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PREFACE

Our most recent NAKE Workshop (joint with LNBE) was held from June 2-6, 1997, at the University of Groningen. **John Roberts** gave a fine series of microeconomic lectures on the topic of 'The Economics of the Firm.' He managed to strike a fine balance between high theory and practical examples from everyday life (like machines to manufacture front car seats). In addition to setting a new record for producing the most voluminous course reader, **James Heckman** delivered high-quality lectures on 'The Econometric Approach to Evaluating Social Programs' which were well attended despite their highly technical nature. The first lecture gave rise to some (ex post) rather amusing confusion when Heckman insisted on talking about 'the Roy model' (which nobody knew). The model he actually discussed turned out to be better known in the Netherlands as 'the Heckman model' and for good reason too. One of the bright young lights of our profession, **Ricardo Caballero,** spoke on 'Investment Theory and Labour Markets.' Starting out from traditional investment theory he managed to cover a lot of ground and lead students all the way to the current frontier of economic science in that area. Rather amusing was the fact that he brought along with him the most enormous suitcase yours truly has ever seen, filled with work to do while in Groningen. He later told me that he had not actually touched much of it during his stay. Last but not least, **Nicholas Crafts** delivered his lectures 'Economic Growth: Lessons from Economic History' and showed once again that British lecturers tend to possess teaching skills that puts them in a class all of their own. As the French would say, 'chapeau.' I recall his private lectures on cricket with particular fondness, especially because Australia did end up winning the Ashes despite losing the first test during the Groningen workshop (NAKE had nothing to do with that shameful event).

The workshop was not only a success for purely academic reasons. The cooperation with the LNBE was extremely pleasant (thanks Elmer, thanks Janna), the local organizing team was superb (thanks Victoria, Marieke, and Mirjam), the weather was good, and all the social outings were fun (though not necessarily understandable). I fondly recall Jim Heckman tolling the bells of the Martini Tower both when was going up the stairs and when he was coming down.

In this *NAKE Nieuws* you find the best reports on two of the four lecturers. **Thijs Knaap** (RUG) reports on 'Investment Theory and Labour Markets' by Ricardo Caballero, and **Chris Bojke** (RUG) writes on 'The Economics of the Firm' by John Roberts. The other two reports will be published in the next issue of *NAKE Nieuws.*

As was announced in the previous issue of *NAKE Nieuws,* the inaugural edition of the NAKE Day will take place on October 24th, in Amsterdam. See this issue of *NAKE Nieuws* for a description of this initiative, just in case you missed it last time or did not receive an Email message from me recently! At the time of writing, a reasonable number of people have

already submitted their paper for presentation at the NAKE Day **but not yet enough** to really speak of a major rush. I would therefore like to once again put out an urgent call for papers, not only to AIO/OIO's (the so-called 'L' economists) but also to the more senior members of the Dutch economic scene (the 'XL' and 'XXL' economists). Funnily, I received a lot of signals from senior economists to the effect that the NAKE Day is a good initiative, but so far this expression of interest has not yet been translated into paper submissions. Am I missing something here? Registration for the NAKE day can be either electronically via the NAKE Homepage, or (for more traditional people) via the registration form located in the middle section of this *NAKE Nieuws.*

ANNUAL GENERAL MEETING OF MEMBERS OCTOBER 24,1997 IN AMSTERDAM

The annual general meeting of members of the Netherlands Network of Economics (NAKE) will take place over lunch during the NAKE Day in Amsterdam, on **Friday, October 24, 1997** (exact time and place to be announced).

REGISTRATION 1997/1998 UTRECHT COURSES

This summer issue of *NAKE Nieuws* contains an overview of the 1997-8 programme of Utrecht courses. The programme was determined in part on the basis of a student survey which was held in the spring. Unfortunately, the number of respondents was disappointingly small. I expect, however, that the new programme will not be plagued by the appearance of 'small sample bias.' One of the salient features of the new programme is the fact that many young NAKE Fellows have agreed to offer a Utrecht course on their respective area's of specialisation. Like is the case for the human body and any decent soccer team, perpetual rejuvenation is the key to success.

In the middle section of this *NAKE Nieuws* you find a removable course registration form for the courses being offered in blocks I and II. Note that Block I starts on September 12. Please send your completed registration form to the NAKE secretariat preferable **before September 1, 1997.** The outlines of (almost) all courses can be found on the NAKE Home Page.

Ben Heijdra

NAKE Teaching Programme 1997 - 1998

Block I: 12 September - 17 October

Location: KNG ≡ Kromme Nieuwe Gracht 80

Time:	*Place:*	*Course:*	
10.00-12.00	KNG, room 132	97.25.	*Economics of Education*. Van Ewijk & Oosterbeek.
10.00-12.00		97.30.	*Labour Economics: A Comparative Empirical Perspective*. Hartog & Theeuwes.
10.00-12.00		97.43.	*The Economics of Household Behaviour*. Kooreman.
10.00-12.00		97.38.	*Econometrics of Foreign Exchange Markets*. F. de Jong.
10.00-12.00		97.17.	*Agricultural Policy Analysis*. Burrell & Oskam.
10.00-12.00		97.67.	*Differential Games*. Houba.

Block II: 31 October - 5 December

10.00-12.00		97.04.	*Advanced Labour Economics*. Hartog & Teulings.
10.00-12.00		97.47.	*Applied Non-Parametric and Semi-Parametric Econometrics*. Melenberg & Lee.
10.00-12.00		97.34.	*Theory of Incomplete Markets*. Herings.
10.00-12.00		97.13.	*Topics in International Macroeconomics*. Beetsma.
10.00-12.00		97.07.	*Panel Data*. Verbeek.
10.00-12.00		97.19.	*Econometric Applications of Maximum Likelihood Methods*. Cramer.

Block III: 30 January - 6 March

10.00-12.00		97.04.	*Advanced Labour Economics*. Hartog & Teulings.

10.00-12.00	97.14.	*The Economics of the Trade Union*. Booth.
10.00-12.00	97.48.	*History of Economic Ideas*. Morgan.
10.00-12.00	97.12.	*Regional Economics, Agglomeration, and the Global Economy*. Brakman & Van Marrewijk.
10.00-12.00	97.27.	*Coordination Problems*. Goyal & Janssen.
10.00-12.00	97.9A.	*Environmental Problems and Policy: A Theoretical Introduction*. Folmer & De Zeeuw.

Block IV: 20 March - 1 May

10.00-12.00	97.51.	*Experimental Economics and the Design of Mechanisms*. Schram & Van Winden.
10.00-12.00	97.24.	*The Political Economy of Transition*. Ellman.
10.00-12.00	97.53.	*Social Choice Theory*. Peters & Storcken.
10.00-12.00	97.31.	*Intertemporal Aspects of Macroeconomics*. Heijdra & Meijdam.
10.00-12.00	97.9B.	*Growth and Environment*. Withagen & Smulders.
10.00-12.00	97.68.	*Advanced Industrial Organisation*. Van Cayseele & Furth

All course descriptions can be found on the NAKE Home Page:

http://www.fee.uva.nl/vak_groep/nake

Ricardo Caballero
Aggregate Investment Theory

Report by Thijs Knaap (RuG)

1 Introduction

Professor Caballero's discussion of aggregate investment theory featured both old stock and innovations in the field. This report traces the main line of the argument and presents some of the models that can be useful in explaining today's aggregate investment. As with the lectures, this main line is contained, to a large extent, in Caballero (1997). The next section briefly highlights the importance of the subject matter. Sections 3 and 4 then cover the two main ideas from modern investment theory: the fact that investments are major and infrequent events and the occurrence of information and contract problems.

2 Investment Theory: History, Goals

Investment is an important subject in its own right: it is a substantial component of aggregate output and it accounts for much of its fluctuations. On top of that, it turns out that the theory of investment can be applied to a large number of other economic areas such as the analysis of R&D, labor hoarding, human capital accumulation and fiscal reforms. These subjects are similar in that they describe a situation where there is a cost in the short term, whose payoff is collected in the long term.

Early investment theory used an aggregate production function which explained the level of GDP by the levels of labor and capital. After inverting the relation and taking differences it is possible to explain changes in the stock of capital by changes in GDP. If the production function allows for substitution between factors, the cost of capital should also enter the equation. The bottom line of this approach is, however, that investment takes place in response to changes in GDP, rather than in response to market opportunities.

The q-theory of investment does not suffer from this deficiency. The average q, the value of the firm divided by the total value of its equipment and structures, or the marginal q, the ratio of extra value and added equipment, is used as an indicator of investment opportunities.

All the above models fail when confronted in a straightforward way with the data. To the dismay of many economists, investment correlates with changes in corporate cash flow and changes in GDP, but not with any measure of q or the cost of capital. Only when refined econometric measures are used can some of the latter variables be shown to exert influence, but only in the long run or in shorter periods which encompass a large change in their value. More importantly, they leave most of the variance in investment unexplained.

The theory that will be introduced in the next section aims at a way of explaining investment that is consistent 'from the ground up.' At the firm-level, we really see at least three sorts of investment take place:

- Ongoing investment, like machine maintenance, that takes place almost every day in a large plant. Costs are small relative to the total stock of the company's capital.
- Gradual investment, like small refinements of an existing machine, or a software upgrade.
- Major and infrequent investments, in which a large amount of new capital is purchased and costs are significant relative to the firm's total stock of capital.

Doms and Dunne (1993) use microeconomic data to show that the typical firm has a 'lumpy' investment pattern, *e.g.* spending 25-40% of seventeen years of investment in one year. This suggests that the latter type of investment accounts for an important share of the total expenditure. The next section will therefore characterize this type of investment at the micro level, and present a consistent macro model.

3 Major and Infrequent Investments

3.1 Theoretical Framework

The key to making investment take place in chunks rather than a continuous flow, is introducing a cost of adjustment over and above the rental cost of capital. Especially a cost that is significant even at infinitesimal adjustments will cause the firm to invest infrequently, and with large fractions of total

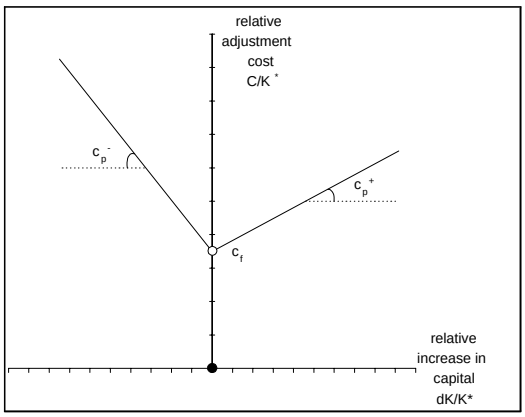

Figure 1: The adjustment costs relative to K^* as a function of the relative change in capital.

investment at a time. Caballero assumes an adjustment cost structure as in figure 1. The adjustment in capital is on the horizontal axis, and is taken as a fraction of the ideal stock of capital K^*. If the fraction is η costs are

$$C(\eta, K^*) = K^* \cdot \begin{cases} c_f + c_p^+ \cdot \eta & \text{if } \eta > 0 \\ 0 & \text{if } \eta = 0 \\ c_f - c_p^- \cdot \eta & \text{if } \eta < 0 \end{cases}$$

To compute the ideal stock of capital we construct the following model:

A firm would like to, at any point in time, maximize a flow of profit,

$$\begin{aligned} \Pi \cdot \Delta t &= \max_{K,L} (P(Y) \cdot Y - w \cdot L - r \cdot K) \cdot \Delta t. \\ Y(K, L, A) &= A \cdot K^\alpha \cdot L^{1-\alpha} \end{aligned}$$

Time is discrete and moves with increments Δt. We assume the firm actually performs this continuous maximization with respect to L. Use θ to denote a sufficient (scalar) statistic for conditions faced by the firm (including the shape of the function P, technology A and wages w). It is assumed that $\Delta\theta/\theta$ is IID so that $\ln\theta$ is a random walk, possibly with a drift. The maximization problem now becomes

$$\Pi \cdot \Delta t = \max_K (K^\gamma \cdot \theta - r \cdot K) \cdot \Delta t.$$

with $\gamma < 1$. This gives us K^*, the static optimum, the stock of capital that the firm would like to entertain:

$$K^* = \arg\max_K \Pi = \left(\frac{\gamma \cdot \theta}{r}\right)^{\frac{1}{1-\gamma}}$$

Being an affine transformation of $\ln\theta$, $\ln K^*$ follows a random walk.

At this point, it is important to remember the costs of capital adjustment that were introduced above. It will probably not be profitable to set $K = K^*$ at every point in time because unlike labor, every (small) adjustment in capital causes the firm to incur at least the fixed cost $c_f \cdot K^*$. So, instead of following the static optimum, the firm will choose maximization of its present value V as a guideline for investment. This new guideline will cause the firm's most preferred capital stock K^{**} to be different from K^* (due to, for instance, a drift in θ) and can make inaction the most profitable strategy.

From this setup, a few things can be seen immediately.

- If K is close to K^{**}, the increase in present value from adjusting K is probably less than the cost of adjustment. Thus, there will be a region around K^{**} in which the firm does not repair imbalances between K and K^{**}.
- If it is profitable to change the capital stock when it is at K_0, it must also be profitable to do so when it is at K_1 with $|K^{**} - K_0| < |K^{**} - K_1|$.[1]
- If the variable relative adjustment costs c_p^+ and c_p^- are positive and significant, adjustments will not be complete. It will be optimal to adjust K to a value closer to K^{**}, but not to K^{**} itself (the slope of the V-function, or marginal benefit, is zero there).

Summarizing, a firm now behaves as follows. Every period, it adjusts labor L to its optimal value. The optimal static stock of capital K^* is computed from conditions θ, as well as the imbalance $Z = K/K^*$. Then,

$$\begin{cases} \text{if } Z < L, & Z \text{ is adjusted to } Z = l \\ \text{if } L \leq Z \leq U, & Z \text{ remains unchanged} \\ \text{if } U < Z, & Z \text{ is adjusted to } Z = u \end{cases} \tag{1}$$

with $L \leq l \leq K^{**} \leq u \leq U$. Caballero argues that these variables may be found using the 'smooth pasting conditions' $V_Z(l) = V_Z(L) = c_p^+$ and $V_Z(u) = V_Z(U) = -c_p^-$.

[1] This because like the Π-function, the second derivative of the net present value function V w.r.t. K is always negative. The first derivative of V is zero at K^{**}. We know that K_0 is far enough away from K^{**} to incur both fixed and variable adjustment costs. Thus, $(V^{**} - V_0) / |K^* - K_0|$ is surely larger than the variable costs of adjusting. But from the second derivative V_{KK} we know that the slope the V-function along the stretch $K_0 \to K_1$ can only be steeper than the above sufficient measure. Thus, if it is profitable to adjust from K_0, it must be profitable to do it from K_1.

3.2 Empirical Verification

3.2.1 The hazard function

A reality check of the above model may be conducted with both micro- and macro-economic data. A first observation from micro data is that firms do not always react the same to an imbalance in capital. Thus, it is necessary to incorporate a random element in the (deterministic) adjustment scheme (1). Caballero (1997, p. 21) does this by letting c_f be a random variable of which a new value is drawn for each firm for every period. This means that trigger values L and U also become random, and we can talk about a probability of adjustment $\Lambda(x)$ with $x \equiv \ln(K/K^{**})$. Λ is the *hazard function*, a term borrowed from transition econometrics. For convenience, variable adjustment cost is set to zero, so that when a firm adjusts, its new stock of capital will be K^{**}. In terms of x, the net investment will be $e^{-x} - 1 \approx -x$. This allows us to write expected investment as $-x \cdot \Lambda(x)$.

3.2.2 Quadratic costs of adjustment

It is useful to see how the hazard function Λ would look in a rival model, the quadratic adjustment cost model. In this setup, adjustment costs are $C = c \cdot (K_t - K_{t-1})^2$. There are no fixed costs of adjustment, and c is positive. Rotemberg (1987, p. 92) shows that the optimal path of capital now is

$$K_t = \alpha \cdot K_{t-1} + [(1-\alpha)(\delta - 1)/\delta] \sum_{j \geq 0} (1/\delta)^j E_t K^*_{t+j}$$

Assuming $E_t K^*_{t+j} = K^*$ for all j and noting that $K^{**} = K^*$ we can write this, after log-linearization, as[2]

$$E\left(\frac{I}{K}\right) = -\beta \cdot \ln(K/K^*)$$

with $\beta > 0$. But here we can use the identities from above to get

$$-x \cdot \Lambda(x) = -\beta \cdot x$$

Dividing through by x we see that the quadratic adjustment cost model predicts a constant hazard rate.

[2] This trick is often applied to approximate the neoclassical model of growth. See, for instance, Barro and Sala-i-Martin (1995, p. 53).

3.2.3 Estimates

If we call the function that describes the distribution of capital imbalances $f(x,t)$, we can now write total expected investment in period t as

$$\frac{I_t}{K_t} = -\int_{-\infty}^{\infty} x \cdot \Lambda(x) \cdot f(x,t)\,\mathrm{d}x$$

Caballero, Engel and Haltiwanger (1995) estimate the hazard function $\Lambda(x)$ from panel data of approximately 7,000 firms during 17 years. The function is estimated both non-parametrically from micro data, and by fitting a 4^{th} degree polynomial on $\Lambda(x)$ using macro-data and several distributional assumptions. An artist's impression of the results[3] is in figure 2. From both

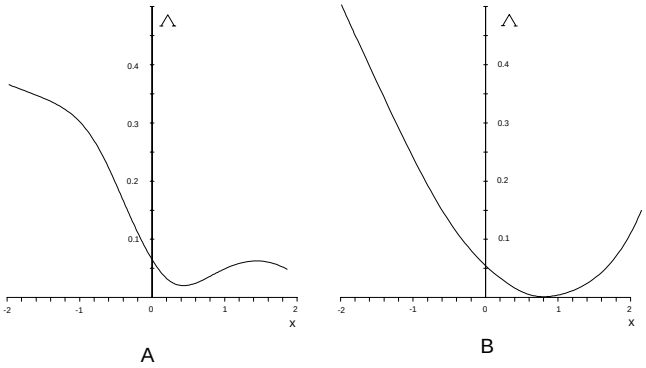

Figure 2: Hazard rate Λ versus imbalance x. A: estimated from micro data. B: estimated from aggregate data using distributional assumptions.

panels of this figure, it is clear that the hazard rate is not constant across x, thereby rejecting quadratic adjustment costs. Rather, a small value of x leads to a higher probability of investment. A large x does not often lead to disinvestment. This seems to indicate a strong irreversibility of investment.

4 Informational and Contractual Problems

Whereas the last section was much concerned with the technical side of investment, this section covers the consequences of strategic actions of investing agents. Strategies can involve waiting for others to gain information on the investment climate and reneging on imperfect contracts.

[3] I'm the artist.

4.1 Informational Problems

Gale (1995) discusses social learning, or situations in which private information is partly revealed by the actions of agents. In the investment context, it could be that all agents receive a private signal on the return of a certain kind of investment, and that the true return is the average of all these signals. These agents could all be better off by sharing the information, but assuming they do not it may be revealing to wait and see how many colleagues actually invest. Their action in this case carries extra information about the true return, information that can be added to one's private signal.

Gale argues that it may well be possible in a variety of models that imitation dominates private information. That is, even though every agent receives a positive signal, nobody invests because they all wait for someone else to make the first move. This situation is more likely if the space of actions is limited, as was the case with lumpy investments above. Any agent's information is then filtered and only observed as a binary variable: the investment go or no-go. The possibility that investments are irreversible also makes them prone to informational problems, as the potential losses of a bad investment project are obviously large compared to the costs of waiting one period to get information.

4.2 Contracts, Specificity, Opportunism

If an investment problem involves more than one party, contracts have to be made about each party's behavior after the costs have been sunk. Because investments are often irreversible and tailored to the other parties, it can be profitable to renege on a contract once the other party has committed itself. Professor Roberts gave an example of this 'hold-up problem' during his part of the workshop: after investing in a machine that makes seats that can only be used in a specific type of Toyota car, you have little outside opportunities if your sole possible customer, Toyota, unilaterally decides to lower the price it is willing to pay for the seats. Professor Caballero even admitted that M.I.T. itself had tried to renegotiate a contract with the Cambridge electricity company recently, after that firm had just invested to cope with the institution's demand for electricity.

4.2.1 Theory

Caballero and Hammour (1996) develop a model that shows the macroeconomic consequences of the hold-up problem. Production takes place with two factors, 1 and 2, both measured so that their supply equals one. An

amount U_i is used of each factor in a factor-specific (autarkic) decreasing returns sector, the remaining units E_i are inputs in a constant returns joint production sector ($i = 1, 2$). The output in factor i's own sector is $F_i(U_i)$, and the joint production output is $y^n \cdot (1 - U_1)/x_1 = y^n \cdot (1 - U_2)/x_2$ with technical coefficients x_i given. Define $E_i = (1 - U_i)/x_i$.

Joint production requires some sunk costs: of E_i units sunk in this sector, only $\phi_i \cdot E_i$ can be retrieved to work in the factor's 'autarkic' sector ($0 < \phi_i < 1$). If contracts are incomplete, each party to a joint production project expects to be held up until the return to the project is no more than the return to his or her outside opportunity. Call factor compensation in the autarkic sector p_i, then, expecting a hold-up, the anticipated wage in the joint sector can never exceed $(1 - \phi_i) \cdot p_i$. This will cause a rent in that sector,

$$s^n = y^n - (1 - \phi_1) \cdot p_1 \cdot x_1 - (1 - \phi_2) \cdot p_2 \cdot x_2$$

which is assumed to be divided equally. Factor compensation in the joint sector now is $w_i^n = (1 - \phi_i) \cdot p_i \cdot x_i + \frac{1}{2} s^n$.

We compare situations with complete and incomplete contracts. With complete contracts ($\phi_i = 0$, $i = 1, 2$), we have that the returns in both sectors must equalize: $p_i = w_i$. With incomplete contracts, both parties require $p_i \geq w_i^n$ with the latter defined above. This is equivalent to

$$y^n \geq p_i \cdot x_i + p_{\neg i} \cdot x_{\neg i} + (\phi_i \cdot p_i \cdot x_i - \phi_{\neg i} \cdot p_{\neg i} \cdot x_{\neg i}) \tag{2}$$

with $\neg i = 3 - i$. In the perfect contract equilibrium the term in brackets does not appear.

From (2) we can see that there may exist projects that will be executed in a perfect contract equilibrium, and will not be executed in an imperfect contract equilibrium, if the term in brackets is different from zero. The term in brackets represents the difference in sunk costs between the two parties. If there exists such a difference, the party with the largest sunk costs (or, the largest appropriable sum) will demand the highest return. In figure 3, the general equilibrium versions of (2) are drawn out. The horizontal difference between lines (1) and (2) is the above 'term in brackets.' All else equal, factor 1 stands to lose the most from investing in the joint sector (because of, say, a high value of ϕ_1). For each y^n (vertical axis) this factor puts more into the autarkic sector than factor 2.[4] Thus, in equilibrium, there is an excess supply of factor 2 for the joint sector.

Caballero and Hammour (1996) derive a number of properties of this model. These properties include a segmented market for the factor in excess

[4]This means that the return in the autarkic sector for factor 1 will be lower, indicating a lower expected payof from the joint sector.

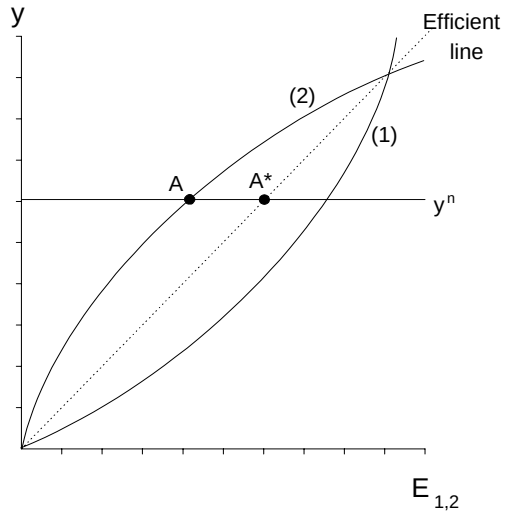

Figure 3: Factor 1 and 2's required y^n for different values of commited capital $E_{1,2}$. The efficient line is from the perfect-contract world, in which A^* is put into the joint sector. Imperfect contracts cause this amount to fall to A.

supply[5] and *sclerosis* or too little scrapping of old joint projects. When the factors are actually called capital and labor a number of properties of business cycles may be derived.

It is also shown that, when factors get to control their own level of appropriability ϕ_i, they will generally not aim at $\phi_i = 0$. This because a positive level of appropriability leads to positive rents earned. However, it is plausible that movements in ϕ_i are sluggish, and may not react quick enough to macroeconomic shocks (shocks in y^n). This causes inefficiencies in a volatile environment.

4.2.2 An empirical example

Professor Caballero argues that this model goes a long way in explaining some of the phenomena in Europe in the 1970s and 1980s. Looking specifically at France, he points out that institutions in the early seventies changed in favor of the factor labor. The changes took place in the Grenelle accords, and with the institution of labor inspectors. Indeed it seems like labor was the scarce factor in those years, and welfare-institutions were its way of raising ϕ_L. With

[5] In figure 3, at the going prices, factor 2 earns more in the joint sector than in the autarkic sector. There is no arbitrage because there are no more units 1 willing to cooperate. Thus the market for factor 2 is segmented.

the turning of the tide in favor of the factor capital, France and the continent found themselves suffering from 'Eurosclerosis'. Reducing appropriability again was now resisted by the fortunate 'insider' workers of the segmented labor market.

Some of these assertions were tested during the workshop with an amended version of the above model. Using 'suitable' parameters, the main features of French wages, profits, and interest rates could thus indeed be mimiced.

5 Concluding Remarks

This reprise of professor Caballero's lectures touched upon the history of investment theory and showed two new ways of looking at this age-old economic field. Having incorporated microeconomic observations and information- and appropriability-aspects, investment theory seems capable of generating more insight into a variety of economic problems.

References

Barro, R. J. and Sala-i-Martin, X.: 1995, *Economic Growth*, McGraw-Hill, New York.

Caballero, R. J.: 1997, Aggregate Investment: A 90's View. Forthcoming in the *Handbook of Macroeconomics*, J. Taylor and M. Woodford, eds.

Caballero, R. J., Engel, E. M. R. A. and Haltiwanger, J. C.: 1995, Plant-Level Adjustment and Aggregate Investment Dynamics, *Brookings Papers on Economic Activity* **0**(2), 1–54.

Caballero, R. J. and Hammour, M. L.: 1996, The Macroeconomics of Specificity. NBER Working Paper # 5757, Cambridge, MA.

Doms, M. and Dunne, T.: 1993, An Investigation into Capital and Labor Adjustment at the Plant Level. mimeo, Center for Economic Studies, Census Bureau.

Gale, D.: 1995, What Have We Learned from Social Learning? Mimeo, Boston University, Boston, MA.

Rotemberg, J.: 1987, The New Keynesian Microfoundations, *in* O. J. Blanchard and S. Fischer (eds), *NBER Macroeconomics Annual*, MIT Press, Cambridge, MA, pp. 69–104.

John Roberts
'The Economics of the Firm'

Report by: Chris Bojke RuG

1 Introduction

As opposed to considering inter-firm conduct within a market, Professor Roberts directed his lecture series to consider intra-firm conduct itself. This emphasis was justified by the suggestion that market-based theories treat firms as relatively unexplored/unexplained black boxes which simply turn resources into goods in the most efficient manner. Whilst this treatment has freed economists to tackle problems of, say, imperfect competition, it has perhaps restricted them in what they can say about firms' behaviour in real life. A close analogy to the black box assumption might be that of the homo economicus assumption in the theory of consumer choice. A vast and varied literature is available not only on the non-existence of this perfectly rational human being, but also on the significant and often contrary effects that arise when attempts are made to model human beings in a more behavioural manner, it is clear that these assumptions matter. He adds weight to this argument by appealing to Simon's[1] argument that a visitor from Mars observing social structures would conclude that economic activity within firms, hugely dominates economic activity between firms and would find it curious that (Earthling) economists should allow the analysis of the market to take centre stage[2]. In short, intra-firm conduct is not just an interesting economic puzzle, it counts in a big way.

Shifting the emphasis from market theories of the firm to organisational economics requires the economist to take explicit account of a whole range of microeconomic phenomenon, previously (often implicitly) assumed away. Thus organisational economics is characterised by discussion of such things like incomplete contracts, principal-agent problems, lines of authority, asset ownership and the argument of second best. Concentrating on these themes, Professor Roberts demonstrated how agents within a firm respond to structure and incentives. Having been acquainted with the idiosyncracies of this branch of economics and the techniques of analysis, the participants were then asked to consider a broader range of questions such as; 'how are disputes and claims for quasi-rents within

[1] H A Simon 1991

[2] Of course kindly aliens might send some of their own economists incognito to push Earthling economists in the correct direction. It is worth noting that, in the US, a predictable choice of an unalarming stereotypical pseudonym for any self-respecting Martian, might well be 'John Roberts'.

the firm resolved by the competing factions?' and even broader questions such as 'why do firms exist?'.

2 Survival of the.....Weakest !??!

In considering the organisational economics of a firm one particularly curious stylised fact you might agree with, is that firms offer weaker incentives to agents than the market does. For example, many employees often receive less than their marginal revenue product in wages. This may lead you to question how firms can exist *despite* offering weak incentives. The answer to this question is supplied by turning the question on its head and stating that firms exist in *order* to offer weak incentives. This statement is explained via a multi dimensional principal-agent, p-a, framework and the argument is a summary of the paper by Holstrom and Milgrom[3].

Consider a risk-neutral principal and a risk-averse agent where the principal requires the agent to carry out a number of different functions (therefore a multi dimensional task p-a model). Since the agent's effort is often not directly observable, the principal has the problem of designing an optimal incentive scheme for the agent, where it becomes in the agent's own best interest to conform to supply the effort desired by the principal. i.e. rewards as motivation. It is well known that with risk averse agents, supplying them with fair incentive based contracts burdens them with unwanted risk, and thus the optimal contract is not so easily derived. This problem is confounded when we extend the single task case to that of a multi dimensional task case. Now the principle must be aware that any incentive contract will not only influence total effort, it will also influence the division of that effort among the different tasks. Take a simple example of such a multi dimensional problem, an agent may be responsible not only for the output of a good, but also the maintenance of the machine which produces that good. If we assume that the volume of quantity is the more easily measured and forms the basis of providing agents with motivation, then there exists an incentive for that agent to direct all of their effort in that single direction, at the expense of machine maintenance. Whenever one of the tasks is harder to measure than another, incentives to direct effort to the *more easily* measured tasks should be muted. Hence we often observe such 'low powered' incentive schemes in firms.

Ownership of the asset is also potentially an important issue. Suppose in our example that the agent owns the machinery and thus owns the asset returns, then, given a muted incentive contract (e.g. a flat wage), the agent is likely to devote too much of their effort to maintenance and not enough to production. In this case an optimal contract should intensify the rewards to production. i.e. offer stronger incentives.

In Holstrom and Milgrom, ownership of the asset is taken as the definition of whether the agent's relationship to the principal is seen in the context of a firm employee (the principal owns the asset) or that of an independent contractor i.e. the market solution (the agent owns the asset.) It can be shown that, in general, if agents are i) above a certain level of risk aversion ii) the variance of asset returns are high and iii) the variance of measurement error of the agent's effort on other tasks is high, then the agent will

[3]Holstrom and Milgrom 1991

prefer not to take the high powered incentives and own the asset, but rather, become an employee with a low powered incentive contract and let the principal own the asset. Hence the rationale for firms to offer weak incentives is demonstrated.

3 Holdups, Specific Assets and Ownership

A further rationale for the existence of firms emerges when we consider how the sunk investment decision (including investment in human capital) may be influenced by potential holdup problems. A holdup is a particular problem of incomplete contracts, where the future return of an investors current action cannot be effectively controlled by a contract designed and signed today. Because it is impossible to write such an enforcing complete contract, the parties know that in the future they will be competing/bargaining over those quasi-rents which are uncontractable. Thus the decision to invest or not, will strongly depend on the investor's future bargaining position in a way that cannot be controlled today. If the investor's future bargaining power is weak, then the future benefits the investment creates will be dissipated between themselves and other parties and the likely outcome is underinvestment, which is suboptimal. One way in which an investor can be sure of claiming the residual quasi-rents from any investment, is if the asset is a specific asset and that they own this specific asset. Where specific refers to the fact that the owner of the asset can precisely specify who has access to the asset. Thus specifity and ownership together define the agent's bargaining strength. An obvious solution to this problem would seem to be for the investor to own the asset and thus have complete rights to the quasi-rents. In the context of upstream (investor) and downstream (buyer) agents this solution would involve vertical integration. This leads to the question of why we don't observe just massive firms in real life. This argument is developed more fully by Hart and Moore[4].

3.1 Property Rights and the Nature of the Firm

Hart and Moore's influential paper sets out an incomplete contracts problem with the potential for holdups and uses a game theoretic coalition approach to advocate several propositions of who should own what under certain conditions. The model is presented as a 2-stage game where at date 0 a set of $\underline{S}= (1, 2, \ldots I)$ risk neutral agents with $\underline{A}= (a_1, \ldots a_N)$ assets, each take an investment decision x_i ($i = 1$ to I), which is realised at date 1 when trade occurs. In this paper the investment is considered to be a pure human capital investment. The investment decisions, x_i, may not be specified in any contract at date 0 and are, therefore, chosen non-cooperatively by each agent at date 0. Likewise trade and production may not be specified at date 0. At date 1 the investment decisions by all agents are observable to all and the gains from trade are determined by a multi-agent bargaining solution, namely the Shapley Value. Consider a subset S of $\underline{S}$ which represents a coalition of agents at date 1 which controls a subset A of $\underline{A}$ assets. In order to include specifity, we assume that the agents in coalition S may deny the use of A to

[4]Oliver Hart and John Moore (1990)

all agents not in S. More formally, a control structure α, is defined whereby $\alpha(S)$ is that subset of assets $\{a_1, \ldots, a_N\}$ controlled by coalition S at date 1. The following conditions are attached, that each of the assets is controlled by at most just one subset of $\underline{S}$ and that any asset controlled by any subset $S^{|}$ of S must also be controlled by the whole coalition S i.e. $\alpha(S) \cap \alpha(\underline{S} \backslash S) = \emptyset$ and $\alpha\left(S^{|}\right) \subseteq \alpha(S)$. Within this definition of a control structure, the question of ownership is flexible in that either an agent may wholly own an asset or owns a share in the asset (the asset's use is determined by a majority vote.) In coalition S, the marginal return on investment to agent i is given by $\frac{\partial}{\partial x_i} v(S, A \mid x) \equiv v^i(S, A \mid x)$. Hart and Moore then go on to make several assumptions, the two critical ones being;

1. $v^i(S, A \mid x) = 0 \quad \text{if} \quad i \notin S$
2. $\left(\frac{\partial}{\partial x_j}\right) v^i(S, A \mid x) \geq 0 \text{ for all } \quad j \neq i$

i.e. an agent's investment enhances only their own productivity (and not that of the asset) and that such investments are complementary at the margin. Strict superadditivity is also assumed, so that the maximum total value at date 1 is given by $v(\underline{S}, \underline{A} \mid x) \equiv V(x)$ and thus the first best social surplus is given by $\underset{x}{max}\ W(x) \equiv V(x) - \sum_{i=1}^{I} C_i(x_i)$, where $C_i(x_i)$ is the cost to i of action x_i. Each agent can anticipate that at date 1, $V(x)$ will be distributed between the agents according to their Shapley Value. According to this framework Hart and Moore derived 12 propositions, some of the ones dealing with ownership are reported below.

Proposition 1 *For any control structure α, there is underinvestment.*

Proposition 2 *If only one agent i has an investment, then he should own all the assets.*

Proposition 5 *If an asset is idiosyncratic to a single agent, then he should own it.*

Proposition 6 *If an agent is indispensable to an asset, then he should own it.*

Proposition 8 *If two (or more) assets are (strictly) complementary, they should be owned or controlled together.*

Having derived these propositions, Hart and Moore then go on to demonstrate applications for when the set of assets consists of one asset to the case of where it consists of many assets. In the cases where there exists more than 1 asset, the analysis may be used to determine whether the assets should be owned by one person (integration) or whether they should be owned independently (non-integration). Not surprisingly the optimal outcome depends heavily on the scenario assumed, i.e. whether one agent or more are indispensable to one asset or more, etc. For example, in the many asset case, an oil pipeline and oil refinery example is used. Suppose there exists $\underline{A} = (a_1, a_2 \ldots a_N)$ assets, where a_1 is the oil pipeline and assets $a_2 \ldots a_N$ are oil refineries. Notice without the use of a_1, the other assets are useless. Now suppose that there exists N agents, $\underline{S} = (1, 2, \ldots N)$ where asset a_i is essential to agent i. Now also assume that the only synergies that exist

are bilateral and exist only between a_1 and the other assets. The value of any coalition A is given by; $v^i(\underline{S}, A) = v^i(\underline{S}, \{a_1, a_i\})$ iff $a_1, a_i \in A$ and 0 otherwise. If agent 1's investment is important, then this agent should own all assets. However, if agent 1's investment is unimportant but the others investments are important (possibly true for the oil example) then optimal structure changes significantly. Now all other agents, $2 \ldots N$, should share control rights in a_1. The size of the share given to each agent being an increasing function of the importance and responsiveness of that agents investment. Hart and Moore argue that this proposition is bourne out by empirical observation of the actual contractual arrangements of oil refineries and oil pipe owners. Where an agent's share of the pipeline is linked to their use of the line which is related to their investment.

Whilst the previous example was a useful application of the model presented (A second paper by Rajan and Zingales[5] addresses similar questions and agree that ownership and access to assets matter), I hope it also indicates just how specific a solution is to the assumptions of importance and indispensability of agents, concepts which may be difficult to measure. This is not the only problem with this model as some of our assumptions indicate. However even if we put aside objections to risk-neutral agents, investment not improving the intrinsic value of the asset, etc. (these are all things which can be fixed with some extensions to the model), we find some fundamental objections. When discussing the game-theoretic aspects it becomes fairly obvious that this model uses a one-shot game. It would appear more reasonable to suggest that a dynamic process would capture the ownership problem better, for example how would reputations affect the likelihood of holdups?

4 Contracting Environments

In response to the one-shot models in the previous section, Professor Roberts also introduced a paper by Baker et al[6] which uses repeated games in its model. Again the question is asked whether transactions with non-contractible effort should be determined within a firm, with 'implicit' contracts or in a simple spot market. Implicit contracts, unlike explicit contracts, are not enforceable and thus only make sense in the context of repeated games where they can be self-enforcing, agents will only avoid reneging if the threat of punishment in future periods exists. This adds an extra dimension to the previous section.

Consider an economic environment operating in discrete time consisting of an upstream and downstream agent, both of whom are risk neutral. There exists some asset which the upstream agent uses in each discrete time period to produce a good. This good has a value to the downstream agent, Q, but also has a value to an alternative user, P, which is assumed to be less than the value to the downstream agent, $Q > P$. The good is completely consumed in the time period it is produced. Asset ownership is a vital consideration. If the downstream agent owns the asset, then in the eventually of both agents being unable to agree to a transaction for the good, the downstream agent may simply take the good for nothing. Alternatively, if the upstream agent owns the asset

[5]Raghuram G. Rajan and Luigi Zingales 1996

[6]George Baker, Robert Givens and Kevin J. Murphy 1997

then they can dispose of the good as they choose should both agents be unable to agree a price. Thus ownership of the asset conveys ownership of the good. In each time period the upstream agent chooses an action plan $a = (a_1, \ldots, a_n)$ with cost $c(a)$, which will affect both Q and P. For simplicity assume that both Q and P have just two levels of quality, high and low, thus Q_H, Q_L, P_H and P_L. Assume that $Q_H > Q_L > P_H > P_L$. If the quality of the good was purely determined by the upstream agents actions, then explicit contracts would be enforceable, so suppose that the upstream agent may only affect the probability of the good's quality in the following manner;

$$Q = \begin{cases} Q_H \text{ with probability } q(a) \\ Q_L \text{ with probability } 1 - q(a) \end{cases}$$

$$P = \begin{cases} P_H \text{ with probability } p(a) \\ P_L \text{ with probability } 1 - p(a) \end{cases}$$

Where $c(0) = 0, q(0) = 0$ and $p(0) = 0$, so that at least some action is needed by the upstream party in order to have any chance of achieving the higher quality values. Since only the upstream agent sees a, it is uncontractable. This leads Baker et al to construct the following four contracting regimes which are likely to exist under the following combinations of ownership and dynamic conditions.

Under this framework the first best outcome is given by maximising the expected value of the good in its efficient use minus the cost of the upstream agent's actions i.e.

$$\underset{a}{max}\ Q_L + q(a)(Q_H - Q_L) - c(a) \equiv V(a^*).$$

Baker et al turn their attention to the likely outcomes of interaction under the various contract regimes.

4.1 One-Shot Game Analysis

4.1.1 Spot Markets

The two agents come together for a one-off transaction then go on their merry way. The upstream agent owns the asset, the downstream agent exerts no influence over the upstream agent's choice of action, thus the Nash bargaining solution is used to determine the price of the good and thus determines a. The upstream agent chooses a^{SM} by solving:

$$\underset{a}{max}\ \tfrac{1}{2}\left[Q_L + q(a)(Q_H - Q_L)\right] + \tfrac{1}{2}\left[P_L + p(a)(P_H - P_L)\right] - c(a) \equiv U^{SM}$$

and the downstream agent has the payoff: $D^{SM} \equiv \frac{1}{2}\mathrm{E}\Big[Q_i - P_j \mid a = a^{SM}\Big]$

so,

$V(a^{SM}) = D^{SM} + U^{SM} = Q_L + q(a^{SM})(Q_H - Q_L) - c(a^{SM})$

The total surplus V is likely to be less than that generated by the first best solution. Notice that if $(Q_H - Q_L)$ is relatively large compared to $(P_H - P_L)$ then underinvestment can occur and if the opposite is true, then we may get overinvestment. For example suppose $(Q_H - Q_L) = 0$, then the first best level of a is 0, but the upstream agent will exert effort because it will increase the price via the Nash bargaining solution.

4.1.2 Spot Employment

The scene is as with the spot market, the agents meet just once, so there are no informal contracts. However this time the downstream agent owns the asset and therefore has the final rights to the good and can simply take it off the hands of the upstream agent. Recognising this, the upstream agent clearly has no bargaining strength and thus has no incentive to exert effort. The outcome is certain, Q_L will be realised and the total surplus from this is $V(a^{SE}) = Q_L$. This is always less than first best, unless $q(a)(Q_H - Q_L) - c(a) < 0$.

4.2 Repeated Game Analysis

4.2.1 Firms

The downstream player owns the asset but this time incentives are given to the upstream agent because the game is repeated. Implicit contracts are plausible iff they are self-enforcing. Equilibriums are calculated by considering trigger strategies, thus we need to consider pay-offs for colluding and reneging. Suppose the downstream player will pay b_j for Q_j $(j = L, H)$ plus β_j for P_j $(j = L, H)$. The upstream agent will choose a^F to solve:

$$\underset{a}{max}\ b_L + q(a)(b_H - b_L) + \beta_L + p(a)(\beta_H - \beta_L) - c(a) \equiv U^F$$

which will give the downstream player

$$D^F \equiv \mathrm{E}\Big[Q_i - b_i - \beta_j \mid a = a^F\Big]$$
$$= Q_L + q(a^F)(Q_H - Q_L) - \Big[b_L + \beta_L + q(a^F)(b_H - b_L) + p(a^F)(\beta_H - \beta_L)\Big]$$

Generating a total surplus of

$$V^F \equiv Q_L + q(a^F)(Q_H - Q_L) - c(a^F)$$

However, this will only be the case if the implicit contract is self-enforcing. Under what conditions would be the case? Suppose the discount rate of future surpluses is r.

1. D will not renege iff $-b_j - \beta_j + \frac{1}{r}D^F \geq \frac{1}{r}\max\Big[\frac{1}{2}\left(V^{SM} + V^{EM}\right), V^{EM}\Big]$
2. U will not renege iff $b_i + \beta_i + \frac{1}{r}U^F \geq \frac{1}{r}\max\Big[\frac{1}{2}\left(V^{SM} + V^{EM}\right), 0\Big]$

Thus the implicit contract is self-enforcing iff

$$|b_H - b_L| + |\beta_H - \beta_L| \leq \frac{1}{r}\left[V^{SM} - \max(V^{SM}, V^{EM})\right]$$

4.2.2 Relational Contracts

Analysis as above, but this time the self-enforcing conditions are changed with the change of asset ownership to

$$\Big|(b_H - b_L) - \tfrac{1}{2}(Q_H - Q_L)\Big| + \Big|(\beta_H - \beta_L) - \tfrac{1}{2}(P_H - P_L)\Big|$$
$$\leq \frac{1}{r}\left[V^{RC} - \max(V^{SM}, V^{EM})\right]$$

4.2.3 Repeated Game Conclusions

For both firms and the relational contracts, the dynamic aspect means that the discounting rate, r, becomes important. As r increases then the strength of the threats decreases. r may reach the point where no long term contract is possible and the 'correct' framework to use is the one-shot game.

This framework also provides another rationale for vertical integration under the condition of uncertain supply. Suppose $P_H - P_L$ is very large and highly variable, then the temptations for reneging on an implicit contract for both sides become high. Vertical integration, where the downstream agent buys the asset, becomes efficient. This argument is consistent with the observation[7] that companies vertically integrate to reduce the uncertainty of supply.

The incentives in a relational contract situation are always more high powered than that in a firm. That is, if $a^F < a^*$ then it is always true that $a^F < a^R$. This proves complimentary to section 2, where it was claimed that firms exist to offer low powered incentives.

5 Formal and Real Authority Within a Firm

Formal authority does not automatically imply real authority. Real authority is defined as having effective control over decision making and formal authority as having the title of ownership/decision maker. For example a president of a firm might only be a figurehead and rubber stamp the decisions made by others, so the president does not have effective control over the decisions of the subordinates. Another example might include the relationship between a firm's shareholders and its board of directors. Formal authority lies with the shareholders, as they own the assets of a firm, but so often they are unable (or unwilling) to bring their collective weight together to replace an unpopular decision making board that it is clear that the real authority lies with the board. The question of where should authority lie has been the subject of papers by Rotemberg and Saloner (1995) and Aghion and Tirole (1997). This section follows the model presented in the latter study.

One possible answer to this question is that real authority could be auctioned and the people who value authority the most will end up with that authority. However this model takes a slightly different approach and describes the optimal allocation of authority and the not the best method of allocating this authority.

Consider a principal endowed with formal authority and a choice of n (≥ 3) projects to choose from, including a 'no project' choice. Project K yields B_k profit to the principal, where at least one B_k is very negative (and thus the principal will not want to choose a project at random) and the no project option, B_0, yields 0 profit. The best project is the one which yields the highest profit, B, but the information about which is the best project is hidden. The principal hires an agent to collect information on these projects, but this agent may have their own agenda and their own incentives for choosing a project

[7] for example, see Carlton 1979

which is different to that which is best for the principal. Specifically each project $k = 0$ to n, yields a benefit of b_k to the agent, where again, at least one b_k is very negative and $b_0 = 0$. In the case that the rank order of these projects are different then there exists a conflict between the principal and the agents best interests. The question then is should the principal be able to override the agent's choice of project i.e. who should have the real authority? Suppose the principal's best project is implemented, then let the principal receive B and the agent receive βb. If the agent's best project is chosen then he receives b and the principal gets αB. Where both α and β belong to $(0, 1]$. We assume that both αB and βb are positive numbers. In the case that $\alpha \neq \beta$ then the conflict of interests described above is in place. Given that a possible conflict exists, the principal has some incentive to try to gather information themselves, this can be done by exerting E effort with a probability E that this effort reveals *all* the pay-off values B_k[8] and with a probability $1 - E$ that it reveals nothing at all. Naturally this effort has a cost to the principal, $Cp(E)$. Similarly the agent faces the same problem and can exert effort with probabilities e and $1 - e$ of, respectively, gaining full knowledge about their pay-off values or no knowledge at all, with a cost of $Ca(e)$. The principal and agent then determine their effort according to the following sequence of events.

1. The principal writes up a contract allocating real authority to either party.
2. Both parties then choose their effort level.
3. The non-authority party conveys their choice to the other party.
4. The authority holding party chooses the project (possibly the null project) based on their own private information and that of the other party.

Now suppose that the principal decides that they should have the final choice of project.

The utility functions the principal and the agent are

$$U_p = EB + (1 - E)e\alpha B - C_p(E)$$
$$U_a = E\beta b + (1 - E)eb - C_a(e)$$

If neither the principal nor the agent are informed, then the pay-offs are 0 to both. This yields the following reaction functions (assuming a quadratic cost function)

$$E = (1 - e\alpha)B$$
$$e = (1 - E)b$$

If the agent is given the real authority then the utility functions and the reaction curves look like

$$U_p = e\alpha B + (1 - e)EB - C_p(E)$$
$$U_a = eb + (1 - e)E\beta b - C_a(e)$$

$$E = (1 - e)B$$
$$e = (1 - E\beta)b$$

[8]This is a rather curious assumption, surely a more reasonable assumption would be that some effort reveals a limited amount of information about the pay-offs.

As can be seen from the reaction functions, if the agent has authority then they have a greater incentive to become informed at every level. On the other hand well informed superiors mean less incentive to agents to become informed. Which of these two outcomes is the most attractive to the principal depends purely on the parameter values. The conditions under which delegation of authority to the agent is optimal are those conditions in which a) (B_k/b_k) is low, decisions are relatively unimportant to the principal, b) α_k is high, the principal can trust the agent or c) β_k is low, conditions in which the agent cannot trust the principal and d) E is low, the principal is unlikely to be able to assimilate all the information. This last factor may be especially important when the principal has many agents to deal with. This can be dealt with in this model by assuming that E is decreasing in the number of agents. In this case, more delegation would be optimal.

6 Conclusion

Professor Roberts introduced a set of papers which looked at the idiosyncracies of intra-firm behaviour which are largely ignored in traditional micro-economic undergraduate study of 'the theory of the firm'. The key theme in understanding why these models are sufficiently richer than their market-based counterparts, is to understand the implications of incomplete contracts. All the papers discussed, used this theme to demonstrate how the boundaries of firms are optimally determined and/or where power within these firms should lie. Various papers attempted further refinements by adding a dynamic aspect. However, one curious aspect of all the papers was the dominance of theoretical modelling over empirical testing. Although professor Roberts was always handy with some anecdotal evidence, only one of the papers in the reader[9] appears to have made any attempt at empirical verification. Perhaps given another week and another reader, we would have been able to study some empirical evidence. Another aspect which appeared missing was any link to market-based studies of the theory of a firm[10] i.e. how is intra-firm behaviour affected by inter-firm conduct, or vice versa? Does competition affect the boundaries of a firm? Do the boundaries of a firm affect competition? However, perhaps the fact I am now asking these questions will indicate that this course has introduced to me an interesting aspect to 'the economics of a firm' which previously I had been blind to. In this respect, I am sure Professor Roberts will be satisfied at achieving his aim.

7 References

Aghion, Ph., and Tirole, J. *"Formal and Real Authority in Organizations",* Journal of Political Economy, 1997, vol 105, no 1.

Baker, G., Gibbons, R., and Murphy, K.,J., *"Implicit Contracts and the Theory of the Firm"*, NAKE workshop reader 'D. John Roberts: The Economics of the Firm' 1997

[9] Milgrom and Roberts 1993

[10] although Professor Roberts did suggest that big money could be made if any student could produce something approaching a theory which could model this

Carlton, D., *"Vertical Integration in Competitive Markets Under Uncertainty"*, Journal of Industrial Economics, 1979, vol 37.

Hart, O., and Moore, J., *"Property Rights and the Nature of the Firm"* Journal of Political Economy,1990, vol 98, no 6.

Holstrom, B., and Milgrom, P., *"Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design"* Journal of Law, Economics and Organisation, 1991, vol 7, Special Issue.

Milgrom, P., and Roberts, J., *"Johnson Controls, Inc. - Automotive Systems Group: The Georgetown, Kentucky Plant"*, Stanford University Graduate School of Business, Class Discussion Paper, 1993, printed in NAKE workshop reader 'D. John Roberts: The Economics of the Firm' 1997.

Milgrom, P., and Roberts, J., *"Complementarities and Fit: Strategy, Structure and Organizational Change in Manufacturing"*, Journal of Accounting and Economics, 1995, vol 19.

Rajan, R., and Zingales, L., *"Power in a Theory of the Firm"*, University of Chicago working paper, 1996, printed in NAKE workshop reader 'D. John Roberts: The Economics of the Firm' 1997.

Rotemberg, J., and Saloner, G., *"Overt Interfunctional Conflict (and its Reduction through Business Strategy",* RAND Journal of economics, Winter 1995, Vol 26, no 4.

Simon, H., A., *"Organizations and Markets"*, Journal of Economic Perspectives, Spring 1991, vol 5, no 2.

ANNOUNCING:
NEW DUTCH ECONOMICS CONFERENCE: NAKE DAY

Background

Up until a couple of years ago, economists working in the Netherlands had the opportunity to meet and 'talk shop' with their colleagues during the annual *Ecozoekdag*, a one-day economics conference. The organizing institution, the Stichting Ecozoek, discontinued the *Ecozoekdag* after deciding that it was not part of its key activities. Many colleagues we have spoken to over the years have expressed regret at the demise of the *Ecozoekdag*.

At the same time, the twice-annual AIO Presentation Days have met with mixed success. On occasion the turnout would be quite good and the discussions quite lively, but on other occasions the interest could be embarrassingly low. In a sense this is not very surprising in view of the fact that the AIOs have access to close substitutes to the AIO Presentation Day. Indeed, with the advent of Dutch graduate schools, the AIOs now have plenty of opportunities to present their work at a level compatible with the AIO Presentation Day. What is needed for the AIOs is something in between the forum presented by their own graduate school and a full blown international conference.

Our proposed re-animation of the concept of the *Ecozoekdag* must be seen as an attempt to kill two birds with one stone. On the one hand, by upgrading the AIO Presentation Day, we provide the AIOs with a broader and more varied audience. On the other hand, we hope that the new conference, which for lack of a better term we propose to call the *NAKE Day*, will provide an opportunity for Dutch professional economists to meet and interact with each other. It is the express purpose that the NAKE Day will host both academic economists and their more policy-oriented colleagues.

What do we propose to do?

The NAKE Day will be a single-day conference, not clogged up with administrative events. We envisage a number of parallel session, say between six to eight, depending on the number of paper submissions. The sessions will be organized by themes, there will be chairpersons, and discussants. Some sessions will contain presentations by AIOs, *e.g.* the final presentations for AIOs pursuing the NAKE Diploma. We are hoping for 'pooling' rather than 'separating' equilibria in this regard.

Papers are solicited from all economists working in the Netherlands. The Programme Committee will have the final say in the selection of papers. Selection will be based on completed papers. The following people have agreed to serve as members of the Programme Committee.

Prof.dr. **Arnoud Boot**,
University of Amsterdam

Prof.dr. **Lans Bovenberg**
CPB Netherlands Bureau for Economic Policy Analysis, Tilburg University

Prof.dr. **Eric van Damme**
Tilburg University

Prof.dr. **Herman van Dijk**
Erasmus University

Prof.dr. **Kees Koedijk**
Maastricht University

Prof.dr. **Peter Kooreman**
University of Groningen

Prof.dr. **Simon Kuipers**
University of Groningen

Prof.dr. **Mary Morgan**
University of Amsterdam

Prof.dr. **Franz Palm**
Maastricht University

Prof.dr. **Frederick van der Ploeg**
University of Amsterdam

Prof.dr. **Geert Ridder**
Free University, Amsterdam

Prof.dr. **Harald Uhlig**
Tilburg University

At the end of the NAKE Day there will be the annual NAKE Day Lecture. In principle this lecture will be given by a prominent member of the Dutch economics scene. We are very proud to announce that Rick van der Ploeg, NAKE's first director and currently Member of Parliament, will give the inaugural NAKE Day Lecture.

Inaugural Keynote Speaker

Rick van der Ploeg (Member of Parliament, University of Amsterdam)

'The Political Economy of a Consensus Society'

When and where will the NAKE Day be held?

In principle the location of the event will rotate annually. The first NAKE Day will be held on **Friday October 24, 1997**. The most likely location is the Economics Faculty of the University of Amsterdam. Further information will follow by direct mailing and by Email updates. Also consult the NAKE Homepage for the latest available information.

We hope to see you at the first NAKE Day.

Steven Brakman **Ben Heijdra**
Jan van Ours **Tom Wansbeek**
Organizing Committee, NAKE Day

NEW AIO'S/OIO'S

Ir. M.M. (Marrit) VAN DER BERG (LUW)
Begeleiders: Prof.dr A. Kuyvenhoven
Onderwerp: Effects of off-farm employment on savings and investment decisions of farm households under selective financial market constraints

Mr. C. (Chris) BOJKE (RUG)
Begeleiders: Prof.dr P. Kooreman
Onderwerp: Econometric Analysis of Markets with Differentiated Products

Drs. J.T. (Jan-Tjeerd) BOOM (RUG)
Begeleiders: Prof.dr A. Nentjes
Onderwerp: Acceptability of Joint Implementation and Tradable Emission Permits

Drs. J.G.M. (Hans) HOOGEVEEN (VU)
Begeleiders: Prof.dr J.W. Gunning, Dr K. Burger, Dr B. Kinsey
Onderwerp: Saving and investing by rural household in response to uncertain income

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Begeleiders: Prof.dr H.A.A. Verbon, Prof.dr J. James, Dr L. Meijdam
Onderwerp: Pensions

Drs. L.A.M. (Luc) MOERS (UVA)
Begeleiders: Prof.dr M. Ellman, Dr R. Knaack
Onderwerp: Transitional Recession

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Begeleiders: Prof.dr P. de Gijsel, Prof.dr H. Maks
Onderwerp: Efficiency wages, bargaining power and the wage drift in the Netherlands and the Federal Republic of Germany

Drs. J.J.W. (Jolanda) PEETERS (KUN)
Begeleiders: Prof.dr J. Garretsen
Onderwerp: Globalisering en Europa "Een handelstheoretische analyse"

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Begeleiders: Prof.dr ir A.J. Oskam,
Onderwerp: Econometric analysis of economic and environmental efficiency of Dutch agricultural firms

Ir. A.J.W. (Arjan) RUIJS (RUG)
Begeleiders: Prof.dr ir C. Schweigman, Dr E. Dietzenbacher
Onderwerp: Price formation processes on interrelated, imperfect markets for agricultural products: the case of Burkina Faso

Z. (Zsolt) SANDOR (RUG)
Begeleiders: Prof.dr T.J. Wansbeek, Prof.dr P. Kooreman, Prof.dr M. Wedel
Onderwerp: Simultaneous estimation of demand and cost functions in the presence of non-observable product characteristics for oligopolistic markets with product differentiation using macro market share and micro conjoint data

Ir. E.C. (Erik) SCHMIEMAN (LUW)
Begeleiders: Prof.dr E.C. van Ierland
Onderwerp: Modelling combined cost-effective abatement of acidification and tropospheric ozone in Europe

Drs. M. (Mirjam) VAN DER ZOUW (LEI-DLO)
Begeleiders: Prof.dr ir A. Oskam, Dr A.M. Burrell
Onderwerp: Demand- and Supply Models for Dutch Horticulture

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Maroeska Boots (LUW)

Ronald van Dijk (EUR)

Henri de Groot (KUB)

Alex Lammertsma (UM)

Daan van Soest (RUG)

Tassew Woldehanna (LUW)

Thomas Zwick (UM)

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Bouwe Dijkstra (RUG)

Marco Haan (UM)

Edward Rosbergen (RUG)

Adriaan Kalwij (KUB)

Marianne van den Berg (RUG)

Reminders

The first NAKE Day will be held October 24, 1997

See for further information this *NAKE Nieuws*, pages 48-49

Register for the Utrecht courses NOW

See the Registration Form in the middle of this *NAKE Nieuws*

Miscellaneous information on NAKE Homepage

http://www.fee.uva.nl/vak_groep/nake

Registration form NAKE Day, October 24, 1997

University of Amsterdam

Name: .....

Institution: .....

Department: .....

Address: .....

.....

Phone: .....

Fax: .....

Email: .....

I would like to visit the NAKE Day. I will / will not present a paper

Title of the paper: .....

.....

I am available / not available to act as a discussant at the **NAKE Day.**

I am available / not available to act as a chairperson at the NAKE Day.

The registration fee is Dfl 50,- (Incl. lunch en closing drinks). This should be paid by I October: Postbank account number nr. 5945701 or ABN/AMRO account number 499992679, both in the name of Universiteit van Amsterdam, Faculteit der Economische Wetenschappen & Econometrie, Roetersstraat 11, 1018 WB Amsterdam. Mention 'NAKE Day 1997' and your name.

Please return this form and (if applicable) four copies of the paper preferably before September 1, 1997 to the NAKE secretariat, Ms. José Dijkzeul, Roetersstraat 11, 1018 WB Amsterdam.

Registration Form Utrecht Courses

Blocks I and II, Fall 1997

(please write legibly)

Name: .....

Department: .....

University: .....

Address: .....

.....

Phone no. .....

Email: .....

I will attend the following courses (please mark boxes):

Block I

- ☐ 97.25 Van Ewijk & Oosterbeek, *Economics of Education*
- ☐ 97.30 Hartog & Theeuwes, *Labour Economics: A Comparative Empirical Perspective*
- ☐ 97.43 Kooreman, *The Economics of Household Behaviour*
- ☐ 97.38 F. de Jong, *Econometrics of Foreign Exchange Markets*
- ☐ 97.17 Burrell & Oskam, *Agricultural Policy Analysis*
- ☐ 97.67 Houba, *Differential Games*

Block II

- ☐ 97.04 Hartog & Teulings, *Advanced Labour Economics*
- ☐ 97.47 Melenberg & Lee, *Applied Non-Parametric and Semi-Parametric Econometrics*
- ☐ 97.34 Herings, *Theory of Incomplete Markets*
- ☐ 97.13 Beetsma, *Topics in International Macroeconomics*
- ☐ 97.07 Verbeek, *Panel Data*
- ☐ 97.19 Cramer, *Econometric Applications of Maximum Likelihood Methods*

Please return this form as soon as possible (preferably **before 1 September**) to the NAKE secretary: José Dijkzeul, Secretariaat NAKE, Roetersstraat 11, 1018 WB Amsterdam.

(The registration form for Blocks III and IV will be included in the next issue of *NAKE Nieuws*)