



MICRO

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Economic Policy Under the Microscope

Policy is generally defined as a logically organized program designed to achieve some stated goal. Ideally, once launched, a policy should be monitored and assessed as to how effective it has been, or not been, in achieving the desired objectives. Unfortunately, economic policy is not always assessed, in part because applied policy analysis may not carry the same cachet as theoretical work for academic economists. Still, many policies are based on the work of theorists, or as Keynes wrote: *Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back.* It is only fitting then, that academics complete the circle by turning their attention to the grittier task of assessing policy.

This issue of MICRO features the work of some economists who have not hesitated to leave the rarefied atmosphere of theory to plunge into the murkier task of evaluating economic policies, guided all the while, of course, by the precepts of both economic theory and public policy. In this context, Steven Globerman and Daniel Shapiro examine Canadian policy toward foreign direct investment over the years. Richard Lipsey and Kenneth Carlaw assess the effectiveness of a number of key policies aimed at stimulating technological change. Finally, Mohammed Rafiquzzaman and Lori Whewell take a close look at the growth in patenting activities among the G-7 countries.

This issue also features reports on presentations made under the auspices of Industry Canada's Distinguished Speakers in Economics Program. Anne O. Krueger assesses US trade policy and its alarming drift in recent years. Phoebus Dhrymes discusses the measurement of productivity at the plant level. And in a more theoretical vein, Oliver Hart outlines the importance of property rights in developing the theory of the firm.

CONFERENCE -- CANADA IN THE 21ST CENTURY: A TIME FOR VISION

September 17-18, 1999 in Ottawa

Sponsored by Industry Canada, with The Centre for the Study of Living Standards.

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RECENT RELEASES

WORKING PAPER SERIES

No. 24: *Canadian Government Policies Toward Inward Foreign Direct Investment*, Steven Globerman and Daniel Shapiro.

No. 25: *A Structuralist Assessment of Technology Policies - Taking Schumpeter Seriously on Policy*, Richard G Lipsey and Kenneth Carlaw.

No. 27: *Recent Jumps in Patenting Activities: Comparative Innovative Performance of Major Industrial Countries, Patterns and Explanations*, Mohammed Rafiqzammam and Lori Whewell

OCCASIONAL PAPER SERIES

No. 20: *Aboriginal Businesses: Characteristics and Strategies for Growth*, David Caldwell and Pamela Hunt.

FORTHCOMING

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No. 26: *Intrafirm Trade of Canadian-based Foreign Transnational Companies*, Richard A. Cameron

No. 28: *Technology and the Demand for Skills: An Industry-level Analysis*, Surendra Gera, Wulong Gu, and Zhengxi Lin.

No. 29: *The Productivity Gap Between Canadian and U.S. Firms*, Frank C. Lee and Jianmin Tang.

No. 30: *Foreign Direct Investment and Productivity Growth: The Canadian Host-Country Experience*, Surendra Gera, Wulong Gu, and Frank C. Lee.

DISCUSSION PAPER SERIES

No. 7: *Implications of Foreign Ownership Restrictions for the Canadian Economy - A Sectoral Analysis*, Steven Globerman.

MICRO is a quarterly newsletter highlighting micro-economic research findings, published by the Micro-Economic Policy Analysis Branch of Industry Canada. This edition was prepared under the general editorship of William Horsman. Rick Cameron has also contributed to this issue. Abstracts of Industry Canada research volumes, and the full text of working papers, occasional papers, discussion papers, and MICRO can be accessed via STRATEGIS, the Department's online business information site, at <http://strategis.ic.gc.ca>. For more information about our research publications, or to place an order, contact the Micro-Economic Policy Analysis Branch, Industry Canada, 5th Floor, West Tower, 235 Queen Street, Ottawa, ON, K1A 0H5. Telephone: (613) 952-5704; e-mail <micro.news@ic.gc.ca>; or facsimile: (613) 991-1261. ISSN 1198-3558.

The public policy goals of investment policy are likely to be complex and contradictory.



It is unlikely that governments can dictate terms to foreign investors because of intense international competition to attract foreign direct investment.

Canadian Policy on Foreign Direct Investment

Over the past decade, international investment flows have been at the centre of restructuring of the global economy. During this period, governments have, broadly speaking, been reducing both formal and informal barriers to inward foreign direct investment (FDI).

However, host countries are rarely neutral toward inward FDI. Virtually all have barriers to inward FDI of varying degrees of formality and transparency. At the same time, virtually all offer implicit and explicit incentives to foreign-owned multinational companies (MNCs) to establish affiliates in their market. Thus, the public policy goals of investment policy are likely to be complex and contradictory.

In Industry Canada's Working Paper Number 24, *Canadian Government Policies Toward Inward Foreign Direct Investment*, Steven Globerman and Daniel Shapiro examine Canadian investment policy in an effort to assess the importance of restrictions on foreign investors in Canada.

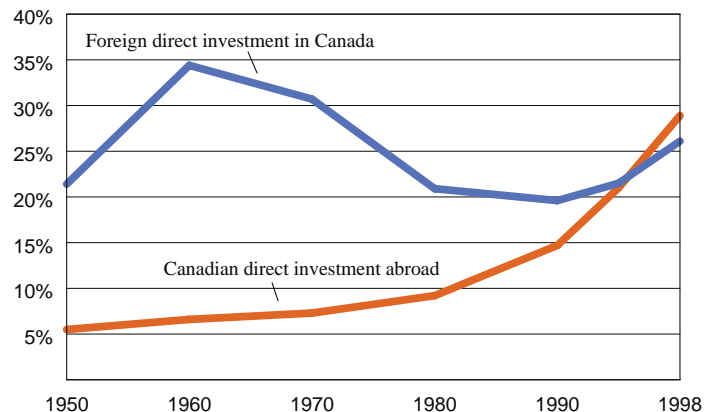
Globerman and Shapiro's objective is to evaluate the importance of formal and informal restrictions that apply to foreign investors in Canada, as well as to analyze the net benefits to Canada of selectively restricting inward FDI. They begin by reviewing the range of policies that government can implement to influence inward FDI directly or indirectly. Next, they set out the criteria against which to evaluate the consequences of Canadian government policies toward inward FDI. They also review significant government initiatives supported by legislation, as well as policies directed at restricting inward FDI at the sectoral level.

The authors conclude that despite theoretical economic arguments that support the notion that host governments can extract concessions from MNCs, empirical findings suggest that it is unlikely that they could dic-

tate terms to foreign investors because of intense international bidding efforts to obtain FDI.

Nevertheless, they argue that there is still a role for government to play in influencing inward FDI flows. Specifically, host governments can improve the overall investment climate by focusing their efforts on developing an appropriate infrastructure, including an educated and skilled labour force, vigorous anti-monopolistic

Book value of investment as percentage of GDP



Source: Statistics Canada, *Canada's International Investment Position*, various issues

policies, an efficient and up-to-date legal system, adequate transportation and communication networks, sound macro-economic policies and a wealth-creating culture. Such policies would also encourage domestic investment.

The authors conclude that the overall investment climate seems to be considerably more important for influencing inward FDI patterns than other specific FDI policies, because it reflects the consequences for profitability of a wide range of government initiatives.

Neoclassical theories assess incrementality solely by the effects on technological change.



Taking Schumpeter Seriously

Since the 1960's, the Canadian government has instituted a number of key policies aimed at stimulating technical change. To what extent can economic analysis be used to assess the impact of these policies?

In Industry Canada's Working Paper Number 25, *A Structuralist Assessment of Technology Policies — Taking Schumpeter Seriously on Policy*, Richard Lipsey and Kenneth Carlaw attempt to measure the success of several such policies by applying a two-pronged approach to examine the conditions that favour their success or failure.

They begin by reviewing the available assessments that have been made by others, generally following what they describe as a neoclassical approach. These concentrate mainly, but not exclusively, on outputs generated by the programs.

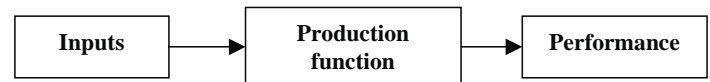
Next, they evaluate the design of the policies or programs in question against criteria they developed in a previous essay, in what they describe as a structuralist-evolutionary approach. This approach starts from different assumptions about the behaviour of the economy, and it reaches different conclusions about the role of policy and the substance of program evaluation.

The two types of theory also suggest different criteria for assessing incrementality. Because they treat structure and institutions as "black boxes," neoclassical theories assess incrementality solely by the effects on technological change, usually measured by changes in R&D expenditures. Because the structuralist decomposition stresses the relation between technology and the underlying structure through which it operates, the incrementality criterion allows for policies that alter structural relations without necessarily affecting the level of R&D

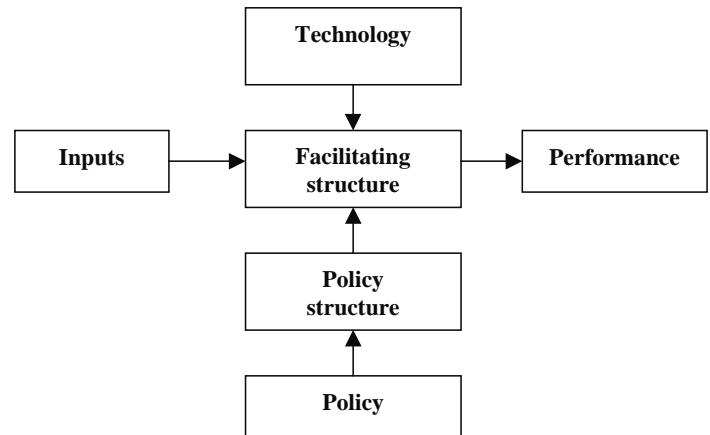
expenditure or inducing specific technological changes.

Where there is agreement between the judgments reached under both approaches, Lipsey and Carlaw con-

Neoclassical Approach



Structuralist Approach



Source: Lipsey and Carlaw

clude that there is a strong case for either success or failure. And where the judgments resulting from the two procedures disagree, they reconcile the differences by comparing their theoretical perspectives with those of other assessors. The sources of different judgements are often found in the different assumptions that characterize the theories employed.

Using this framework, Lipsey and Carlaw found the

The structuralist model suggests that irreducible elements of judgement are required for all policy decisions.



Patent applications by Canadian inventors abroad have grown at a faster rate than patent applications in Canada originating from abroad.

Trends in Patenting Activities

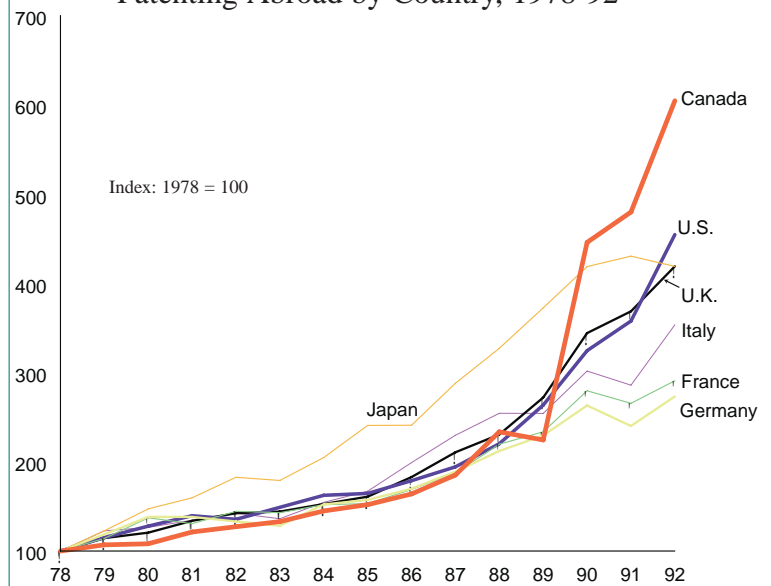
Defence Industry Productivity Program (1968-1995) consistent with these criteria and judged it a clear success, though there was some criticism of failure involving political capture and possible internally generated technology push. Lipsey and Carlaw acknowledge that the Industrial Research Assistance Program (from 1961 onward) was trying to induce important structural changes and appears to have succeeded. Their overall judgement of this program is that it was a clear success in almost all of the dimensions covered by their criteria.

They rated the Industrial Research and Development Incentives Act (1966-1976) and the Program for the Advancement of Industrial Technology (1965-1976) and their successor, the Enterprise Development Program (1976-1983) less favourably. In their view, these programs never seem to have established clear criteria for what they were trying to do and why. For similar reasons, they judged the latest successor to these programs, the Industrial Research and Development Program (1983-1989), to be a failure. This program sought to combine into one operation two objectives (industrial and regional development) that were in such fundamental conflict that, in the opinion of Lipsey and Carlaw, they would have been best administered separately.

Lipsey and Carlaw's paper not only provides a useful review and assessment of technology programs, but is an interesting exercise in its effort to apply divergent theoretical approaches to assessing and reconciling the conclusions arising from each.

Why do we care about the reasons for the surge in Canadian patenting? In general, Canadians have traditionally been pictured as less innovative. They are viewed as technologically far behind their counterparts in other industrialized nations and they file fewer patent applications, both domestically and internationally, than the citizens of these countries. Thus, if the number of patents filed by a firm, sector or country is a direct reflection of inventive intensity, then a rise in filings by Canadians would be a direct reflection of an increase in inventive activity.

Patenting Abroad by Country, 1978-92



Source: Rafiqzaman and Whewell

Mohammed Rafiqzaman and Lori Whewell have taken a closer look at innovative performance, as measured by the growth in patenting activity among the G-7 countries. In Industry Canada's Working Paper Number 27, *Recent Jumps in Patenting Activities: Comparative Innovative Performance of Major Industrial Countries, Patterns and Explanations*, they analyze the nature,

Patent filings have increased primarily as a result of increasing technological innovation, rather than changes to Canadian patent policies.



pattern and causes of changes in patenting activities, with an emphasis on Canada's performance.

The paper notes that Canadians have traditionally been portrayed as less innovative since they file fewer patent applications, both domestically and internationally, than residents of the other G-7 countries. However, the study shows that the situation may be improving. An assessment of patenting activities by the seven industrial countries reveals that although all these countries have experienced rapid growth in patenting activity the inventive performance of Canadians has been increasing at a faster rate than that of residents of the other nations.

As well, substantial changes have occurred in cross-border patenting activity between Canada and the United States. Canadians are increasingly applying for patent protection in countries other than the United States, and Canada is becoming a more attractive place in which to seek patent protection for nationals of countries other than the United States.

The authors find that characteristics of both technology source and destination countries, and of the national patent system, play important roles in the decision to file for a patent. Source country characteristics, such as research intensity and home country bias, are also significant determinants of international patenting activity.

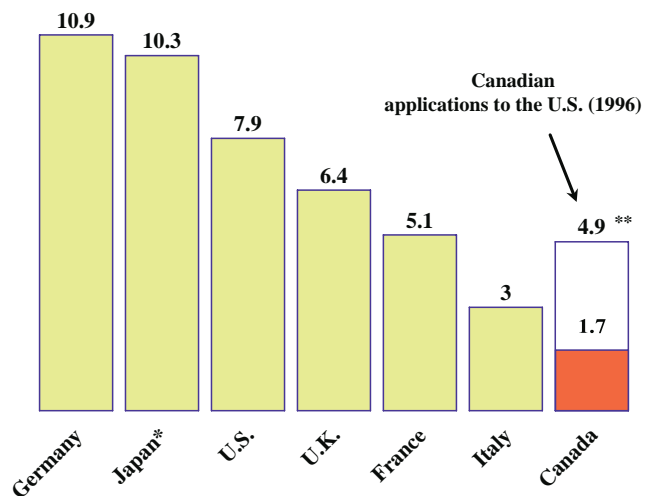
Destination country characteristics such as human capital, imports, market size, degree of intellectual property protection, and geographic proximity tend to induce inventors from the source country to patent in the destination country. The actual cost of patenting, however, is not an important determinant of international patenting activity.

Rafiquzzaman and Whewell consider two competing hypotheses in attempting to explain the causes of the recent increase in Canadian patenting activity: the pro-patent hypothesis which states that changes in Canadian patent policies (i.e., the move to a first-to-file from first-to-invent approach) have caused inventors to increase their number of patent applications; and the fertile technology

hypothesis which suggests that patent filings have increased as a result of increasing technological innovation. The results suggest that although both hypotheses are at work, the fertile technology hypothesis seems better able to explain the recent increase in patenting activity in Canada.

Finally, the paper investigates the sectoral distribution of patenting activity within the Canadian manufacturing sector. The authors find that the largest growth in the number of applications for manufacturing patents in recent years has occurred in science-based industries. This group effectively accounts for the largest share of patent applications

**Inventiveness Coefficient, 1996
Domestic Patent Applications
Per 10,000 Labour Force**



* Japanese data adjusted to be comparable to the other countries.
** This is an overestimate of Canada's inventiveness because patent applications may be filed on the same inventions in both countries.
Source: Industry Canada compilations based on OECD data

in the manufacturing sector. However, not all industries within the science-based sector are equally innovative and dynamic; growth of patenting activities in sectors such as telecommunication equipment, pharmaceuticals and medicines, adhesives, and other instruments and related products industries has outpaced that of other science-based sectors.

US trade policy has become increasingly contradictory.



DISTINGUISHED SPEAKERS SERIES

The Dangerous Drift in US Trade Policy



Globalization, or the increasing integration of the world economy has been a major feature of economic development and rising living standards in recent decades. As this has happened, the importance of the open multilateral trading system has increased. In particular, under the GATT, trade was greatly liberalized, and the world economy grew at unprecedented rates in the quarter century that followed the Second World War.

The United States' leadership was key in restoring the open multilateral trading system in the post war period and in leading the world toward trade liberalization in the context of the GATT. In recent years, however, American trade policy has been shifting away from its earlier reliance on the open multilateral trading system, with growing emphasis on bargaining one-on-one with individual trading partners and on regional trading arrangements.

Anne O. Krueger examined the impact of this trend in a Distinguished Speakers in Economics lecture, entitled *American Trade Policy and the East Asian Economies*, delivered in October 1998.

She argued that US trade policy has become increasingly contradictory as fear of competition and pressures from special-interest groups have resulted in an aggressive sectoral and bilateral approach—even as the US government

continues to assert its support for an open multilateral system. That contradiction in turn is spawning a number of dangers that confront the international trading system as a whole.

Krueger reviewed a series of trade policy measures that have impacted the East Asian economies adversely. In her view, these initiatives have weakened the multilateral trading system. Keeping China out of the WTO simply ensures that a country that accounts for a growing share of world trade is not part of the multilateral system. Preferential arrangements such as NAFTA result in trade diversion

rather than trade creation. Finally, the APEC approach simply diverted scarce negotiating resources, which hard-pressed East Asian governments could have used to better effect within the framework of the WTO.

She pointed out that not only do bilateral measures weaken the multilateral trading system, but they also have unforeseen harmful consequences. For example, US exchange rate policy contributed to the bubble economy in Japan. Voluntary export restraints by Japanese steel companies put even

greater stress on the already weakened Japanese banks that had invested in these companies. Price floors imposed on Japanese chip manufacturers encouraged the entry of new suppliers such as Samsung, resulting in overcapacity problems. The sector-by-sector approach allows American industries to prevent the dismantling of the United States'

- *US leadership was key to restoring the open, multilateral trading system in the postwar period.*
- *In recent years, US trade policy has been shifting, with more emphasis placed on bilateral and regional arrangements.*
- *This is not a conscious shift in policy, but a drift induced by a slow erosion in support for multilateralism, coupled with domestic pressures to increase protection.*
- *The United States is too important a trading nation for the multilateral system to flourish in the absence of US support.*

In East Asia there is a perception that the United States is not living up to its own free trade rhetoric.



Economic theory assumes that new plants are more productive than old plants.

Measuring Productivity at the Plant Level

own protectionist measures. Finally, "bilateral bashing" frustrates the governments of East Asian countries because there is a perception that the United States is not living up to its own free trade rhetoric. Thus, measures which seem to work in the short run could lead to cumulative and more costly problems.

Krueger maintained that this change in US policy is not the outcome of any conscious shift in strategy, but rather the result of a slow erosion of the commitment to multilateralism, and the ability of those seeking protection to cloak their pressures under the guise of seeking "fair trade," facilitated by American practices of vigorously pursuing antidumping and countervail cases under administered trade law. The net result is a drift to country-by-country, bilateral negotiations.

She concluded by warning that the present bilateral approach to trade policy is gradually undermining the open multilateral trading system that has been serving the entire global economy so well — at a time when the need is to strengthen the system. Should that system gradually weaken, the entire trading community will lose, and US productivity and living standards will suffer along with those of other countries.



Economic theory assumes that new plants are bearers of new technology. The corollary to this is that new plants are more productive than old plants. Is this really the case?

In his lecture *The Economics of Productivity*, Phoebe Dhrymes answered that, although this may be true of ten-year-old plants compared to twenty-year-old plants, it is not necessarily true of one-year-old plants compared to three-year-old plants.

In addressing these issues, Dhrymes argued that there are serious problems with aggregate measures of productivity. In the aggregate approach, productivity growth occurs through a shift in the production function common to all plants in an industry or sector, through better allocation of factors of production, or through improvements in the quality of these factors. Aggregate productivity grows through increases at the sectoral level and through the re-allocation of resources between sectors.

In Dhrymes' view, however, there is a vigorous dynamic process underlying the stability of aggregate production at the industry level that constantly redefines the position of plants in the industry-wide ordering of productivity. This argues against the sectoral approach to productivity and indicates that a part of an economy's productivity growth accrues by means of resource reallocation from less productive to more

- *There are serious problems with aggregate measures of productivity; they convey too simplistic a view of the process and may very well be quite misleading.*
- *Part of an economy's productivity growth accrues by means of resource allocation from less productive to more productive plants within a sector.*
- *Plants may never improve their productivity, but productive plants may expand operations, while less productive plants shrink or cease to exist.*
- *An industrial policy should not be a blanket policy which helps all plants, but rather those plants which are efficient.*

Aggregate studies of productivity are seriously deficient.



If markets are so good why do firms even exist?

productive plants within a sector.

Consequently, Dhrymes' work emphasizes individual plant level productivity over time. He has found that certain plant characteristics, such as age, can increase the probability of both improving and worsening productivity. For example, new plants are not uniformly more productive than older plants, but it appears that new plants face greater uncertainty in their evolution, and are less likely to maintain their productivity standing. It is also not true that new plants enter at the high end of the productivity scale.

Size matters as well. Larger plants (in terms of employment) are less likely to exit, less likely to move down the productivity rankings and more likely to maintain their ranking, than small plants. Thus, new plants, being generally smaller, tend to improve or deteriorate initially. If they survive and grow, however, they are more likely to retain their productivity ranking. Overall, the findings indicate that some plants may indeed never improve their productivity, but that good plants may expand operation, or highly productive plants start operations, while bad plants may shrink or cease to exist.

Professor Dhrymes pointed to these findings as support for his argument that productivity growth needs to be studied at the plant level. He also concluded that one important implication of his findings is that if you have an industrial policy, it should not be a blanket policy seeking to help all plants but only those plants which are efficient.

What is a Firm?



What is a firm? Where are the optimal boundaries for a firm? These and similar questions have been the subject of much discussion by economists, particularly in the context of the theory of the firm.

Oliver Hart outlined a framework for addressing these questions in his September 1998 lecture entitled *The Theory of the Firm: Implications for Microeconomic Policy*. He began by reminding his audience that Coase initially asked the question: *If markets are so good why do firms even exist?* Hart then answered the question by argu-

ing that firms are necessary because of contractual incompleteness and relationship-specific investments and that ownership is key in resolving contractual incompleteness.

It is impossible to write a contract that will anticipate all eventualities; contingencies might arise that no contract could allow for without becoming too costly. Why does ownership matter? In a world of incomplete contracts, decisions will have to be made in the future which were not specified in any

initial arrangement and, according to Hart, residual rights of control determine decision-making power in the economic relationship.

Relationship-specific investments arise when one firm locates next to another firm in order to use the second firm's output, and once the investment is made, the first firm becomes dependent on the output of the second,

- ***Firms exist as a result of contractual incompleteness and relationship-specific investments.***
- ***Residual control rights, based on ownership, determine decision-making power when situations not provided for in a contract arise.***
- ***Residual control rights are like any other economic good; there is an optimal allocation of these rights.***
- ***It follows that there is an optimal set of firm boundaries or allocation of asset ownership.***



Why does ownership matter?

which can then cause hold-up problems by raising prices or withholding product. In such a situation, an investor could seek protection by acquiring more assets, thereby holding more residual control rights and a more substantial bargaining power.

Hart also argued that residual control rights are like any other economic good; there is an optimal allocation of these rights. It follows that there is an optimal set of firm boundaries or allocation of asset ownership.

The speaker did point out, however, that the simple model has limitations. For example, results from the

hold-up explanation are not very robust. The simple model may also be too narrow to explain the benefits of joint ownership, where neither investor can walk away with the assets, or of delegation of authority in large publicly-owned companies. Nor does it deal well with concepts such as reputation.

Professor Hart concluded by noting that much more empirical work is required to test this theory, but that it is unfortunately a very difficult undertaking because the theory is concerned with so many things that are not measurable.

