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Attachment 2
APPENDIX A

THE USER COST OF CAPITAL AND MACROECONOMIC POLICY

Draft of Chapter 3 forthcoming in

THE MACROECONOMIC ENVIRONMENT AS IMPLICIT INDUSTRIAL POLICY: ITS ENTERPRISE AND INDUSTRY EFFECTS

By John R. Norsworthy and Diana H. Tsai

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CHAPTER 3. THE USER COST OF CAPITAL AND MACROECONOMIC POLICY

1. Background

In measuring the user cost or rental price of capital assets and associated rates of return for analysis of production and growth, economists have neglected to incorporate the return to financial capital that common sense and economic logic prescribes, and for the most part have ignored the distinction between equity and debt financing as well. A consequence of omitting these factors is persistent measured differences in rental prices of capital across industries, based on differences in measured rates of return.[1] Increasing concern with the decisions of enterprises engendered by deregulation, privatization and capital markets research make it important to extend the economic theory of the cost of capital to embrace these concepts, and thus to reconcile the practices in production and growth economics with those of finance and accounting. Because the user cost of capital is so strongly influenced by the macroeconomic environment, it is important for policy analysis to accurately quantify those influences. With this aim, the current chapter briefly revisits the rate of return and rental price concepts conventionally used in modeling the investment decisions of the firm, and in studies of productivity and economic growth, and shows how incorporating these concepts into practice alters rates of return and the rental prices of physical assets. To our knowledge, the production literature in economics has been silent concerning the role of financial capital until its treatment by Norsworthy and Jang (1992). The sole exception is Nguyen and Andrews (1986), based on a study carried out at Norsworthy's direction at the U.S. Bureau of Census.[2]

The theory and practice in measurement of the rental price (or user cost) of capital assets in economics is largely due to Jorgenson, working individually and in association with several colleagues. Key papers in Jorgenson's development of neoclassical capital theory and its application include Jorgenson (1963), Hall and Jorgenson, (1967), Jorgenson and Griliches (1967), Christensen and Jorgenson (1969), Jorgenson, Gollop and Fraumeni (1987), and Jorgenson and Yun (1991). The quantitative effects of various factors on the rental price through 1987 are reviewed in detail in Harper, Berndt and Wood (1989). Jorgenson (1993) details more recent developments and analyzes the implications of corporate tax rates. His work links the neoclassical theory of capital developed by Hicks and Samuelson to the cost of capital, a concept that he and many others have applied to the national production and income accounts where both U.S. and international measurement conventions treat financial concepts curiously. For example, in the production accounts, interest is treated as a transfer, rather than a payment to a factor of production, and *net* interest is the basis for measuring intersectoral flows. By implication, then, financial assets receive short shrift. The U.S. national income and product accounts (NIPA) do not include financial assets by industry; thus correction of the bias entirely within the NIPA framework is not possible.[3] Many of the applications of production and growth theory to industry and sectoral level data have ignored both financial assets and the debt-equity distinction and the relationship between taxation and the cost of capital.[4] Examples in

widely cited works abound: Berndt and Wood (1975), Denison (1967,1980), Denny, Fuss and Waverman (1981), Jorgenson, Gollop and Fraumeni (1987), Kendrick and Grossman (1980), Morrison and Berndt (1980), Norsworthy, Harper and Kunze (1979), Norsworthy and Malmquist (1983). The omissions are perhaps most dissonant with financial and accounting practices when applied to regulated industries, where rate of return regulation has traditionally recognized financial assets as requiring a reasonable rate of return; for instance, Caves et al. (1984), Christensen et al. (1989), Christensen and Greene (1976), Gollop and Roberts (1983).

For analysis at the enterprise level, inclusion of financial assets and the debt-equity distinction in measuring the rental price of capital and assessing the effects of tax policies and interest rate changes, is quantitatively important, and should not be optional.

The objective of the chapter is to measure the effect of including financial assets and the debt-equity distinction on the measured rental price of a physical asset, and thus pave the way for the analyses in subsequent chapters. Measurement of the rental price of financial assets themselves is not treated here. In the next section, the theoretical background of the rental price of capital and the associated rate of return is briefly restated, and for their discrete forms biases due to omission of financial assets and the debt-equity distinction are shown. In section 3, the effects are illustrated for rates of return and for the rental price of aircraft in the airline industry using U.S. historical tax parameters.[5] The results are so stark that little elaboration is required. Brief conclusions follow in section 4.

2. The Neoclassical Rental Price of Capital[6]

The defining characteristic of capital inputs to production, physical or financial, is that they are not used up during the period of production. Consequently the asset price of capital input does not represent its cost to the producing enterprise. In continuous terms, a capital asset A provides a flow of services over time that is proportional to the stock of that asset. In consequence, and in the absence of taxes, the enterprise earns a rate of return r_E on A and all other assets. Under conditions of continuous geometric decay of the service stream, the flow of services k_A during time span dt from a capital good A acquired at time u is simply

(1) $$k_A = e^{-\delta(t-u)}dt$$

For rental price of capital $p(t)$ at time t, the value $v(t)$ of this stream of services is

(2) $$v(t) = e^{-rt}p(t)\cdot e^{-\delta(t-u)}dt$$

The rental price $p(t)$ is expected to prevail into the indefinite future. Then at time t=0,

(3) $$v(0) = e^{-ru}p_A(u)$$

where $p_A(u)$ is the expected asset price of the capital good at time u. The enterprise is in equilibrium with respect to k_A when the acquisition or asset price is equal to the discounted flow of future capital services; i.e., when

(4) $$v(0) = \int_u^{\infty} e^{-rt}p(t)\cdot e^{-\delta(t-u)}dt$$

or

(5) $$e^{-ru}v(u) = e^{\delta u}\int_u^{\infty} e^{-(r+\delta)t}p(t)dt$$

which implies

(6) $$E[v(u)] = e^{\delta u}\int_u^{\infty} e^{-(r+\delta)(t-u)}p(t)dt$$

where E[] is the expectation operator. Differentiating (6) with respect to t as in Jorgenson(1967), we obtain

(7) $$\dot{v}(u) = (r+\delta)\ v(u) - p(u)$$

which can be solved for the rental price

$$p(u) = v(u)\ (r+\delta) - \dot{v}(u)$$

In equilibrium, $p_A\ (u) = v(u)$ and the enterprise's rate of return r_E must equal the discount rate, so that

(8) $$p(u) = p_A(u)\ (r_E + \delta) - \dot{p}_A(u)$$

Thus the rental price p depends on the equilibrium rate of return r, the rate of decay δ, and capital gains or losses due to changes in the asset price, $\dot{p}_A$.

Christensen and Jorgenson (1969) derive a discrete form of the rental price and extend the formulation to include tax effects, resulting in a rental price in period T that is written[7]

(9) $$p_T = \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T}\right](p_{A,T-1}r_T + \delta\cdot p_A - [p_{A,T} - p_{A,T-1}]) + p_{A,T}\tau_T$$

where discrete time is denoted by T, μ_T is the corporate tax rate, z_T is the present value of tax-allowed depreciation, λ_T is the investment tax credit, and τ_T is the rate of property taxation, all in period T.[8] For its conventional formulation, the effects on the rental price of its component arguments follow:

(10a) $$\frac{\partial p_T}{\partial p_A} = \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T}\right]\cdot(\delta - 1) + \tau_T$$

(10b) $$\frac{\partial p_T}{\partial p_{A,T-1}} = \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T}\right]\cdot(r+1)$$

(10c) $$\frac{\partial p_T}{\partial \mu_T} = \frac{1-z_T-\lambda_T}{(1-\mu_T)^2}(p_{A,T-1}r_T + \delta p_A - [p_A - p_{A,T-1}])$$

(10d) $$\frac{\partial p_T}{\partial z_T} = \frac{-\mu_T}{(1-\mu_T)}(p_{A,T-1}r_T + \delta p_A - [p_A - p_{A,T-1}])$$

(10e) $$\frac{\partial p_T}{\partial \lambda_T} = \frac{-(p_{A,T-1}r_T + \delta p_A - [p_A - p_{A,T-1}])}{(1-\mu_T)}$$

(10f) $$\frac{\partial p_T}{\partial \tau_T} = p_A$$

The rate of return, r_T, is defined as the ratio of property income, less depreciation plus capital gains, to total assets at the beginning of the period, A_{T-1}, valued in prices of the

prior year.[9] This definition assumes that the capital engaged in production during the current period is the capital stock at the beginning of the period. Property income is the residual income to capital from total revenues, TR, after all payments, VC, have been made to the variable factors of production, i.e., labor and all purchased intermediate inputs. Intermediate inputs are categorized as energy, materials and purchased services by the U.S. Bureau of Labor Statistics. Other categorizations are common when particular industries or phenomena are investigated.

In the discrete, short run case, the rate of return concept must be adjusted. In order for (9) and successive equations to make economic sense, the rate of return in (9) must be an expected *ex ante* rate of return based on the external cost of funds. Only in equilibrium will this rate of return be equal to the realized *ex post* rate of return: the short run rate of return below. If investment in the enterprise is to be maintained, the expected or *ex ante* rate of return must be sufficient to offset the alternative cost of funds plus a risk premium suitable to the industry. The ex post rate of return must be sufficient on average to sustain the expectation of a sufficient *ex ante* rate of return. Thus the realized rate of return in period T is

$$(11)\quad r_T = \left[\frac{(TR - VC) - (\delta p_{A,T} - (p_{A,T} - p_{A,T-1})) \cdot A_{T-1}}{p_{A,T-1} A_{T-1}} \right]$$

This formulation is completely unexceptionable as a measure of the *ex post* rate of return if (and only if) A_{T-1} includes all assets of the enterprise. In practice, A_{T-1} has included only the physical assets of the enterprise: equipment, structures and inventories. Since there is no other source from which omitted assets may receive compensation, the rate of return computed in (11) will have an upward bias. The magnitude of this bias will depend on the relative magnitudes of physical and financial assets, which differ substantially across industries and even among enterprises in a given industry, as is demonstrated below. Insofar as these differences persist through time, the convergence of interindustry and interenterprise rates of return predicted by the theory of efficient capital markets will be inaccurately assessed.

Fortunately, it is not difficult to adjust the omission and remove the associated bias. If F_T denotes real financial assets in period T measured in constant dollars of a base period T=0, and A_T denotes physical assets in constant dollars, the pre-tax rate of return r_T should be redefined as

$$(12)\quad r_T = \left[\frac{PI - (\delta p_{A,T} - (p_{A,T} - p_{A,T-1})) \cdot A_{T-1} - (p_{F,T} - p_{F,T-1}) F_{T-1}}{p_{A,T-1} A_{T-1} + p_{F,T-1} F_{T-1}} \right]$$

where PI is gross property income, TR-VC, and $p_{F,T}$ is the inverse of an appropriate price index measuring the purchasing power of returns on the assets of the enterprise. From the perspective of shareholders of the enterprise, the Consumer Price Index is appropriate.
In this formulation, financial assets are measured in real terms, and their real value is adjusted annually for changes in the price level. Their treatment is analogous to that of physical assets. Then, denoting the rate of return based on physical assets only as ρ_T, the change in the measured rate of return due to the inclusion of financial assets is

$$(13) \qquad \Delta r_T = r_T - \rho_T = -\left(\frac{p_{F,T-1}F_{T-1}}{p_{F,T-1}F_{T-1} + p_{A,T-1}A_{T-1}}\right)\left[(1-\delta)\frac{p_{A,T}}{p_{A,T-1}} + \frac{PI}{p_{A,T-1}A_{T-1}} - 1\right]$$

The first expression on the right hand side of (13) is the ratio of financial to total assets. The first term in the second expression adjusts for the fact that depreciation of physical assets is computed based on current rather than prior year prices. The third term is the gross rate of return on physical assets. The value of Δr_T will be negative under normal conditions, i.e., when the gross rate of return to physical assets offsets their rates of depreciation and revaluation. (Because revaluation of financial assets is completely captured in its price index p_F, there are no corresponding revaluation and depreciation terms for financial assets.) Clearly, the correction is greater when the ratio of financial to physical assets is higher.

There are three major distortions that flow from the mismeasurement of the rate of return: appraisal of the efficiency of capital markets, appraisal of the effects of government policies on enterprises and industries, and measurement of technology in econometric models. Concerning the efficiency of capital markets, firms or industries with higher financial capital requirements will appear to enjoy higher rates of return, and to have higher costs of capital when cross-sectional comparisons are made. The cross-sectional differences in measured rates of return will persist so long as the financial capital requirements persist. Concerning the estimates of the effects government policies on the enterprise, the rate of return appears in four of the six sensitivity equations above, (10b-10e), three of which measure the effects of federal tax policy on the rental price of capital. So the effects of the corporate tax rate, the investment tax credit, and tax-allowed depreciation will be distorted by omission of financial assets from computation of the rate of return. To the extent that state governments levy taxes on financial assets, the corresponding sensitivity measure in (10f) will also be distorted. In estimated models of production, where the technology of production is inferred from prices and quantities of inputs, substitution elasticities and other characterizations of technology (such as economies of scale, total factor productivity and its growth, capacity utilization and the shadow cost of capital) that depend on relative input prices or the level of user cost will be biased.[10]

Under the U.S. tax code, interest payments on the debt of the enterprise is tax exempt as a cost of doing business, while the return to equity holders is taxed, whether it is distributed as dividends or held as retained earnings. This distinction should therefore be recognized in the calculation of the rental price of capital as part of the adjustment for tax effects. The adjustment is readily accomplished by rewriting (9) as follows:

$$(14) \qquad p_T = \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T \varepsilon_T}\right](p_{A,T-1}r_T + \delta \cdot p_A - [p_{A,T} - p_{A,T-1}]) + p_{A,T}\tau_T$$

where ε_T is the ratio of the equity of the enterprise to the total of its debt and equity. The effect of ε_T on p_T is

$$(15) \qquad \frac{\partial p_T}{\partial \varepsilon_T} = \left[\frac{1}{\mu_T \varepsilon_T^2}\right](p_{A,T-1}r_T + \delta \cdot p_A - [p_{A,T} - p_{A,T-1}])$$

The change in p_T due to the debt-equity adjustment is computed as

$$(16) \qquad \Delta p_T = \left(\left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T \varepsilon_T} \right] - \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T} \right] \right) (p_{A,T-1} r_T + \delta \cdot p_A - [p_{A,T} - p_{A,T-1}])$$

Since the effect of making the correction will generally be to reduce the measured cost of capital, the effect on current practice will take the same direction as the rate of return correction noted above. Thus the rental price of capital now will reflect that which is commonplace in the finance and accounting literature: more highly leveraged enterprise has a lower cost of capital, *ceteris paribus*.

There are no direct implications of this adjustment for appraisal of the efficiency of capital markets. The effect on inferences from estimated models of production is that the bias from overstating the rental price of capital is even larger. The implications for the measured effects of government policy are substantial in that five of the sensitivity equations are modified as shown below.

$$(17a) \qquad \frac{\partial p_T}{\partial p_A} = \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T \varepsilon_T} \right] \cdot (\delta - 1) + \tau_T$$

$$(17b) \qquad \frac{\partial p_T}{\partial p_{A,T-1}} = \left[\frac{1-\mu_T z_T - \lambda_T}{1-\mu_T \varepsilon_T} \right] \cdot (r+1)$$

$$(17c) \qquad \frac{\partial p_T}{\partial \mu_T} = \frac{\varepsilon_T (1-\lambda_T) - z_T}{(1-\mu_T \varepsilon_T)^2} (p_{A,T-1} r_T + \delta p_A - [p_A - p_{A,T-1}])$$

$$(17d) \qquad \frac{\partial p_T}{\partial z_T} = \frac{-\mu_T}{(1-\mu_T \varepsilon_T)} (p_{A,T-1} r_T + \delta p_A - [p_A - p_{A,T-1}])$$

$$(17e) \qquad \frac{\partial p_T}{\partial \lambda_T} = \frac{-(p_{A,T-1} r_T + \delta p_A - [p_A - p_{A,T-1}])}{(1-\mu_T \varepsilon_T)}$$

$$(17f) \qquad \frac{\partial p_T}{\partial p_T} = p_A$$

These derivatives may be contrasted with the corresponding measures for the conventional formulation of the rental price shown in (10a-10f) above. The values of these derivatives and their corresponding elasticities are shown in Table 8.

3. Empirical Effects of Omissions from Rate of Return and Rental Price

To show the empirical effects of these omissions, rates of return and rental prices of physical assets were computed for seven major airlines for the period 1972-86. Enterprise data are preferable for illustrative purposes because accounting data (from the airlines' balance sheet and income statement) are publicly available that describe financial assets and the debt-equity structure of the firm. As noted above, industry or sectoral level financial statements are not available for individual industries in the national income and product accounts. So enterprise data must be used to assess accurately the effects of misspecifying the rate of return and the user cost of capital. The rates of return and service

prices of capital consistent with financial theory were computed according to equations (12) and (14) respectively, based on data reported to the Federal Aviation Authority.[11]

To illustrate the omission of financial assets, the rate of return was recomputed with the value of financial assets set to zero, the usual practice in implicit in productivity modeling and growth accounting. The rental price was computed according to (14), and in three variants: with financial capital omitted, with the debt-equity adjustment omitted, and with both omitted. The last variant corresponds to the most common practice in production modeling and growth accounting. The results are shown in Tables 1-7. Details of the computations are shown in Appendix Table A1. Annual results are shown to convey a sense of the intertemporal dispersion of the short run rates of return and annually computed service prices of capital. Once again, both of these concepts apply to the long run. However, short run changes in the macroeconomic environment can, of course, cause year-to-year changes in both measures.

Rates of return in all cases show strong cyclical effects and sensitivity to energy price increases in 1973 and 1979. These effects are echoed in the rental prices. Clearly, it takes financial assets to run an airline, and the debt or equity holders providing these assets must be compensated, or the assets will be withdrawn. Omission of financial capital results in considerably higher measured rates of return and intertemporal dispersion of those rates for all airlines.

The following effects are observed in the rental prices for all airlines:

1. The measured rental price is considerably higher when financial capital is omitted because the rate of return is higher.
2. When the debt-equity adjustment is omitted, the measured rental price is higher because the tax effect is overstated.
3. When both effects are omitted, the measured rental price is usually more than twice its properly measured value.

The sensitivities of the rental price to its various components are shown in Table 8 for American Airlines. The sensitivities are measures both as derivatives and elasticities of the rental price p_T with respect to its components, evaluated at the mean values for the 1972-86 period. The elasticities are generally high for all arguments in the rental price function except the rate of return. In particular, the elasticities are high for the government policy variables: the corporate tax rate, the investment tax credit, and the present value of tax-allowed deductions. The measured elasticities with respect to those policy variables vary considerably when the rental price is misspecified.

Based on these empirical results, it seems evident that better economic models, growth analyses and policy assessments would result from using rate of return and rental price measures that incorporate financial capital and the debt-equity adjustment.

4. CONCLUSIONS

The rental price or user cost of capital is the most important link between government tax and other macroeconomic policies, and the decisions of profit-making enterprises. Conventional economic growth and productivity studies of industries and regulated firms have ignored quantitatively important elements of user cost. When these elements, financial assets and the distinction between debt and equity are excluded, the resulting measures of user cost and the associated rate of return are sharply biased, and generally have greater variability across enterprises. These effects are demonstrated for seven U.S. airlines from the early 1970s to the mid-1980s. Industry or sectoral level data in the national income and product accounts of the United States and other countries do not have associated balance sheets from which the data on financial assets can be obtained. However, there are data services available that can be used to obtain estimates of the averages of financial assets and of the debt-equity ratio by industry or sector. Because the enterprise results for the measured user cost of capital and rate of return are so sensitive to exclusion of these factors, it is important to make the effort to include their estimates in industry and sectoral studies, and *a fortiori*, in studies of enterprises. Correct specification of the user cost and rate of return on capital is especially important when the objective is to assess the effects of government policy on the industries and sectors, as in chapters 6 and 7, and on enterprises, as in the next chapter.

There was a saying that attained some currency several years ago that "an economist is an accountant without the personality." In view of these results, it is tempting to rephrase that as "an economist is an accountant without the financial insight."

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TABLE 1. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
AMERICAN AIRLINES, 1972-1986

Year	Rate of Return: Consistent with Financial Theory	Rate of Return: Omits Financial Capital	Rental Price of Capital: Consistent with Financial Theory	Rental Price of Capital: Omits Financial Capital	Omits Debt Equity Distinction	Standard Practice: Omits Both
1972	-0.08498	-0.22816	-0.11573	-0.05065	-0.2001	-0.08984
1973	-0.16015	-0.36959	0.009711	-0.03954	0.012538	-0.07175
1974	-0.07494	-0.06301	0.000388	0.003236	-0.0037	0.001129
1975	-0.10994	-0.15942	0.009975	-0.00307	0.012649	-0.00957
1976	-0.02386	0.061534	0.021752	0.046091	0.032053	0.07305
1977	-0.01788	0.101317	0.037717	0.076848	0.057728	0.122449
1978	0.005362	0.175126	0.049528	0.107152	0.080927	0.181179
1979	-0.05542	-0.0188	0.02738	0.040976	0.041823	0.065026
1980	-0.05892	-0.02821	0.01348	0.025595	0.017875	0.039091
1981	0.024505	0.12709	0.044468	0.088167	0.072214	0.149893
1982	0.002519	0.045681	0.080536	0.10631	0.136055	0.181858
1983	0.1202	0.224478	0.149863	0.217554	0.256966	0.376522
1984	0.095006	0.199482	0.182159	0.258577	0.3077	0.440318
1985	0.138079	0.283728	0.235273	0.347675	0.399859	0.595129
1986	0.10096	0.186531	0.201796	0.266874	0.34534	0.459813
Average	0.03005	0.12345	0.069597	0.105455	0.116569	0.178955

TABLE 2. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
CONTINENTAL AIRLINES, 1972-1986

Year	Rate of Return Consistent with Financial Theory	Rate of Return Omits Financial Capital	Rental Price of Capital Consistent with Financial Theory	Rental Price of Capital Omits Financial Capital	Omits Debt Equity Distinction	Standard Practice: Omits Both
1972	-0.10089	-0.18671	-0.09273	-0.0566	-0.16065	-0.09962
1973	-0.18855	-0.38866	0.003076	-0.04322	0.001109	-0.07942
1974	-0.16289	-0.34429	-0.01921	-0.06027	-0.03932	-0.11277
1975	-0.18355	-0.28483	-0.00784	-0.03182	-0.02041	-0.06589
1976	-0.12183	-0.19012	-0.00407	-0.02037	-0.01498	-0.04776
1977	-0.18297	-0.29616	-0.01262	-0.0437	-0.03191	-0.09336
1978	-0.04136	0.011941	0.029988	0.045574	0.053336	0.084812
1979	0.0358	0.239073	0.054113	0.119676	0.099629	0.228451
1980	0.066867	0.298554	0.056723	0.137613	0.10478	0.264849
1981	0.238116	0.517819	0.127418	0.239	0.233964	0.445762
1982	0.012901	0.045139	0.077876	0.094929	0.147072	0.181282
1983	0.058729	0.110554	0.098105	0.127753	0.186489	0.245907
1984	-0.05222	-0.0576	0.066486	0.063051	0.12082	0.113992
1985	-0.06241	-0.08527	0.098819	0.07648	0.13106	0.100423
1986	-0.36643	-0.52716	-0.20834	-0.37076	-0.27992	-0.49494
Average	-0.03771	0.00607	0.025633	0.031283	0.050023	0.068627

TABLE 3. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
DELTA AIRLINES, 1972-1986

Year	Rate of Return Consistent with Financial Theory	Rate of Return Omits Financial Capital	Rental Price of Capital Consistent with Financial Theory	Rental Price of Capital Omits Financial Capital	Omits Debt Equity Distinction	Standard Practice: Omits Both
1972	-0.02688	-0.00097	0.014773	0.039069	0.01948	0.056537
1973	-0.13987	-0.21337	0.015313	-0.00362	0.020699	-0.00888
1974	-0.06077	-0.03925	0.003575	0.009115	0.002036	0.01075
1975	-0.08797	-0.08848	0.016336	0.016193	0.022517	0.022285
1976	-0.06591	-0.07148	0.009738	0.008166	0.011865	0.009192
1977	-0.06672	-0.06821	0.020828	0.020367	0.031214	0.030406
1978	0.017338	0.067395	0.055166	0.072731	0.087999	0.117559
1979	0.030548	0.083541	0.062059	0.082774	0.096301	0.129885
1980	0.053482	0.106182	0.064038	0.087402	0.095533	0.131942
1981	0.092352	0.229767	0.079499	0.143592	0.123589	0.227643
1982	0.057012	0.130873	0.123765	0.172403	0.193882	0.272262
1983	0.127443	0.226287	0.172366	0.244435	0.26527	0.378597
1984	-0.05014	-0.05291	0.077571	0.0755	0.123454	0.119944
1985	-0.05106	-0.05648	0.088045	0.083932	0.146276	0.139013
1986	-0.15983	-0.21396	0.003419	-0.03794	-0.00353	-0.07595
Average	-0.00141	0.034637	0.050433	0.063558	0.078123	0.0987

TABLE 4. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
NORTHWEST AIRLINES, 1972-1986

Year	Rate of Return: Consistent with Financial Theory	Rate of Return: Omits Financial Capital	Rental Price of Capital: Consistent with Financial Theory	Rental Price of Capital: Omits Financial Capital	Rental Price of Capital: Omits Debt Equity Distinction	Rental Price of Capital: Standard Practice: Omits Both
1972	-0.11912	-0.23133	-0.06142	-0.0373	-0.09224	-0.05706
1973	-0.16467	-0.32344	0.009118	-0.03423	0.01072	-0.05318
1974	-0.14777	-0.22062	-0.02023	-0.04004	-0.03319	-0.06269
1975	-0.15132	-0.19854	-0.00199	-0.01628	-0.00593	-0.02714
1976	-0.07809	-0.09377	0.006231	0.001025	0.00602	-0.00151
1977	-0.03162	-0.01025	0.035685	0.043367	0.050269	0.061872
1978	-0.01004	0.039894	0.049396	0.068667	0.071829	0.101319
1979	0.000643	0.049727	0.051449	0.071113	0.077349	0.108456
1980	0.055072	0.109286	0.064303	0.088153	0.096631	0.134087
1981	0.040975	0.097847	0.057562	0.085237	0.084685	0.12775
1982	0.007558	0.038556	0.09356	0.114559	0.141402	0.174297
1983	0.069847	0.11894	0.131739	0.167939	0.199235	0.255521
1984	-0.03587	-0.03111	0.090905	0.094594	0.14157	0.147611
1985	-0.03671	-0.03821	0.101125	0.099961	0.165519	0.163514
1986	-0.05727	-0.08702	0.080616	0.058267	0.133667	0.093865
Average	-0.00686	0.017626	0.050838	0.059526	0.077878	0.091119

TABLE 5. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
TRANSWORLD AIRLINES, 1972-1986

Year	Rate of Return Consistent with Financial Theory	Rate of Return Omits Financial Capital	Rental Price of Capital Consistent with Financial Theory	Rental Price of Capital Omits Financial Capital	Omits Debt Equity Distinction	Standard Practice: Omits Both
1972	-0.03436	0.025939	-0.03679	0.043526	-0.07001	0.072945
1973	-0.11006	-0.27465	0.020671	-0.01602	0.032699	-0.03354
1974	-0.08225	-0.08904	-0.00079	-0.00229	-0.00666	-0.00941
1975	-0.09182	-0.10123	0.014105	0.011811	0.020788	0.01656
1976	-0.05357	-0.04465	0.012755	0.01509	0.017794	0.022072
1977	-0.04585	-0.02492	0.026923	0.033277	0.042545	0.05391
1978	0.00462	0.077509	0.048098	0.072147	0.080488	0.123532
1979	-0.00536	0.085683	0.044088	0.07627	0.073543	0.131242
1980	-0.00516	0.054753	0.032925	0.055021	0.055017	0.096411
1981	0.097056	0.268575	0.071619	0.140563	0.127151	0.257029
1982	0.047562	0.19455	0.095444	0.172513	0.183854	0.339835
1983	0.041797	0.129924	0.091231	0.143457	0.167075	0.268115
1984	-0.00492	0.025928	0.100095	0.120582	0.180861	0.220014
1985	-0.04587	-0.05553	0.093874	0.086365	0.15324	0.140284
1986	-0.13537	-0.21038	0.023883	-0.04425	0.02918	-0.07116
Average	-0.00955	0.045585	0.042729	0.058069	0.07405	0.105419

TABLE 6. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
UNITED AIRLINES, 1972-1986

Year	Rate of Return Consistent with Financial Theory	Rate of Return Omits Financial Capital	Rental Price of Capital Consistent with Financial Theory	Rental Price of Capital Omits Financial Capital	Omits Debt Equity Distinction	Standard Practice: Omits Both
1972	-0.0091	0.153663	0.020834	0.083008	0.031473	0.137678
1973	-0.15418	-0.39715	0.011003	-0.04493	0.014943	-0.08284
1974	-0.10496	-0.15631	-0.00625	-0.01801	-0.01586	-0.03665
1975	-0.11854	-0.1685	0.007631	-0.00487	0.008788	-0.01365
1976	-0.0366	-0.01153	0.017089	0.023587	0.025939	0.037975
1977	-0.00683	0.051362	0.03927	0.057213	0.063732	0.095325
1978	0.06541	0.186295	0.071847	0.114145	0.116388	0.187775
1979	-0.0658	-0.05336	0.023204	0.027736	0.035241	0.043127
1980	0.035794	0.18985	0.05033	0.110381	0.083313	0.189747
1981	0.099136	0.212941	0.075473	0.123387	0.128726	0.214902
1982	0.131831	0.231221	0.153425	0.211046	0.273278	0.37875
1983	0.13514	0.248208	0.157556	0.229967	0.274095	0.403729
1984	0.059474	0.135586	0.151732	0.205697	0.262596	0.35921
1985	-0.01729	-0.00595	0.108465	0.116634	0.191554	0.206761
1986	-0.06532	-0.08561	0.068603	0.054831	0.1229	0.095756
Average	0.03045	0.099911	0.061133	0.084975	0.105184	0.147537

TABLE 7. RATE OF RETURN AND RENTAL PRICE OF CAPITAL
US AIR, 1972-1986

Year	Rate of Return Consistent with Financial Theory	Rate of Return Omits Financial Capital	Rental Price of Capital Consistent with Financial Theory	Rental Price of Capital Omits Financial Capital	Omits Debt Equity Distinction	Standard Practice: Omits Both
1972	-0.01994	0.100811	0.011031	0.061673	0.014232	0.09593
1973	-0.06067	-0.06796	0.034652	0.032841	0.052575	0.049641
1974	-0.01289	0.208128	0.015452	0.069699	0.021426	0.110926
1975	-0.06559	-0.01444	0.022331	0.036392	0.032568	0.055538
1976	-0.00591	0.073595	0.027892	0.051699	0.040672	0.07884
1977	0.007473	0.095252	0.047763	0.077855	0.071496	0.119156
1978	0.035036	0.104509	0.065836	0.092217	0.09845	0.139477
1979	0.030294	0.08484	0.065013	0.087518	0.09614	0.130708
1980	0.088687	0.167692	0.080634	0.116142	0.119855	0.174439
1981	0.096369	0.155324	0.082293	0.110138	0.126631	0.171272
1982	0.028924	0.050239	0.103999	0.117849	0.164076	0.186694
1983	-0.0664	-0.07734	0.03133	0.023243	0.04302	0.030484
1984	-0.11709	-0.15202	0.028158	0.000749	0.038471	-0.00586
1985	-0.06975	-0.08688	0.076226	0.062728	0.121224	0.098264
1986	-0.13545	-0.18988	0.021307	-0.01699	0.029084	-0.04373
Average	-0.0098	0.020486	0.04203	0.04821	0.063275	0.071983

TABLE 8. SENSITIVITIES OF RENTAL PRICE WITH RESPECT TO CONSTITUENT ARGUMENTS, EVALUATED AT MEANS

Argument		p_T Derivative	p_T Elasticity
p_{AT}	Consistent with Financial Theory	-0.4808	-4.448
	Financial Capital Omitted	-0.4808	-4.448
	Debt-Equity Adjustment Omitted	-0.8383	-7.755
	Both Omitted	-0.8383	-7.755
p_{AT-1}	Consistent with Financial Theory	0.6250	5.338
	Financial Capital Omitted	1.2463	10.645
	Debt-Equity Adjustment Omitted	1.0791	9.217
	Both Omitted	1.1934	10.194
r_T	Consistent with Financial Theory	0.4351	0.193
	Financial Capital Omitted	0.4351	0.193
	Debt-Equity Adjustment Omitted	0.7512	0.333
	Both Omitted	0.7512	0.333
μ_T	Consistent with Financial Theory	-0.0891	-0.536
	Financial Capital Omitted	-0.1828	-1.099
	Debt-Equity Adjustment Omitted	0.0396	0.238
	Both Omitted	0.0812	0.488
z_T	Consistent with Financial Theory	-0.0661	-1.063
	Financial Capital Omitted	-0.1356	-2.179
	Debt-Equity Adjustment Omitted	-0.1142	-1.835
	Both Omitted	-0.2341	-3.763
λ_T	Consistent with Financial Theory	-0.1301	-2.234
	Financial Capital Omitted	-0.2668	-4.581
	Debt-Equity Adjustment Omitted	-0.2246	-3.858
	Both Omitted	-0.4607	-7.911