation is estimated in which real effective Sydney office market rents are related to gaps between both natural and actual vacancy rates and equilibrium and actual real effective rental rates.

Value estimates (relative to replacement cost) for 1992, including that for above-market leases, are computed and the sensitivity to key assumptions is shown. Value/replacement-cost calculations are then made for the entire 1985-92 period and contrasted with comparable estimates implicit in data published by BOMA and JLW, two prominent Australian real estate sources. Lastly, the ratios of real effective rents to equilibrium rents and value to replacement cost are projected for the 1993-2006 period.

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In equilibrium, real estate will be valued at (approximately) replacement cost. When value exceeds replacement cost in a market, new construction surges, raising vacancies and lowering rents and thus value. When replacement cost exceeds value, replacement construction is deferred, lowering vacancies and raising rents and value. Moreover, expectations of the construction, vacancy and rent responses imply that existing real estate values will be only modestly sensitive to changes in required real after-tax returns caused by real interest rate or tax changes.[1] Because higher long-term real interest rates lower real estate values, construction declines and rental income on existing properties rise. That is, the rental cash flows on existing real estate are more analogous to those on a sluggishly adjusting adjustable-rate loan than to the fixed coupons on a long-term bond; thus the percentage real estate value decline would be far less than that of a long-term bond.

As a result of the construction response mechanism, deviations of real estate values greater than five percent from replacement cost would be rare in relatively stable markets, i.e., those without substantial excess supply or demand. Unfortunately, stable well-functioning is not the way one would describe office markets in many part of the western world. In London, Tokyo, most national capitals of Scandinavia, most state capitals of Australia, and many large U.S. cities, vacancy rates of 20 to 30 percent have been common, real effective rents have plunged, and values are almost certainly far below replacement cost. And in the transforming socialist economies of Central and Eastern Europe, the profit-motivated construction equilibrating mechanism described above has not existed for at least a half a century. For the value

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[1] Hendershott, Follain and Ling (1987) make this point in their analysis of the impact of the 1986 tax act on real estate values. Ling (1992) extends the argument in his analysis of the impact of capital gains tax rate changes.

of any type real estate in any locale there to be near replacement cost would be pure happenstance.

This paper illustrates a method for valuing real estate in overbuilt (or underbuilt) markets with office building data from Sydney, Australia. The method is presented in Section I, where fundamental value is expressed as replacement cost less the present value of expected below-equilibrium real rental income. Underpinnings for the calculation of below-equilibrium real rents are given in Section II; equilibrium real rents are specified and real rental adjustment equations are estimated using data from the 1970-92 period. The percentage change in real effective rents is related to gaps between both the natural and actual vacancy rates and equilibrium and actual real rental rates. Expectations of future equilibrium real rents (including real discount rates) and vacancy rates thus provide a future rental income stream from which the present value of expected below-equilibrium rental income, and thus fundamental value, can be computed.

The value/replacement-cost ratio is calculated for Sydney in Section III, and its sensitivity to a number of assumptions is indicated. Most importantly, the 1992 ratio is not sensitive to real interest rate (and thus risk premium) assumptions owing to offsetting adjustments in below equilibrium rents and the discount rate. Also, the value of above-market leases, which likely existed on Sydney buildings leased up in the early 1990s, is computed.

In the absence of price "bubbles," price should equal fundamental value plus the value of above-market leases.[2] In Section IV, estimates of the

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[2] See Flood and Hodrick (1980), Shleifer and Summers (1990) and Stiglitz (1990) for useful discussions of the literature on asset market bubbles. While the construction response will not guarentee the absence of bubbles, it will clearly limit their duration.

ratio of fundamental value plus above-market leases to replacement cost are compared and contrasted with ratios derived from series commonly reported in two prominent Australian real estate sources, JLW and BOMA.[3] During the 1990-92 period, the JLW and BOMA series were 50 to 100 percent greater than fundamental value (plus the value of enforceable above-market leases). An important issue is whether the reported series are misrepresentations of market value or reflect a speculative bubble. While independent evidence on Sydney land values is offered for the development of a speculative bubble in the second half of the 1980s, the same evidense implies the bubble burst in the early 1990s. Further, the surge in Sydney office market construction in the late 1980s, a reasonable builder response to a prices exceeding fundamental value, almost guarentees the bursting of such a bubble in the early 1990s. That is, the 1992 BOMA data (and the JLW data to a lesser extent) appear to overstate market value significantly.[4]

I. The Basic Valuation Model

The fundamental value of a property in period t (V_t) is the present value of expected future net operating income. Assuming, for simplicity, that the expected ratio of operating expenses to replacement costs (exp) and one-

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[3] The Sydney Jones-Lang-Wootten (JLW) Research and Consultancy Office reports effective rent, vancancy rate and capital value series for most Australian capital cities. The Building and Operating Management Association (BOMA) reports cash flow and appreciation returns for different property types in most capital series. The BOMA series are analogous to those produced by the Frank Russell company in the U.S. (the appreciation return component is based on appraisals, not transactions).

[4] Some have argued that appraisers are reluctant to revalue properties sharply over short periods. This tendency could be exaggerated for downward adjustments owing to incentives of investment managers to maintain the values upon which their percentage fees are based.

period real risky financing rates (r) are constant through time, value at time t for a tax-exempt investor is

$$V_t = \sum_{j=1}^{\infty} \frac{[g_{t+j}\frac{1-v_{t+j}}{1-v^*} - \exp] RC_t(1-d)^{j-1}}{(1+r_t)^j}, \qquad (1)$$

where g is the expected real gross rental rate per replacement-cost dollar of occupied space, v* and v are the "natural" and expected vacancy rates (v* being constant), and RC, the current replacement cost, is expected to decline at the depreciation rate, d.[5] Real gross rents on all space are obtained by adjusting the rental rate on occupied space by the ratio of actual to natural occupied space.

In equilibrium, v_{t+j} will equal v* for all j, gross rents will equal real financing costs, economic depreciation, and operating expenses, and value will equal replacement cost. The equilibrium rental rate is thus defined as

$$g_t^* = r_t + d + \exp. \qquad (2)$$

The validity of (1) can be verified by setting all $v_{t+j} = v^*$, all $g_{t+j} = g^*$, and substituting (2) into (1).

The determinants of the V/RC ratio are of particular interest to us. To place these determinants in better focus, we add and subtract

[5] Technically, the zero-coupon rate (plus an appropriate risk premium) for each maturity should be used to discount each period's cash flow. When the yield curve is steeply sloped and the cash flows are markedly uneven, using different-period discount rates can greatly affect valuation. Similarly, the expected inflation rate between the current period and when the cash flow will be received should be used to compute each cash flow.

$$\sum_{j=1}^{\infty} \frac{(r_t+d)\,RC_t(1-d)^{j-1}}{(1+r_t)^j} = RC_t$$

from the right hand side of equation (1). Combining terms and dividing by RC, we see that the V/RC ratio is reduced from unity to the extent that expected future below-equilibrium rents (BERI) exist:

$$\frac{V_t}{RC_t} = 1 - \frac{BERI_t}{RC_t}. \tag{3}$$

where

$$\frac{BERI_t}{RC_t} = \sum_{j=1}^{\infty} \frac{[r_t+d+\exp - g_{t+j}\frac{1-v_{t+j}}{1-v^*}]\,(1-d)^{j-1}}{(1+r_t)^j}. \tag{4}$$

The keys to valuation are first specifying equilibrium rents (the real interest and depreciation rates and the expense ratio) and second determining both how far the rental rate (g adjusted for vacancies) is currently below the equilibrium rate and the time path along which the rental rate will return to equilibrium. The latter involves projecting the time path of vacancy rates and the real gross rental rate. We now turn to estimates of a real gross rental adjustment equation.

II. Explanation of Sydney Real Effective Rents

A long tradition exists of relating the percentage change in real effective rents to the difference between the "natural" and observed vacancy rates (Eubank and Sirmans, 1979, Rosen and Smith, 1983, and Wheaton and Torto, 1988):

$$\Delta g_{t+j} / g_{t+j-1} = \lambda (v^* - v_{t+j-1}) . \qquad (5)$$

As popular as this relation is, it suffers from three problems. First, the equation provides no relationship between the <u>levels</u> of actual and equilibrium rents, which must be equal in equilibrium. Second, the adjustment equation requires substantial overshooting of the natural rate in response to shocks other than a change in the equilibrium rental rate.[6] Third, the equation cannot hold simultaneously for leases of different terms.

Say that the market is initially in equilibrium with gross rents equal to equilibrium rents, the vacancy rate equal to the natural rate, and value equal to replacement cost. A negative demand or positive supply shock (excess space unexpectedly becomes available) increases vacancies and decreases rents (and thus values). The contraction in construction resulting from value declines turns vacancies around, but rents continue to fall until the vacancy rate is back to the natural rate.[7] The market must then go through a reverse adjustment with rents rising, first with falling vacancies and later with rising vacancies, until they return to equilibrium, vacancies return to the natural rate, and value again equals replacement cost. To create the force returning rents to equilibrium, the rental adjustment equation necessarily entails the vacancy rate substantially overshooting the natural rate. The vacancy rate will decline below the natural rate because value is less than replacement cost (net construction is negative) when the actual vacancy rate

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[6] Wheaton and Torto (1993) discuss the microfoundations of the adjustment equation and estimate a less constrained form for numerous U.S. cities on data from the 1979-91 period. They do not impose an equilibrium rent relationship.

[7] If the disturbance was a decline in the real interest rate, then the adjustment is complete at this point; rents have declined to the new lower equilibrium level, and value equals replacement cost.

first returns to the natural rate.

Moreover, even if the rental adjustment equation characterized one-period leases, it cannot hold for longer term leases. With rational expectations, the rent on multiperiod leases will be an average of expected future one-period leases, just as longer term bond rates are averages of future one-period bond rates. Thus expectations that one-period rents will rise in the future will turn rents on multiperiod leases upward before the vacancy rate reaches its natural level.[8] Logically, equation (5) cannot hold simultaneously for leases of different term.

To allow a more general adjustment path with pleasing long-run properties, real effective rents are specified as adjusting to gaps between both the natural and actual vacancy rates (v^* and v_{-1}) and equilibrium and actual net rents (g^* and g_{-1}):

$$\Delta g_{t+j}/g_{t+j-1} = \lambda(v^*-v_{t+j-1}) + \beta(g^*_{t+j} - g_{t+j-1}) \qquad (6)$$

With this equation, vacancy rates do not have to overshoot following a supply shock. After high vacancy rates have dragged rents significantly below equilibrium, the known eventual return to equilibrium acts as a force causing real rents to rise, even when the vacancy rate is still above the natural rate.

The Data

Rental adjustment equations are estimated using annual data from Sydney

[8] In a cross-section study of individual leases, the term of the lease can be entered as a regressor to capture the differential impact of future expected values of one-term leases on the value of longer-term leases with different terms. In a pooled time-series cross-section study, the impact of term should be allowed to vary over time because the term structure of leases varies over time.

over the 1970–92 period.[9] The natural vacancy rate is treated as a constant over time.[10] In (5) or (6), v_{t+j-1} is included as a regressor and the constant term is λv^*. Thus the natural rate can be computed after the estimation as the ratio of the constant term to the coefficient on the lagged vacancy rate (λ).

Real effective rents require the downward adjustment of real face rents for both free rent periods and tenant improvements. Conveniently for us, JLW (1992) has collected data on both of these terms for Sydney office markets over the 1970–91 period. According to their data, rent incentives increased sharply over the 1989–91 period, rising from less than four months equivalent free months rent (including adjustment for improvements) on a ten-year lease to almost 23 free months. JLW also compute effective real rents by discounting/amortizing real cash flows with a real interest rate. We have adjusted JLW's methodology in only one respect; they amortize the present value of the rent incentives over the life of the building whereas the correct amortization period is the length of the lease. With this adjustment, the amortized value of the rent incentives jumped from 6 percent of real face rent in 1989 to 41 percent in 1992.[11] The percentage change in the resultant real effective rent is the dependent variable in our analysis.

The equilibrium real gross rental rate equals the real risk-free rate

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[9] All data were generously supplied by the Sydney JLW Research and Consultancy office.

[10] Few degrees of freedom prevent serious testing of a nonconstant natural vacancy rate. It is worth noting, though, that reported evidence seeming to suggest large time variation in natural vacancy rates may simply reflect continuing market disturbances (Hendershott and Kane, 1992).

[11] Their methodology understates the increase in value of rent incentives and thus the decrease in effective rents between 1989 and 1992. Rather than a 48 percent real decline, they compute a 26 percent decline.

plus a risk premium, the depreciation rate, and the expense ratio. An approximate Australian risk-free real rate was computed as $(1+rf)/(1+\pi)-1$ for semi-annual intervals over the December 1969 to June 1992 period, using the ten-year Treasury rate as the risk-free rate and a three-period average of annualized percentage changes in the Deflator for Private Final Consumption Expenditures as the expected inflation proxy. The series actually employed is a smoothed version of the calculated series because longer term real interest rates should move relatively smoothly. The smoothed real risk-free rate drops from 0.02 in 1970 to zero in early 1971, stays there until the middle of 1974, and then abruptly plunges to -0.04 and remains there though the middle of 1977. The series then rises linearly to 0.06 in June 1982, where it stays through June 1992.

The risk premium and depreciation rates are set at 0.035 and 0.025, respectively, throughout the period. BOMA data indicate that the ratio of outgoings (operating expenses) to gross rates has ranged from 0.285 to 0.335; exp is set equal to 0.05, giving a gross rental rate of 0.17 and an outgoings ratio of 0.294 (0.05/0.17). Thus the equilibrium rental rate declines from 0.13 in 1970 to 0.07 in the 1975-77 period, and rises to 0.17 throughout the 1982-92 span. To convert this gross rental rate series to a current (1992) dollar rent per square meter number, the series is multiplied by the ratio of the JLW-based real effective rent level to the equilibrium rental rate in a year in which equilibrium and actual rents were equal. Given the steadiness of both actual and equilibrium rents during the 1983-85 period, real effective rents are assumed to have equalled equilibrium rents in June 1986. This equilibrium rent series and the JLW real effective rent series are plotted in Figure 1. A clear relationship is evident, with the JLW series generally

lagging the equilibrium series.

The last key input is the vacancy rate. This series began and ended the 1970s at about 3 percent, with a sharp increase and reversal in between (the peak was 13 percent at the end of 1976). Real effective rents followed the vacancy rate with about a two year lag. The vacancy rate stayed below 5 percent throughout the 1980s and was 3 percent in the middle of 1989; during the second half of the decade, real effective rents rose by 50 percent. Since then a plethora of completions and negative absorption has driven vacancy to 23 percent and halved real effective rents.

The Estimates

Table 1 reports some estimates of the rental adjustment equation. Coefficient estimates and standard errors (in parentheses), the equation R2 (not adjusted for degrees of freedom), and the implied natural vacancy rate are reported. The first estimate is of the naive model in which rents adjust solely to the difference between the natural and actual vacancy rates. As is seen, the equation explains less than a third of the variance. The implied natural vacancy rate is 6.0 percent.

Adding the equilibrium rent gap more than doubles the explanatory power. While the explanatory power is reasonable, the equation misses a significant portion of the broad swings in real effective rents. More specifically, between 1978 and 1989 (Junes) real rents rose by $513, $375 of which was lost by June 1992. The equation explains only 72 and 38 percent, respectively, of the increase and reversal.

To better explain the sharp fall in real rents during the June 1989–June 1992 period, the forward change in the vacancy rate (the December to December

change explaining the June to June change in rents) has been added. Knowing that substantial capacity was coming on line should have directly reduced real effective rents. While adding the forward vacancy-rate change does not increase the explanatory power much (the t-ratio on the variable is barely above one), the equation is far better able to explain the prel989 rise in real rents and especially the subsequent decline. Rather than the 72 and 38 percents just mentioned, 85 of the increase and 63 percent of the decrease are explained. The estimate of the natural vacancy rate rises slightly to 6.8 percent.

Figure 2 plots the level of real effective rents and the level predicted dynamically (the initial level moved forward based on the predicted changes). Because the annual errors in predicted changes using the difference equation are largely independent, the predicted level tracks the actual level reasonably well. Figure 2 also includes forecasted rent levels for the 1993-2003 period, assuming the Sydney vacancy rate is 23 percent through December 1994 and then declines (see below). The equation predicts another $120 (27 percent) decline in real effective rents before an upturn in 1998.[12]

III. Value/Replacement-Cost Ratios in June 1992

In this section, the model is fully parameterized, and V/RC ratios are computed for Sydney in June 1992 under the base assumptions using each of the real rental adjustment equations. The sensitivity of the V/RC ratio calculated using the "traditional" difference rental-adjustment equation to: a more optimistic vacancy rate decline, alterations in estimated rental-

[12] According to recent JLW data, real effective rents declined by 30 percent between June 1992 and June 1993.

adjustment coefficients, and a decrease in real interest rates is illustrated. Lastly, the value of long-lived enforceable leases, which would result in slower declines in real rents after 1989, is also computed.

Model Parameterization

The V/RC ratio is unity less the present value of below-equilibrium future cash flows divided by replacement cost. As can be seen from equations (2) and (4), the variables to be specified are: the real risky discount rate (r), the depreciation rate (d), the expense ratio (exp), the natural vacancy rate (v*) and the time paths of future vacancy and gross rental rates. Moreover, from equation (6), the time path of future gross rental rates is fully specified by the other variables. With constant future values of r, d, v* and exp, only a future time path of vacancy rates is needed for the calculations.

Most of the June 1992 values have already been specified: r = 0.095, d = 0.025, and exp = 0.05, giving a gross equilibrium rental rate of 0.17. From the estimation, v* = 0.068. With the assumption of equality between actual and equilibrium rents in June 1986, the actual gross rental rate in June 1992 is 0.117.

The last key assumption is the future time path of vacancy rates expected by market participants. Table 2 lists assumed future vacancy rates in Sydney as of year-end over the 1985-92 period. Each column contains the rate expected during June of the year heading the column to exist at the end of the years in the far left column (the diagonal contains observed vacancy rates). The "expectations" for 1989-92 were developed in discussions with JLW staff (JLW was itself forecasting higher vacancy rates in 1989 and 1990).

Huge construction in process indicated a 7 percentage point rise in the Sydney vacancy rate between endl991 and endl992. The expected rate is assumed to remain in the 23 percent range throughout 1993–94, then to decline by two percentage points a year through 1998, at which point the decline accelerates to 2.5 points per year owing to the recognition that some stock will be profitably converted to other uses. By 2003, the rate is 5 percent.[13] After that it stays below the natural vacancy rate until actual real rents return to their equilibrium level in 2006.

1992 V/RC Calculations

With the above described set of assumptions, the June 1992 V/RC ratio for office buildings in Sydney Australia is 0.435.[14] Figure 3 shows the time paths by which the ratios of net cash flows to equilibrium net rents and value to replacement cost, respectively, are expected to return to unity. Net cash flows in 1992 were just under half of equilibrium net rents, and they plunge to under one-fifth throughout the 1994–96 span. During the same period, real effective gross rents are decline by 27 percent. Real gross rents then turn around gradually before jumping as a 9 to 13 percent annual rate during the 1999–2003 period. This rise, combined with the increase in occupancy, pushes net cash flows up rapidly. In contrast, the rise in the V/RC ratio is a virtual constant 10 percent per year over the 1994–99 period before dampening as the ratio dovetails into unity. Value rises immediately, in spite of the 60 percent further decline in real net cash flows, because the period of

[13] The slight overshooting in vacancy rates after 2002 is needed to get rents to stabilize at their equilibrium level.

[14] A comparable calculation of this ratio for U.S. office markets nationwide in early 1992 was 0.6 (Hendershott and Kane, 1992). A calculation for Melbourne Australia, using the Sydney rental adjustment equation, is 0.36, owing to a sharper rise in vacancy rates and decline in real rents.

higher rents is coming closer.

Of course, our assumptions are just that, so calculations are presented to indicate the sensitivity of the result to variations in the assumptions. First, we assume a more optimistic vacancy rate pattern: the rate declines by a point in 1993 and 2.5 points per year, reaching 7 percent in 1999 (and then overshooting through 2003). Not only is space occupied sooner, but rents adjust toward the equilibrium quicker. The result is a V/RC ratio of 0.565. On the other hand, a rental adjustment equation in which the response to the rent gap varies with the ratio of natural to actual vacancy rates fits the 1970-91 data about as well as the equation with a constant rent gap response implies a lower value. With this equation, rents initially decline further and then rise back to equilibrium less rapidly. As a result, the estimated V/RC ratio drops from 0.435 to 0.21.

The ratio is <u>not</u> sensitive to the assumed real interest rate when feedback effects are incorporated. To illustrate, consider the impact of a decline in the real rate of interest from its unusually high June 1992 level. While the decline reduces below-equilibrium rents directly by lowering the equilibrium level, and thus raises the V/RC ratio, the time path along which actual rents rise to the lower equilibrium level is lower (the initial drop in rents is steeper), owing to the reduced value of the equilibrium-actual rent gap, and the present value of a given below-equilibrium rental shortfall is greater. When the 1992 ratio is recomputed for a two percentage point lower real rate, V/RC rises only from 0.435 to 0.45.

The reported V/RC ratios computed so far are for buildings earning market rents. However, in the 1980s Australia had lease contracts in which rents on existing buildings would rise with increases in market rents but not

decline with decreases. To the extent that tenant rents have not "ratcheted" down in response to declines in market rents, the roughly 50 percent decline in real effective market rents observed between 1989 and 1992 was largely avoided. Because of their above-market leases, these buildings are worth more than their fundamental values.

To calculate how much more buildings with above-market leases should be worth, real rents are adjusted upward. We consider buildings fully leased-up with tenants who obtained 10-year leases throughout the 1980s.[15] Thus, one-tenth of the building "goes to market" each year over the next decade. Nominal rents on the nonmarket leases are constant (real rents fall by 5 percent per year). By June 1999, all leases are at market. Under these assumptions, the replacement-cost ratio in 1992 for prime buildings, including both fundamental value and the premium for above-market leases, is 0.558. That is, fully enforceable above-market leases were worth another 0.12 of replacement cost.

IV. Fundamental, BOMA, and JLW Values, 1985-92

Using our framework and appropriate assumptions, a time series of the value/replacement-cost ratio for Sydney office buildings is constructed for the 1985-92 period. In addition, comparable "market" ratios are computed from the BOMA and JLW data. Comparison of these ratios with that estimated using our method reveals substantial differences.

The real interest rate, depreciation rate, and expense ratio are set at

[15] The 10-year lease term is consistent with the computation of effective rents and has been the typical term for the Sydney office market. Just as the premium on bonds paying above-market coupons will be greater the longer the maturity of the bond, the value of above-market leases will be greater the longer the term of the lease.

the 1992 values throughout the 1985-92 period. The "market" vacancy rate forecasts were listed in Table 2. For the June 1985 though June 1988 period, the year-end and next year vacancy rates are assumed to be accurately forecast; the vacancy rate is then increased a percentage point a year to 8 percent and then reduced over two years to the natural rate. For 1989-91, a sharp increase in the vacancy rate (based on discussions with JLW) is followed by a reversal, including a brief time below the natural rate.

Column 1 of Table 3 contains the calculated Sydney V/RC ratios for the 1985-92 period. The ratio is roughly constant at 1.0 over the 1985-89 period (the 1989 ratio is no higher than the 1985 ratio, in spite of the 50 percent greater real effective rent level in 1989, because of the substantially higher vacancy rates -- and thus real rent declines -- forecasted in 1989 than in 1985). Subsequent sharp jumps in vacancy rates and plunging real effective rents lower the ratio to 0.435 in 1992. The 1992 premium for the value of above-market leases is also listed in the table.

Two sources publish "market" data from which V/RC ratios can be computed and compared with the fundamental value ratio adjusted for above-market leases. A comparable BOMA/Russell series comes from a two-step procedure. First, the appreciation component of the BOMA/Russell office return series is cumulated to generate a nominal appraised value series. Second, to obtain a real constant-quality measure, this series is divided by the deflator for private consumption (scaled to unity in June 1985) and then blown up by 1.25 percent per year to allow for depreciation in the replacement-cost denominator. (The 1.25 percent is less than the general 2.5 percent depreciation rate because new buildings are continuously added to the BOMA data base.) The BOMA/Russell series is set equal to 1.01, the fundamental

value/RC ratio, in June 1985, which is consistent with our assumption that rents equalled their equilibrium values in 1986. These values are shown in column 2 of Table 3. For the JLW calculation, we begin with their nominal capital value indicator and adjust it as in step two, using a 2.5 percent depreciation factor. The resultant V/RC estimates, including the assumed 1.01 1985 value, are listed in column 3.

The BOMA and JLW data increase sharply between June 1985 and June 1989, 53 and 68 percent respectively, and then decline abruptly between June 1989 and June 1992, 34 percent (BOMA) and 57 percent (JLW). The smaller BOMA movements are consistent with appraised values lagging market values.[16] Both series, but especially that based on BOMA data, are substantially above fundamental value in June 1992.

Two possible explanations exist for the surge in the BOMA and JLW series in the second half of the 1980s. First, the real required return on real estate (the risk premium in our model) may have declined. Second, a speculative bubble (increase of market relative to fundamental value) may have formed. One indicator of a speculative bubble, given the constancy of the fundamental value series, would be an independent estimate of a sharp increase in real land prices.[17] Such an estimate exists. The Valuer-General of New South Wales computed a 350 percent real increase in land value per square meter of office space in the Sydney central financial district between 1986

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[16] Like the Russell-NCREIF data in the U.S., the BOMA-Russell data in Australia are largely based on appraised values. The JLW data are JLW's estimates of market values.

[17] In our valuation model, land is valued together with the structure; the rents that the two can earn jointly determines the value of the total property.

and 1989.[18] If land were only 5 percent of the total value of offices constructed in 1986, the real land increase would account for virtually all of the computed increases in the BOMA and JLW ratios.

Because land values may be mismeasured in the RC measure, we compute the ratios of the BOMA/Russell and JLW based ratios to our fundamental value (adjusted for leases) ratio, thereby eliminating measurement error in RC. Ratios of ratios, assuming 0.03, 0.06, and 0.09 in 1990–92, respectively, to be the ratio of enforceable above-market leases to replacement cost, are reported in columns 4 and 5. As can be seen, JLW's 1992 ratio is almost 50 percent greater than our estimate of fundamental value plus the value of above-market leases, and the ratio derived from BOMA's 1992 data is almost double our estimate.[19]

These multiples suggest that the late 1980s office market bubble has not yet burst. However, data from the New South Wales Valuer-General suggest that bubble has popped; real office market land prices have returned to their 1986 values. Moreover, any decline in the real estate risk premium during the 1985–89 period has almost certainly also been reversed. The implication is that market value should be in line with fundamental value (plus above-market leases). We conclude that the JLW, and especially BOMA, Sydney office market

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[18] Land value data are contained in various reports; the latest are in Valuer-General (1992, Table 18, p 21). These data pertain to the middle of the year and are supposed to represent market values based on the comparable sales method. The Valuer-General's estimates, which are the basis for property tax assessments, may be challenged legally.

[19] The JLW overestimate can be largely explained by their mismeasurement of the decline in effective real rents during the 1989–92 period.

data overstated market value significantly in June 1992.[20]

V. Summary

Real estate markets are periodically plagued by excess supply, rent concessions and few arms-length transactions. During such periods, valuation is problematic. The model presented here expresses fundamental value as the difference between replacement cost and the present value of expected below-equilibrium rents. Equilibrium rents are specified and real rental adjustment equations are estimated using Sydney office market data during the 1970-92 period. The percentage change in real effective office rents is related to gaps between both the natural and actual vacancy rates and equilibrium and actual real rental rates. Inclusion of the rent gap guarentees that actual rents will eventually return to their equilibrium level (and more than doubles the equation's explanatory power). With this relationship, only market participants' forecast of vacancy rates until the market returns to equilibrium is needed to estimate value. Such a forecast was obtained from the Sydney JLW consulting office.

The estimated fundamental-value/replacement-cost ratio for the Sydney office market was about 1.0 throughout the mid1985-mid1989 period. The subsequent surge in vacancies from 3 to 23 percent halved effective rents and lowered the ratio to 0.43 by mid1992. For prime pre1989 properties with enforceable "rachet" clauses, real rents have only begun their plunge. The above-market rents these buildings are earning could be worth another 0.12 of replacement cost.

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[20] The JLW difference for Melbourne is comparable; the BOMA ratio is over three times greater than our estimate of fundamental value plus the value of above-market leases.

Ratios developed from the capital return component of the BOMA return series and from the JLW capital value series indicate about a 50 percent increase in the ratio in the second half of the 1980s. Even with a sharp decline since then, these ratios imply values 50 to 100 percent greater than our estimate of fundamental value plus enforceable above-market leases. While evidence on Sydney land values and of an office market construction boom supports the conjecture of a speculative bubble forming in the second half of the 1980s, the same evidence implies that the bubble has burst and that the BOMA data especially significantly overstate market value.

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Table 1: Explanation of the Percentage Change in Real Effective Sydney Office Market Rents, 1971–92

equ.	constant	vac_{-1}	g^*-g_{-1}	Δvac	R^2	v^*
1.1	.1125	−.0189 (.0062)			.317	6.0
1.2	.1121	−.0176 (.0047)	2.57 (0.60)		.650	6.4
1.3	.1159	−.0171 (.0046)	2.26 (0.64)	−.0085 (.0069)	.679	6.8

The data are from JLW. Vacancy rates are in percentage points; rental rates are in decimals. Standard errors are in parentheses. See the text for exact definition of the variables.

Table 2: Vacancy Assumptions Used in 1985-92 Calculations

	1985	1986	1987	1988	1989	1990	1991	1992
1985	2.6							
1986	1.6	1.6						
1987	2	1.2	1.2					
1988	3	2	2.3	2.3				
1989	4	3	3	3.9	3.9			
1990	5	4	4	5	8	9.4		
1991	6	5	5	6	10	13	15.7	
1992	7	6	6	7	10	15	19	23
1993	8	7	7	8	8	13	20.5	24
1994	7	8	8	7	6	10	17	23
1995	6.8	7	7	6.8	6	7.5	13	21
1996		6.8	6.8		6.8	5	10	19
1997						5.5	7.5	17
1998						5.5	5.5	15
1999						6.8	5	12.5
2000							5	10
2001							6	7.5
2002							6.8	5
2003								4.5
2004								4.5
2005								5.5
2006								6.8

Data are those expected in June of the years on the horizontal to exist at the end of the years on the vertical.

Table 3: V/RC Ratios for Sydney, 1985–92

June	(1) V/RC	(2) BOMA	(3) JLW	(4) [(2)/(1)] Relative BOMA	(5) [(3)/(1)] Relative JLW
1985	1.01	1.01	1.01	1	1
1986	1.02	1.05	1.04	1.03	1.02
1987	1.02	1.13	1.14	1.11	1.12
1988	1.01	1.32	1.46	1.31	1.44
1989	0.98	1.54	1.69	1.57	1.72
1990	0.86	1.53	1.61	1.72	1.80
1991	0.68	1.25	1.17	1.69	1.58
1992	0.43	1.01	0.76	1.94	1.47
premium leases (1992)	0.12				

FIGURE 1: Actual and Equilibrium Rents

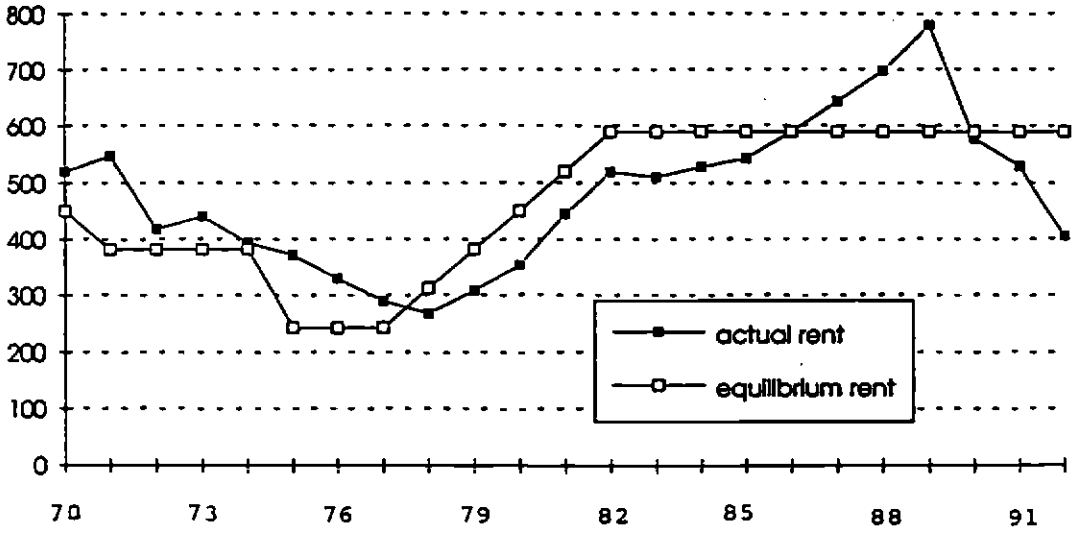

FIGURE 2:

Actual & Predicted Real Effective Rents

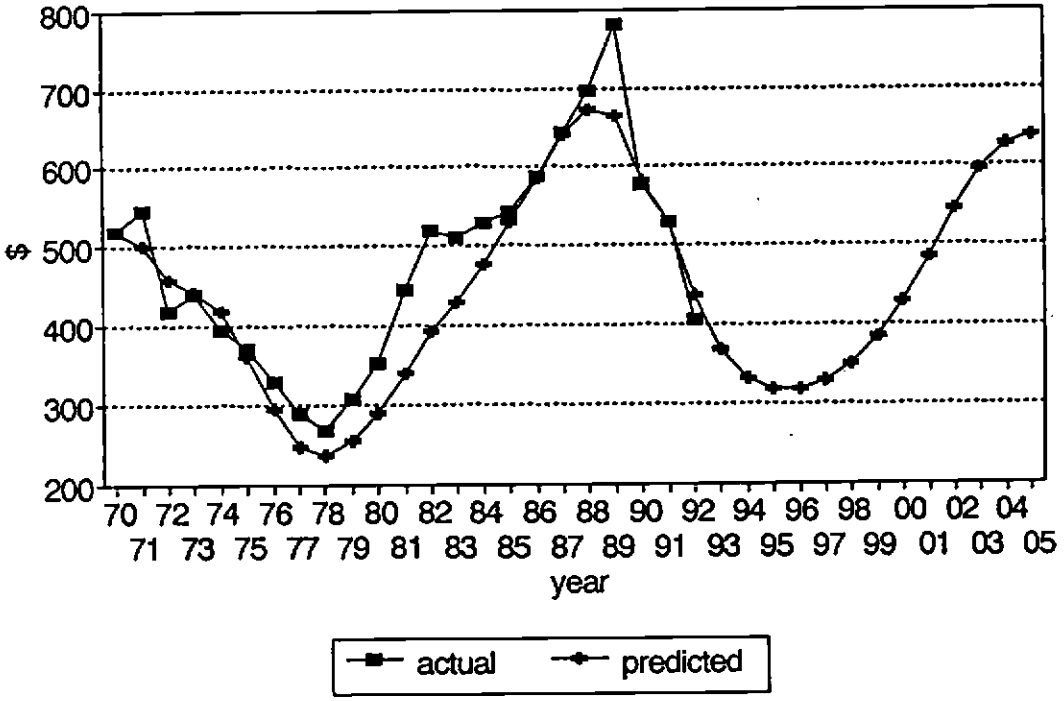

FIGURE 3:
Adjustment of Cash Flows & Value