Share prices and the value of workers

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Is the value of workers in a company reflected in its share price? Traditional approaches suggest not. This article proposes an alternative: the workforce of the company can be seen as a collection of matches between workers and jobs. The company decides on forming matches, as well as on investment in physical capital, on the basis of its expectations of future profits, which also determine the share price. So there is a link between investment and hiring on the one hand and share prices on the other. This approach has implications for the analysis of share price movements, employment and investment.

Introduction

Traditional economic theory struggles to explain the behaviour of share prices. The standard model in economics and finance states that the value of the company, as reflected in the share price, should equal the value of its capital stock. But typically that model matches the data poorly. The lack of a direct role for labour in the standard model of (perfectly) competitive markets is also puzzling. Workers are assumed to be paid their marginal products in wages. So with labour therefore 'capturing' its contribution to the company, it is only the value of capital that is left for the owners of the company, ie its shareholders. Hence owning shares is akin to owning capital.

This article presents an alternative way of thinking about these issues. The relationship of the company with its workers can be viewed as a collection of matches of workers to jobs. The cost of the match is any cost in forming the match, such as recruitment costs, and any expense incurred in operating production processes, such as training. The job-worker match generates production and hence revenue for the company. These returns accrue over time, as long as the job-worker match lasts, and generate a stream of profits for the company. The expected present value of these profits should be reflected in the share price. So the behaviour of share prices can be explained by studying the present value of job-worker matches, and of the associated capital stock. That is the aim of this article, using tests of macroeconomic data.

The rest of the article proceeds as follows. The next section outlines a model that relates a company's share price to the value of both its workers and its capital. The model is then tested against US data, and the implications of the results for explanations of share price behaviour are discussed.

The value of the company

This section describes a model that formalises the broad concepts outlined above. The model assumes that a company makes optimal decisions on hiring workers, and on investing in physical capital, with the aim of maximising its expected profits, discounted over time. These decisions are then related to the share price. As such there is a link between share prices, labour and capital.

The company has to choose the rates of hiring and investment that maximise expected discounted profits.(2) In doing so it takes into account how productive labour

(1) The Bank of England awards Houblon-Norman and George fellowships to economists engaged in full-time research on an economic or financial topic of interest. Eran Yashiv was a Houblon-Norman fellow in 2005, and would like to thank the Bank of England for funding and hospitality. He would also like to thank Hoyt Bleakley, Ann Ferris, Jeff Fuhrer and Elizabeth Walat for their worker flows series, Bob Hall for market value data, Darina Waisman for able research assistance, and Colin Ellis for excellent editorial work.

(2) When discussing future values, such as future profits, we often need to express them in common terms relevant for today. This is done by converting future values to current or present values by discounting. The latter term refers to the idea that £1 in the future is worth less than £1 in the present, as we must take into account the accrual of interest on any sum invested today. Hence discounting uses the rate of interest to convert values from the future to the present. For example: £$(1 + R)$ in a year from now will be worth £1 today (in present value) when the interest rate is R. The term 'expected' refers to the notion that future values are not known with certainty but can only be evaluated taking into account the probabilities of future events.

and capital are, as well as how costly they are. This is done with a forward-looking perspective: firms take into account not only production in this period, but also in all future periods.

The share price of the company, or more generally its economic value, is the expected discounted stream of future profits, ie revenues less costs. The link of the share price with hiring and investment on the one hand and with labour and capital on the other is established by splitting this present value into different components.

Under certain assumptions,(1) the value of the company is equal to the sum of two components:

(i) the value of the capital stock, which is equivalent to the present value of future capital productivity; and

(ii) the value of the labour stock (the company's workforce), which is equivalent to the present value of future labour productivity, minus wage costs.

This decomposition implies that the company decides on hiring and investment based on its expectations of the future productivity of capital and labour. But these expected productivities also determine future profits, which are reflected in the current share price. So the rate of investment and the rate of hiring relate to the same expectations that drive the share price. Thus there is a link between hiring and investment flows and labour and capital stocks on the one hand, and the share price on the other. The innovation of this approach is that firms partly derive profits (and hence extra market value as reflected in its share price) by successfully matching workers to jobs, in addition to employing capital and using it productively. And the former channel is likely to be increasingly important, compared with the latter, in an economy where production becomes more labour-intensive (and less capital-intensive): for example, this may happen if the balance of the economy moves towards the service sector and away from manufacturing. The box on page 454 discusses the model in more detail.

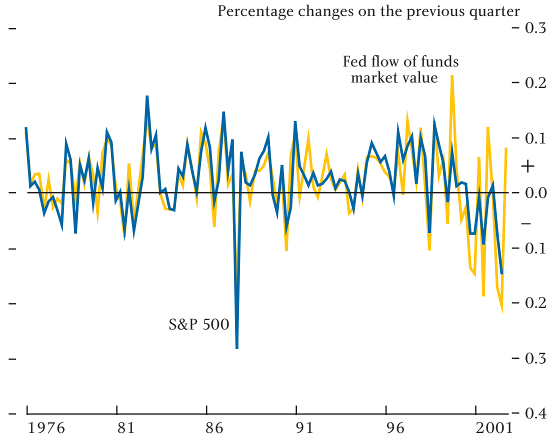
Taking the model to the data

In this section, the model set out above is applied to US data. First, the relevant data are presented, and then the performance of the model is examined.

Ideally, we would apply the model to UK data. But unfortunately, the existing data are either too short and/or not comprehensive enough. For example, UK data on gross hiring (from both unemployment and inactivity) are only available on a quarterly basis from the 1990s. So instead, the model is tested against US data for the private non-farm non-financial sector.

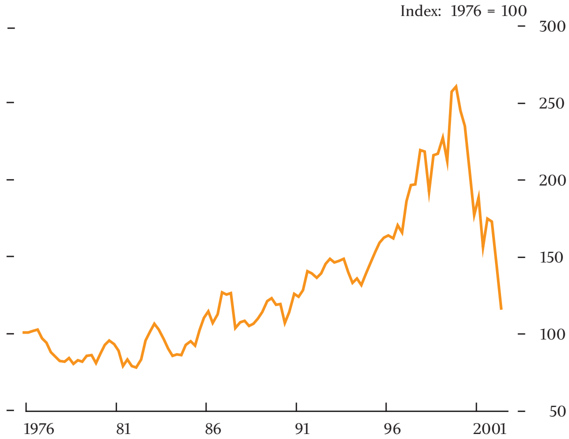
The key data we require are company values. These are based on the Fed flow of funds database for the United States.(2) The data are the sum of financial liabilities and equity less financial assets, adjusted for the difference between market and book values for bonds. This is a broad measure, intended to capture the private sector as a whole. This series is close to the more familiar, but narrower, S&P 500 index. Chart 1 shows the two series over the sample period 1976–2002; there is a clear positive correlation.

Chart 1
Fed flow of funds market value and the S&P 500



Sources: Based on Hall (2001) and Thomson Financial Datastream.

Chart 2
US market value to GDP ratio



Sources: Based on Hall (2001) and Bureau of Economic Analysis.

(1) Namely a so-called constant returns to scale (CRS) class of production function, and CRS adjustment costs. For example, with a CRS production function, when capital and labour (the inputs) double, output also doubles.
(2) These data are available on the internet at: www.federalreserve.gov/Releases/Z1/. The precise data used were supplied by Bob Hall (based on Hall (2001)) and are available on request.

The theoretical structure of the model

This box sets out the theoretical structure behind the model used in this article in more detail. The value of the company is assumed to equal the present value of its capital stock plus the present value of its labour force:

$$s_t = k_{t+1}Q_t^K + n_{t+1}Q_t^N$$

where: s_t is the value of the company;
k_{t+1} is the value of the company's capital stock;
Q_t^K is the present value of investment;
n_{t+1} is the size of the company's labour force;
Q_t^N is the present value of hiring workers;

and t subscripts indicate the time period.

What are these present values? The present value of investment is the expected stream of future revenues from using capital (after-tax, and discounted to take into account the interest rate and the depreciation rate). The present value of hiring is the expected stream of future revenues from employing workers, net of their wages (after-tax, discounted to take account of the interest rate and the match break-up rate).

The model differs from the standard approach to valuing companies, in that the present value expressions are the key determinants of the share price. In the special case where changing the level of capital is costless (so $Q_t^K = 1$), and there are no hiring costs for labour (so $Q_t^N = 0$), then the market value equals the value of the capital stock (ie $s = k$). This is the standard 'neo-classical' model. Alternatively, if there are no hiring costs for labour ($Q_t^N = 0$) but the firm faces costs when it wants to change capital, the model becomes essentially analogous to Tobin's Q theory, which states that the market value of a company should be related to the replacement cost of its assets.

So the model in this article encompasses models from three strands of literature. The first is the literature on adjustment costs of physical capital, in particular Tobin (1969) and Tobin and Brainard (1977). This is known as Tobin's Q model. The standard Q model assigns no direct role for labour, as determination of the company's value only requires taking into account the capital and any associated adjustment costs. The second is the literature on the adjustment costs of labour. When there are costs in adjusting labour, such as hiring or firing costs, the company extracts rents. These rents compensate it for the adjustment costs. Such costs are inherent in the search and matching model of the labour market (Mortensen and Pissarides (1999) survey this literature). The third is the production-based asset-pricing model for a company's market value proposed by Cochrane (1991, 1996). This model takes the Tobin's Q equation from the first strand cited above and, taking investment as given, explains share prices using the company's optimal investment decision.

Chart 2 shows the Fed market value series divided by non-financial business sector GDP, ie the ratio of market value to GDP. This will be the series used in the empirical work reported later. The sample includes the large increase in share prices from 1995 to 2000, and the sharp drop thereafter.

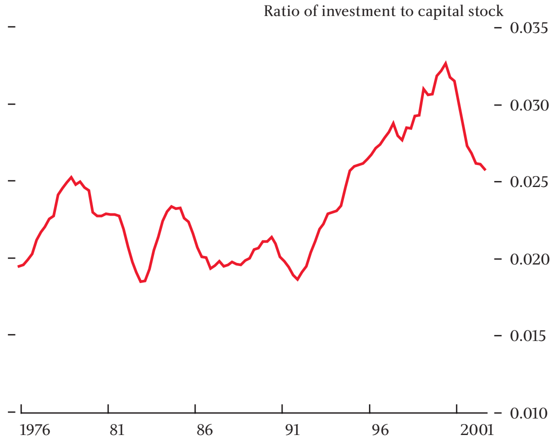
Testing the model also requires series for capital and labour stocks. We also need to consider the investment rate — the ratio of investment to the capital stock — and the gross hiring rate — gross hiring divided by employment, shown in Charts 3 and 4.(1)

The investment and hiring rates are negatively correlated: for example, when investment rates rose in the 1990s, hiring rates fell. So although companies hire and invest at the same time, when they increase investment rates they have tended to reduce hiring rates and *vice versa*.

Using these data, the model can now be estimated. The key component of the model is the value of the firm: this is set out in more detail in the box above. The value of the firm depends on the present values of investment and hiring. In turn, these depend on the amount of profit the company expects to generate by hiring an

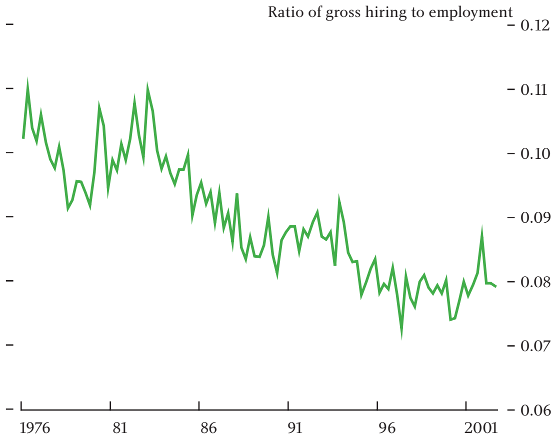
(1) The quarterly capital data have been interpolated from annual data. The hiring rate data were supplied by Hoyt Bleakley, Ann Ferris, Jeff Fuhrer and Elizabeth Walat, and are based on Bleakley *et al* (1999). All data are available on request.

Chart 3
US investment rate



Source: Bureau of Economic Analysis.

Chart 4
US hiring rate



Source: Based on Bleakley *et al* (1999).

extra worker or buying an extra machine. If a new machine is expected to generate extra profit, then the present value of investing in that machine is positive; and if that profit exceeds the cost of buying the machine, the company will probably buy it. Hence, the present value of investment is likely to vary with the investment rate. But the hiring rate could also be related to the present value of investment: if a company buys a new machine, it may also need more workers to operate that machine. Alternatively, the machine could replace existing workers. The reverse also applies: when the firm hires new workers, it may also decide to change its investment spending.

So not only is the present value of investment related to the investment rate, and the present value of hiring to the hiring rate: in both cases the interaction between investment and hiring is also likely to be important. For this article, the present value of investment is estimated as a function of the investment rate and the product of the investment and hiring rates; and the present value of hiring is estimated as a function of the hiring rate and the product of the investment and hiring rates:

Present value of investment = $\alpha + \beta$**investment rate* + η* *(investment rate*hiring rate)*

Present value of hiring = $\delta + \zeta$**hiring rate* + η* *(hiring rate*investment rate)*

Measuring the present values in this manner, the relationship between the market value of the firm on one hand and the stocks of capital and labour (multiplied by their estimated present values) on the other can be assessed using regression analysis. More details on the model are available in the appendix.

In the benchmark model, firms face costs in changing both capital and labour: this is referred to as the job-worker match (JWM) model. But two common alternatives are also estimated. Often it is assumed that there is no role for labour in determining the market value of the firm: in that instance, the model becomes the so-called 'Tobin's Q' model, where the market value of a company is related to the replacement cost of its assets. Another alternative form of the model is where there is no role for labour and firms face no costs in adjusting their level of capital: in that instance — the so-called 'neo-classical' model — the market value of the company (or the share price) equals the value of capital. These models are discussed in more detail in the box on page 454.

The regression results, based on 108 quarterly observations between 1976 and 2002, are reported in Table A below.(1) The models are estimated using Two Stage Least Squares (2SLS). The table reports a measure of the goodness of fit — the adjusted R^2 — and the Durbin Watson (DW) statistic, a simple test to check whether the residuals from the model are serially correlated (that is, related to one another over time). If the DW statistic was equal to two, that would indicate

Table A
Summary statistics for the estimated models(a)

Model specification	Adjusted R^2	DW statistic
JWM	0.80	1.13
Tobin's Q	0.71	0.24
Neo-classical	0.09	0.15

(a) Based on 2SLS estimation. Full estimation results are available in the technical appendix.

(1) Estimation results are available in the technical appendix.

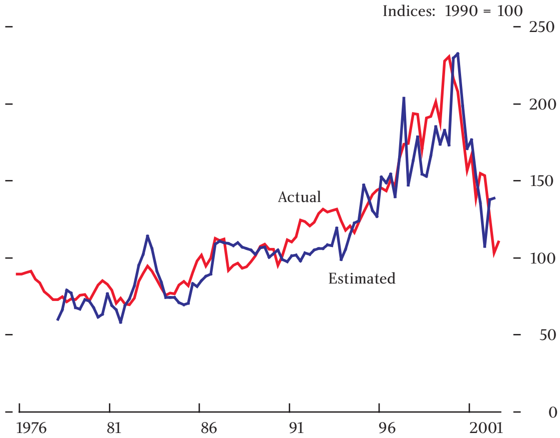
that the residuals were not serially correlated. But if there is serial correlation, that is generally a sign that the model is deficient in some way — for example that it is set up wrongly, or variables that play an important role have been mistakenly left out of the estimation.

The JWM model has the best 'fit' to the data, closely followed by the Tobin's Q model. But the neo-classical model fares poorly. In fact, it finds a negative relationship between company market value and the price of investment. Some serial correlation is present in all of the models — that could indicate that the models are misspecified, or that important variables have been omitted. But, of the three models tested, the JWM model fares the best by far.

Explaining share prices

What can these estimation results tell us about the behaviour of share prices and their relationship with the present values of capital and labour? Chart 5 shows actual market value to GDP data, and the estimate based on the JWM model: the fit is quite close. The fit of the other models, especially the neo-classical model, was not as good.

Chart 5
Actual and estimated US market value to GDP ratios

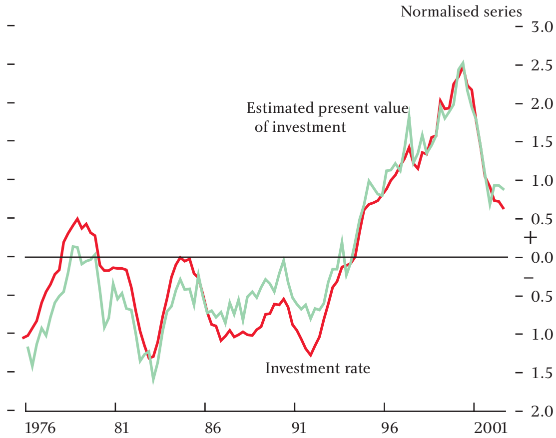


Sources: Based on Hall (2001) and Bureau of Economic Analysis.

Given this close fit, the model can tell us about the different 'components' of the share price, as it differentiates between the roles played by the present value of investment and the present value of hiring.

Chart 6 shows the investment rate series and the estimated present value of investment; Chart 7 shows the hiring rate and the estimated present value of hiring. By construction the estimated present values are close to the hiring and investment rates, given the latter are used to model the former. One interpretation is that the 'share price' of capital can be deduced from observing the investment rate and the 'share price' of labour can be deduced from observing the hiring rate. Observing these two components can then inform what is driving changes in quoted share prices.

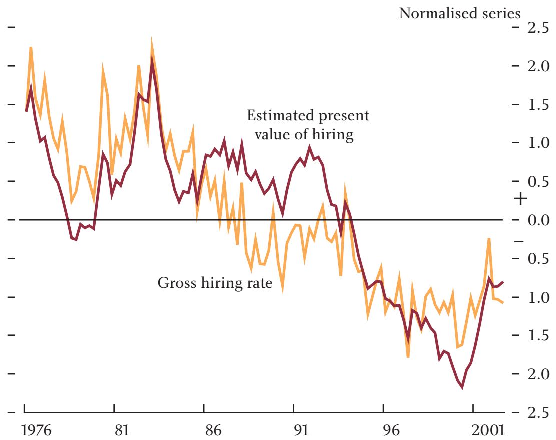
Chart 6
The investment rate and the estimated present value of investment(a)



Source: Bureau of Economic Analysis.

(a) Both series have been normalised.

Chart 7
The hiring rate and the estimated present value of hiring(a)



Source: Based on Bleakley *et al* (1999).

(a) Both series have been normalised.

Charts 6 and 7 also show a marked negative correlation between the present values of investment and hiring, as well as the actual investment and hiring rates. Why do we observe this negative correlation?

The representative firm is hiring and investing at the same time. But that does not mean that hiring and investment are positively correlated: both occur at the same time, but hiring could rise while investment declines (or *vice versa*). Why might that happen?

Suppose the present value of investment rises, but at the same time the present value of hiring falls. By itself, the former would probably lead to higher investment and higher hiring: in contrast, the latter would be likely to result in lower investment and lower hiring. What matters is which effect is more important for the actual rates of investment and hiring. If the impact of the higher present value of investment is more important for investment than the lower present value of hiring, then investment would rise. Similarly, if the impact of the lower present value of hiring is more important for hiring than the higher present value of investment, then hiring would fall. So investment could rise while hiring falls, as observed in the data and shown in the estimated model.

Are the estimated relationships stable over time? Table B shows the correlations between the market value to GDP ratio, the fitted series and its components for the full sample (1976–2002). Correlations are also reported for two subperiods within this sample: 1976–89 and 1990–2002.

Table B
Correlations between the estimated model and actual data

Correlation between:	Sample period 1976–2002	1976–89	1990–2002
Actual and estimated market value to GDP	0.92	0.81	0.85
Estimated present values of hiring and investment	-0.99	-0.99	-0.99
Market value to GDP and estimated present value of hiring	-0.81	0.31	-0.82
Market value to GDP and estimated present value of investment	0.85	-0.24	0.83

Some of the correlations are fairly stable across the whole sample and the subsamples, for example the correlation between the actual and fitted ratios of market value to GDP. The estimated present values of hiring and investment are also consistently negatively correlated, as observed in the data. The other correlations are less stable, switching sign between the first subperiod and the second. That suggests that the investment and hiring rates have been important drivers of share prices at different times over the past 30 years, rather than one consistently dominating the other. In the early part of the sample, when the investment and hiring rates were relatively flat, the present value of hiring is positively correlated with the value of the firm. In the second half of the sample, when the investment rate rose and the hiring rate fell, market value followed the present value of investment more closely.

The analysis presented here is very much in its early stages. Much more work needs to be done, such as experimenting with different forms of the model. The structure outlined in this article is deliberately simple, and testing the robustness of the results to different assumptions about the costs firms face when investing, or varying the measurement of present values, would be worthwhile. But the model appears to offer a useful avenue for analysing the ratio of the market value of firms to GDP. Movements in this value are related to movements in investment rates and in hiring rates. So the model offers an insight into the relationship between equities and companies' demand for capital and labour. Further work could elaborate on the transmission mechanism between these variables in more detail — for example, by investigating how hiring, investment and share prices respond when they are away from equilibrium. Future investigations could also test the usefulness of asset prices as a leading indicator of employment and investment, or *vice versa*.

Conclusions

Typically, the value of workers is assumed to be unrelated to share prices. This article has examined a theoretical model that explicitly makes the link between the two. It explores the idea that the job-worker match has a present value and that the company is a collection of such job-worker matches. Or in other words, firms decide on employing workers on the basis of how much extra profit those workers are expected to generate for the company over time, and those profits are related to share prices. These present values of labour (and capital) make up the market value of the company, as the expectations that drive share prices also affect investment and hiring. So changes in share prices may be reflected in hiring or investment behaviour; and when the model is tested on US data, a relationship does appear to be evident. While in its early stages, this work offers a new insight into the link between financial variables on the one hand — share prices and market value — and real macroeconomic variables, such as hiring and investment, on the other.

Technical appendix

This appendix shows the formal derivation of the model. Full details are presented in Merz and Yashiv (2004).

Companies use physical capital and labour as inputs in order to produce output goods (y) according to a constant returns to scale production function:

$$y_t = f(k_t, n_t)$$

where other variables are defined in the box on page 454.

Hiring costs include advertising, screening, and training. Investment costs include installation costs, learning the use of new equipment, etc. These are modelled using an adjustment cost function, $g[i_t, k_t, q_t v_t, n_t]$: i denotes investment, and qv gross hiring (vacancies (v) multiplied by the rate at which they are filled (q)). This adjustment cost function is assumed to be convex in the company's decision variables (investment and vacancies) and exhibits constant returns to scale (in all its arguments). Hiring costs and capital adjustment costs interact.

In every period, the existing capital stock depreciates at the rate δ_t and is augmented by new investment i_t:

$$k_{t+1} = (1 - \delta_t)k_t + i_t, \qquad 0 \leq \delta_t \leq 1.$$

Similarly, the number of a company's employees decreases at the rate ψ_t. It is augmented by new hires $q_t v_t$:

$$n_{t+1} = (1 - \psi_t)n_t + q_t v_t, \qquad 0 \leq \psi_t \leq 1.$$

Companies' profits net of taxes π, are given by:

$$\pi_t = (1-\tau_t)\left[f(n_t, k_t) - g(i_t, k_t, q_t v_t, n_t) - w_t n_t - p_t^I i_t\right]$$

where τ_t is the corporate income tax rate, w_t is the wage, p_t^I is the real tax-adjusted price of investment goods. Hence profits are revenues less adjustment costs, wage payments and investment.

The representative company's market value, s_t , is defined as the present discounted value of future profits:

$$s_t = E_t\left\{\sum_{j=1}^{\infty}\left(\prod_{i=1}^{j}\beta_{t+i}\right)\pi_{t+j}\right\}$$

where E_t denotes the expectations based on information available in period t. The discount factor between periods $t+j-1$ and $t+j$ for $j \in \{1, 2, \ldots\}$ is given by:

$$\beta_{t+j} = \frac{1}{1 + r_{t+j-1,t+j}}$$

where $r_{t+j-1,\,t+j}$ denotes the time-varying discount rate between periods $t+j-1$ and $t+j$. This rate could be a weighted average of the cost of equity and the cost of debt.

The company's period t market value can also be defined as the expected discounted market value of the following period:

$$s_t = E_t\left[\beta_{t+1}\left(s_{t+1} + \pi_{t+1}\right)\right]$$

The first-order conditions for dynamic optimality are the same for any two consecutive periods $t + j$ and $t + j + 1$, $j \in \{0, 1, 2, ...\}$, so for the sake of notational simplicity, I drop the subscript j from the respective equations to follow:

$$Q_t^K = E_t\left\{\beta_{t+1}\left[\left(1-\tau_{t+1}\right)\left(f_{k_{t+1}} - g_{k_{t+1}}\right) + \left(1-\delta_{t+1}\right)Q_{t+1}^K\right]\right\}$$

$$Q_t^K = \left(1-\tau_t\right)\left(g_{i_t} + p_t^I\right)$$

$$Q_t^N = E_t\left\{\beta_{t+1}\left[\left(1-\tau_{t+1}\right)\left(f_{n_{t+1}} - g_{n_{t+1}} - w_{t+1}\right) + \left(1-\psi_{t+1}\right)Q_{t+1}^N\right]\right\}$$

$$Q_t^N = \left(1-\tau_t\right)\frac{g_{v_t}}{q_t}$$

In order to establish a link between the company's market value and its stock of capital and employment using the first-order conditions, the latter can be manipulated using the CRS properties of f and g, and can be written as:

$$s_t = k_{t+1}Q_t^K + n_{t+1}Q_t^N$$

The present value of the marginal unit of capital is given by:

$$Q_t^K = E_t\left\{\sum_{j=0}^{\infty}\left(\prod_{i=0}^{j}\beta_{t+1+i}\right)\left(\prod_{i=0}^{j}\left(1-\delta_{t+1+i}\right)\right)\left(1-\tau_{t+1+j}\right)\left(f_{k_{t+1+j}} - g_{k_{t+1+j}}\right)\right\}$$

where f_k is the marginal product of capital, g_k is the reduction in marginal adjustment costs due to an additional unit of capital, τ is the corporate profit tax rate, β is the discount factor, and δ is the depreciation rate. E_t denotes expectations of future values at time t. Basically the expression above is the expected, discounted stream of future after-tax marginal revenue from capital, with discounting taking into account both the interest rate (via β) and the depreciation rate (δ).

The present value of the marginal worker is given by:

$$Q_t^N = E_t\left\{\sum_{j=0}^{\infty}\left(\prod_{i=0}^{j}\beta_{t+1+i}\right)\left(\prod_{i=0}^{j}\left(1-\psi_{t+1+i}\right)\right)\left(1-\tau_{t+1+j}\right)\left(f_{n_{t+1+j}} - g_{n_{t+1+j}} - w_{t+1+j}\right)\right\}$$

where f_n is the marginal product of labour, g_n is the reduction in marginal hiring costs due to an additional worker, τ is the corporate profit tax rate, β is the discount factor, and ψ is the separation rate. The latter represents the rate at which job-worker matches break up. The expression above is the expected, discounted stream of future after-tax marginal revenue from workers, net of wages, with discounting taking into account both the interest rate and the separation rate.

It should be remarked that in the special case of a perfectly competitive labour market with no hiring costs, Q_t^N equals zero. In the special case of no adjustment costs for capital as well as no hiring costs, the share price equals the value of the capital stock, as in the neo-classical model. Thus the model differs from the standard approach in that there are positive present value expressions for hiring and investment that are key determinants of the share price.

Estimation results

In the main model, the value of the firm was estimated as a function of capital and labour, multiplied by their present values:

$$\frac{s_t}{f_t} = (1-\tau_t)\left[\frac{k_{t+1}}{k_t}\left[\frac{p_t^I}{\frac{f_t}{k_t}} + Q^K\left(\frac{i_t}{k_t}, \frac{q_t v_t}{n_t}\right)\right] + \frac{n_{t+1}}{n_t}\left[Q^N\left(\frac{i_t}{k_t}, \frac{q_t v_t}{n_t}\right)\right]\right]$$

This model nests the three different types of model set out in the box on page 454, depending on how the present values were estimated. In the benchmark JWM model, these were estimated as:

$$Q^K\left(\frac{i_t}{k_t}, \frac{q_t v_t}{n_t}\right) = f_1 + e_1\frac{i_t}{k_t} + e_3\frac{q_t v_t}{n_t}\frac{i_t}{k_t}$$

$$Q^N\left(\frac{i_t}{k_t}, \frac{q_t v_t}{n_t}\right) = f_2 + e_2\frac{q_t v_t}{n_t} + e_3\frac{q_t v_t}{n_t}\frac{i_t}{k_t}$$

The estimated coefficients and t-statistics, based on Two Stage Least Squares (2SLS estimation) using lagged variables as instruments, are shown in Table A1.

Table A1
Estimated present values in JWM model

Coefficient	Estimate	T-statistic
f_1	-94.1	-4.5
e_1	5441.7	7.8
e_3	-30870.5	-7.2
f_2	-6.8	-0.3
e_2	1229.8	6.3

In the Tobin's Q model, the present values are defined as:

$$Q^K\left(\frac{i_t}{k_t}\right) = f_1 + e_1\frac{i_t}{k_t}$$

$Q^N = 0$

The estimated coefficients are shown in Table A2.

Table A2
Estimated present values in Tobin's Q model

Coefficient	Estimate	T-statistic
f_1	619.5	12.9
e_1	-5.8	-5.0

Finally, in the 'neo-classical' model there are no adjustment costs. In this instance

$Q^K = 0$

$Q^N = 0$

so the value of the firm is estimated as:

$$\frac{s_t}{f_t} = e_0 + e_1\left[(1-\tau_t)\frac{k_{t+1}}{k_t}\left(\frac{p_t^I}{\frac{f_t}{k_t}}\right)\right]$$

Table A3 shows the coefficient estimates in this model.

Table A3
Estimated coefficients in neo-classical model

Coefficient	Estimate	T-statistic
e_0	39.8	11.1
e_1	-44.8	-9.4

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