IMPLEMENTATION ISSUES IN THE COMMERCIALISATION OF TECHNOLOGY: AN EVALUATION OF THE MIC PROGRAM

Neal Ryan

The MIC Program was the first systematic attempt of the Commonwealth Government to intervene in the supply of venture capital to emerging technology-based industry. The program has now been terminated, and this paper evaluates its political, commercial and industrial development successes and failures. This evaluation has implications for the implementation of government programs assisting in the development of new technology industries.

Keywords: Government programs, industrial development, management and investment companies, technology-based industry, venture capital.

THE POLICY CONTEXT

Considerable recent public policy literature has focussed on the conditions for optimum policy outcomes. Implementation studies have particularly drawn attention to controlling these outcomes. Authors such as Gunn[1] and Hood[2] have proposed conditions under which governments can maximise their control of outcomes from the top down whilst others such as Elmore[3] have argued that optimum policy outcomes are maximised by involving implementing actors from the bottom up. Although the understanding of implementing policy has been advanced overseas since Pressman and Wildavsky's seminal study of federally funded job-creation programs in the United States,[4] there is little Australian literature addressing the issue, particularly in the areas of industry policy and science and technology (S&T) policy.

This paper examines implementation issues arising from the Management and Investment Company (MIC) program. These issues also have implications for the type of government intervention that may be required to assist the development of new technology industries. The MIC program is unique and important in Australian S&T policy. It is the first systematic attempt by government to convert Australia's research and development (R&D) capabilities into new industrial activity. However, the program was developed at a time when the costs associated with high levels of protection, direct and indirect government subsidies, and unproductive interstate rivalries were being reflected in a declining and uncompetitive manufacturing sector.[5] This political climate imposed limits on the extent to which government was prepared to support technology commercialisation activities. Furthermore, the absence of any new technology industry constituency, or effective lobby

groups has meant that governments have had little political incentive to engage in risky commercial activities.

Thus, government intervention in the development of new technology-based industries was cautious and selective. It was not until the early 1980s that governments began to provide assistance for the commercial development of 'sunrise industries'. A continual deterioration of Australia's terms of trade provided the impetus for political parties to turn to S&T to provide new solutions to economic problems. Whilst State Governments began to provide direct investment in new technology businesses in the mid-1980s through State development authorities and venture capital funds, the Commonwealth instigated government involvement in these later stages of commercialisation through the MIC Program. Governments have subsequently withdrawn assistance to these new industries with the failure of a couple of State Government agencies and the announcement of the termination of the MIC program.[6]

The prevailing economic and political climate of the early 1980s was important to the way the MIC program developed. It was introduced by the Hawke Government in 1984 with the aim of "encouraging the development of the venture capital market in Australia" and attracting management and financial support for technology-based, export-orientated businesses.[7] The government utilised a 100 per cent tax concession as a means of attracting investment in private sector venture capital companies called MICs. These companies were granted a licence to raise tax concession capital by a government appointed board titled the Management and Investment Companies Licensing Board (MICLB). MICs were then required to invest capital in new technology enterprises referred to as 'eligible businesses'. The program emphasised the commercial expertise of the private sector and was never intended to act as a permanent substitute for an unsubsidised private venture capital market.[8] Thus, government intervention through the MIC program was a reflection of the desire of government to be seen to be redressing the problem of a declining manufacturing base without recreating the inefficiencies associated with previous industry assistance.

Similar to the context in which the scheme was developed, the outcomes from the MIC program reflect both political and economic influences. Thus, the political and economic outcomes from the program provide a starting point for exposing the implementation issues which have been important to its successes and failures.

AN EVALUATION FRAMEWORK

There are several indicators which may be used to measure political outcomes. For example, Emy identifies the political system and its institutions, party political struggles and the ability of government to change the allocation of resources, as being the main elements of political evaluation.[9] The criteria for evaluating the political success of programs may include considerations such as resource allocations,

cooperation between agencies and tiers of government, coherence, consistency with other policy directions and support from policy actors.

The issues which have been important in relation to the MIC program have been cooperation between agencies, consistency with other economic policy directions pursued by the government, and the political support for the program. Political parties have been particularly important in relation to political support for technology commercialisation programs such as the MIC program. The ideological perspectives of parties have also been important in shaping the form of government intervention used to support this commercial development. Furthermore, there has been considerable recent attention given to S&T policy and political parties in Australia.[10] The new technology sector is largely unrepresented by existing policy communities and institutions. Federalism, parliament or the judiciary have yet to have any significant impact on the sector.[11] The impact of inter-agency politics, and inconsistent policies is well established in literature dealing with both S&T policy,[12] and industry policy,[13] and has been central to the implementation of the MIC program.

The second area of evaluating the MIC program is its economic impact. There are two elements to this task. The first area of economic concern is the commercial success of the program. These considerations provide a narrow quantitative framework for judging immediate success. They assist in measuring one of two central objectives of the MIC program; the development a self-sufficient private sector venture capital market.[14] The obvious criteria for establishing whether these programs have been commercially successful are indicators such as company profitability, export performance, new employment, sales and commercial growth. These are commonly used economic and commercial indicators but need to be understood as short-term and sometimes volatile.

The second aspect of an economic evaluation is the long-term industry structures created by the program. Two broad themes of industrial structure dominate innovation literature: industry concentration and specialisation, and industry linkages. These themes provide a framework for evaluating the development of technological industries supported by government S&T programs.

Industry concentration is often associated with Michael Porter's work on competitive advantage. Porter suggests that market segmentation[15] implies the targeting of key technologies reflecting a competitive advantage.[16] The concept of concentrated and targeted industrial structure is also common in economic literature associated with strategic trade theory. Authors such as Brander suggest that economies of scale, learning curves, R&D races, entry barriers and dynamics of innovation "open up the possibility that there may be strategic sectors".[17] Similar themes also emerge from the work of Krugman.[18] Industry linkages have been more recently associated with the work of Chesnais who argues that competitive performance in technology-based industries is

governed by the interaction between industry, firms and research organisations.[19] These factors have also been identified by Ergas and are thematic in structural analysis of technology industries.[20]

Similar linkages between venture capital funds have also been identified as being characteristic of success within the sector. For example, Bygrave proposes that joint investments provide an important opportunity to spread financial risk and share knowledge.[21] Sandberg and Hoffer also argue that the interactive effects of industry structure is a central determinant of the performance of venture capital funds.[22] Thus, the MIC program is also evaluated with respect to linkages formed between venture capital funds.

Thus, the evaluation framework used in this paper extends from an understanding of the governmental processes which have impinged on the implementation of S&T commercialisation programs to the economic outcomes of the program. These economic outcomes include both narrow commercial considerations and industry structure issues. This evaluation has broader implications for the future implementation of programs to assist in the commercialisation of technology.

POLITICAL EVALUATION

In the early 1980s there was bipartisan support for government intervention in the supply of venture capital in Australia. Both major federal political parties declared support for the establishment of venture capital funds which would provide equity capital and management to new technology-based industries.[23] The Espie Committee provided the policy framework for these promises at the 1983 election.[24]

Thus, in the early 1980s there appeared to be a strong mandate for government intervention in the supply of investment capital flowing to new technology industries. However, at the level of government agencies it would appear that Commonwealth bureaucracy, at least, was divided on government activity in the venture capital sector. Whilst the newly appointed Ministers responsible for S&T and Industry and Commerce, Jones and Button, sought to enact Labor Party policy on venture capital through the vehicle of the MIC program, Commonwealth central agencies resisted its implementation.

The conflict between central financial agencies and the Department of Industry, Technology and Commerce (DITAC) at the stage of implementing the program has been previously reported in the literature.[25] However, there is evidence that Treasury has maintained its opposition to the MIC program. Indeed, Treasury has been successful in reducing the effect of the tax concession to the extent that its original intent has been negated.

The clear intent of the MIC program was to permit a 100 per cent tax concession for capital invested in approved venture capital funds. Keating's press statements are unambiguous in announcing a 100 per cent tax concession for subscriptions to MICs subject to the investment

being held for four years.[26] Furthermore, in response to a question in parliament on the treatment of MIC investments by Treasury, Keating responded:

> where a person meets the patient investment criteria by holding his or her MIC shares for four years or more, the Commissioner considers it unlikely that on an objective view, such an investor would be found to have acquired the shares with the dominant purpose of profit making by sale, in which case any profit on the sale of the shares would not be taxable.[27]

Subsequent to these statements and the release of other public relations material from the DITAC, the Commissioner for Taxation ruled[28] in 1986 that "MIC shares acquired for the purpose of profit-making by sale" should not take into account the original purchase price when determining profit.[29] The effect of this ruling was to remove the tax concession for investment in MICs from institutional investors and shares traders by deducting the concession from the share purchase price upon realisation of profits, or losses.

Another influence on the success of the MIC program has been the scheme's disharmony with other government policy directions. The imposition of an undifferentiating capital gains tax and the high interest rate policy illustrate this proposition.[30]

Thus, while the MIC program received the support of political parties, institutional factors within the Commonwealth bureaucracy have had a significant impact on its implementation. The conflict between agencies and competition with conflicting macroeconomic policy have had a significant impact on the capacity of the program to achieve its objectives. The hostility of Commonwealth central agencies to the program diluted government control of its impact whilst macroeconomic policy neutralised the effect of the incentives offered.

COMMERCIAL EVALUATION

The commercial success of the program provides an indication of the short-term economic benefits of the program. Furthermore, the MIC program is amenable to this form of analysis because the MICLB has kept discrete data sets on the commercial activity of both the MICs and their investee businesses.[31]

Table 1 provides data on the profitability of the MICs until the end of the 1990 financial year. On a superficial level, it appears that the MICs have not demonstrated their commercial viability.

This table indicates that the MICs have been consistently unprofitable. Nearly $100 million of the $300 million raised has been written down or lost outright. However, the losses noted in this table need to be interpreted in relation to the relatively short business-cycle within which these funds have operated.[32]

TABLE 1
ACCUMULATED PROFITS (LOSSES) OF MICS 1988 AND 1989*
($ million, capital raised at 30 June 1989)

License Holder	*1988/89*	*1989/90*	*Capital raised*
Austech Ventures Limited	(1.16)	(7.49)	27.53
Australian Pacific Technology	(4.24)	(6.10)	19.46
BT Innovation Limited	(2.80)	(4.64)	22.50
Continental Venture Capital Ltd	(4.40)	(6.52)	58.19
CP Ventures Group	2.12	(21.95)	40.40
First MIC Limited	(.64)	(3.82)	38.22
Samic Limited	(9.82)	(9.03)	15.90
Stinoc Limited	(25.36)	(25.38)	26.36
Techniche Limited	(2.71)	(7.18)	19.37
Western Pacific	.71	(1.62)	19.04
Westintech Innovation Corp†	.74	n/a	11.77
Total	(47.56)	(93.73)	298.74

* Accumulated losses have the best indication of performance since the dividend payments of MICs have been insignificant.

† The profits of Westintech are from interest accrued in assets rather than venture capital trading. Of the $11.7 million raised by this company, $6.8 million is invested in bank deposits. Westintech exited the MIC program in 1988 and privatised in 1990. It no longer makes its financial position available publicly.

Source: These figures are based on the 1989 *Annual Reports* of the 11 original MIC Licensees and are based on the reported results for the holding company rather than the consolidated group.

The life-cycle of a venture capital fund is usually considered to be about ten years with the main profits from investments being realised in the latter part of this cycle.[33] The 11 MICs listed in Table 1 began operating around 1984/85. In the context of the industry in which these funds operate, it may be premature to assume any commercial judgement on the success or failure of the MICs. Furthermore, the historical absence of a venture capital industry in Australia suggests that the industry may need to move up the learning curve before significant profits are realised in the sector.

The cumulative data for the MICs in relation to sales, employment and taxation is summarised in Table 2. The data in relation to sales suggests that the program has been moderately successful in supporting export-orientated companies. It can be calculated from this table that exports represented about 26 per cent of the total sales of MIC investee businesses from 1983 to November, 1990. This is appreciably higher than the manufacturing industry average, calculated by the Bureau of Industry Economics (BIE) to be about 20 per cent in 1987.[34] One of the defining tests of an 'eligible business' is export orientation, and on this criterion the program has promoted firms having a reasonable international orientation.

Another criterion for an eligible business is its potential for employment. It is indicated in Table 2 that direct employment generated through the MIC program has been small. In absolute terms, direct

TABLE 2
SUMMARY OF ACTIVITIES OF ELIGIBLE BUSINESSES SUPPORTED THROUGH MIC PROGRAM
($ million where appropriate)

Indicator	*1987/88*	*1988/89*	*1989/90*	*total**
Domestic Sales	250.36	272.52	148.62	978.32
Export Sales	93.18	64.35	63.79	342.88
Total Sales	343.55	336.87	212.41	1321.21
Total employees	3242	3071	1778	n/a
Skilled employees	2040	1810	1098	n/a
Total wages	81.13	81.89	62.56	319.75
Total dividends	0.01	0.04	nil	0.38
Total company tax	2.52	1.88	4.18	14.52
Total payroll tax	3.75	3.35	3.27	14.48
Total FBT	.97	.65	0.75	3.18
Total other income	.20	. 0	. 0	10.69

* This is the total for all years up until 30 June 1990. Activities for 1983/4, 1984/5, 1985/6 and 1986/7 have been included in the total although not identified separately in the table.

Source: MICLB Database, *Database of the Annual Returns from the MICs,* interrogated November, 1990.

employment and wages paid by investee businesses are insignificant in comparison to the $26 billion paid in wages and salaries to the one million employees of the manufacturing sector in 1988/89.[35] However, it is significant that skilled labour has consistently represented about 60 per cent of the total employment of MIC investee businesses. Thus, whilst absolute levels of employment are low, the employment generated probably has significant multipliers in relation to the value added to products.

Finally, Table 2 provides data relating to the taxation contribution of investee businesses. This indicator addresses the contention that the MIC program would be cost-neutral over time because of the returns to government from corporate and personal taxes paid.[36]

It can be calculated from this table that company, payroll and fringe benefit taxes paid by MIC investee businesses totalled $32.18 million up to November 1990.[37] If an average personal income tax rate of about 30 cents per dollar is assumed to be paid by employees, income tax receipts would be about $96 million.[38] The estimated cost of incentives offered through the MIC program until the end of June, 1990 was $106 million.[39] There is no public information on the cost of delivering the program during this period but the BIE estimated in 1987 that administrative costs were about $1.7 million from 1984/85 to 1986/87 (the first three years of the program). It would be reasonable to expect that these costs would be about two million dollars for the next three years. Thus, the total administrative and budgetary cost of the program would be less than $110 million, whilst taxation revenue from investee firms and employees was about $128 million.

Thus, on a superficial level the MIC program provided government with a net revenue gain over these six years of the program. Indeed, if taxation revenue from the MIC venture capital companies,[40] tax imputation[41] and the effects of MIC investors in tax brackets which are less than 50 cents per dollar are considered,[42] the positive effect of the program on government revenue would be even greater.

However, this cost/benefit analysis assumes that these businesses and employees would not be contributing to government revenue in the absence of the MIC program. It is unlikely that skilled employees of these firms would be unemployed in the absence of the program but the small and volatile nature of Australia's venture capital market suggests that the business operation would have considerable difficulty in attracting investment capital. Thus, it is reasonable to assume that the MIC capital was a significant influence on the ability of these businesses to trade.[43]

Another problem associated with this form of cost/benefit analysis is assessing the opportunity cost of supporting these firms and industries as opposed to other sectors of economic activity. This refers to the effectiveness of one course of government action as opposed to another, or the market allocating resources in the absence of government action. There is no means of calculating the opportunity costs associated with the MIC program as possible alternative strategies are too numerous and require speculation on possible outcomes.

Thus, commercially the MIC program has had mixed success. The MIC venture capital funds have not traded profitably to the end of the 1990 financial year. However, it may be premature to assess the whole program as being a commercial failure on this basis. It has already been noted that the literature suggests that the life-cycle of a venture capital fund is about ten years. Some MICs may still emerge as profitable entities within this time-frame although it is not reasonable to expect that all, or even most of the MICs will recover the losses incurred to June 1990. The future emergence of a few profitable venture capital funds in a small local economy is probably sufficient success to sustain an Australian venture capital market, and indicate that the program has been successful.

INDUSTRY STRUCTURE

The second area of economic concern addressed in this paper is long-term industry structures developed as a consequence of the program. In the first instance, it has previously been identified in the literature that the MIC program has failed to develop a concentration of resources in specialised generic areas of technology. Rather resources have been diffused across many areas of technological activity.[44]

The second area of industry structure that is important is the linkages created through the program. The evidence suggests that there are limited commercial linkages between the MIC funds. Table 3 summarises the joint investments of the MICs. This data contrasts with the investment

strategies of successful international venture capital funds.

Only 25 per cent of the investments of the MICs were made in conjunction with one or two other MICs.[45] Bygrave reports that 37 per cent of the investments of high technology venture capital funds in the United States are co-investments, with much greater linkages occurring in California where 69 per cent of investments are joint ventures.[46] Thus, the evidence suggests that the MIC program has had only limited success in developing a co-operative venture capital network between MIC venture capital funds.

TABLE 3
JOINT INVESTMENTS MADE BY THE MICS

MIC Partners Involved	*No. of Investments*	*Per cent total*
1	112	75
2	30	20
3	7	5
	149	100

Source: MICLB Database, *Database of the Annual Returns from the MICs*, interrogated November, 1990.

A third area of analysis with respect to industry structure is its success in creating a permanent supply of non-MIC, private venture capital parallelling the increase of risk capital available through the MICs and associated funds. The Bureau reported that total venture capital funds under management[47] "grew from a negligible amount in June 1983 to over $300 million in early 1987".[48] On the basis of this growth, the BIE predicted that the proportion of venture capital funds from private non-MIC funds for start up and early stage innovative businesses would increase from 48 per cent in 1987 to 60 per cent in 1988.[49] However, the 1987 report of the BIE was produced before the October stockmarket crash in that year. There is evidence that since the 1987 stockmarket crash Australia's venture capital market has stagnated or even contracted.

Table 4 indicates that Australia's venture capital base has not grown since the 1987/88 financial year. There has been a marginal decline in the total funds invested in Australia's venture capital industry. Importantly, there has been a consistent decline in the capital under the management of non-MIC private venture capital funds. The only new capital being raised in the industry is occurring with the assistance of the 100 per cent tax concession. This suggests that the initial program objective to create an unsubsidised private sector venture capital market has not been achieved.

Thus, in most respects the MIC program has failed to develop the structures required for a sustainable venture capital industry. There is little evidence of any concentrated specialisation in generic areas of technological activity, or the development of venture capital investment networks. Furthermore, the central capital and management

requirements of the industry appear to have not been achieved although these factors need to be considered in the context of the immaturity of the venture capital industry in Australia.

TABLE 4
ESTIMATES OF AUSTRALIA'S VENTURE CAPITAL BASE
($ million)

Financial year	1986/87	1987/88	1988/89	1989/90
Type of fund				
MIC funds	175	216	161	217
MIC Parallel funds	31	41	49	68
Non-MIC private funds	147	257	251	224
Total	353	514	471	509

Source: Adapted from MICLB (1990), *Annual Report 1989-90,* Canberra, Australian Government Publishing Service (AGPS), p. 18. These figures have been adjusted to account for a change in the definition of venture capital used by Department of Industry, Technology and Communication (DITAC). Since 1989 DITAC has included capital invested in leverage buy-outs and acquisitions, and other later stages of business development not usually defined as venture capital.

IMPLEMENTATION ISSUES EMERGING FROM THE MIC PROGRAM

The MIC program has had both successes and failures. The program was developed in a climate in which economic rationalism was beginning to dominate policy approaches to industry policy. Thus, there have been important institutional obstacles to the successful implementation of the MIC program including a lack of cooperation from central financial agencies, and a lack of co-ordination with macroeconomic policy. Indeed, the importance of the co-operation of these agencies has been demonstrated by the way in which taxation guidelines surrounding the MIC were interpreted by Treasury. Future strategies for the commercialisation of technology need to be supported by other agencies involved in their implementation,[50] or limit the ability of these agencies to interfere with programs.

The commercial performance of the MIC introduces three important issues to analysis of the implementation of venture capital strategies in Australia. First, the corporate structures of these funds did not facilitate long-term commercial strategies. Nine of the 11 original MIC Licence holders were publicly listed on the stockmarket. This required the companies to report profits and losses twice a year and encouraged short-term financial assessments of these companies. This aspect of the program did not encourage 'patient' investors prepared to adopt long-

term investment strategies. Thus, the short-term commercial objectives of a central implementing actor, private sector investors, diverged from long-term strategic objectives. Future strategies will need to consider these conflicts between public and private interests, and between short-term and long-term objectives.

Second, long-term perspectives on Australia's venture capital industry were not encouraged by the central agencies which insisted on the premature evaluation of the program in 1987. This resulted in the BIE review of the program which determined that the program should be terminated three years after the MIC legislation had been presented to parliament.[51] The BIE had assessed the program as being redundant because of the growth in venture capital funds between 1984 and 1987. However, there has been a decline in non-MIC funds under management, with the MICs providing the only new capital being invested in the sector.[52] Thus, the BIE made premature judgements without adequate assessment of cyclical fluctuation in the investments of capital markets. The short-term approach of the BIE reflected a perspective similar to central agencies such as Treasury and the Department of Finance. Once again this reflects on the ability of these agencies to obstruct programs during their implementation. Future mechanisms are required to limit the possibility of agencies hindering the implementation of programs.

Finally, the lack of financial success of the MICs also needs to be evaluated in terms of the effect of the governing legislation. In some ways the legislation was restrictive because it initially prevented the MICs taking a controlling interest in businesses that suffered from poor management from the principle owner, and did not allow venture capital funds to make corporate plans beyond 12 months because of the annual capital raising allocations.[53] Conversely, the legislation did provide few restrictions on generic areas of activities, and failed to enforce a concentration of investment in the sector of economic activity. These legislative inconsistencies are symptomatic of compromises between DITAC and central financial agencies, and the inflexibility of the program to adapt to challenges as the industry moved through its learning curve. The implication for future program implementation is that governing legislation needs to be linked to clear, unambiguous program objectives.

The data on the commercial contribution of the investee businesses to the economy suggest that the program has been moderately successful in several respects. The program has supported businesses with an export orientation, and has provided a small amount of employment, especially for skilled labour. Importantly, the government revenues generated by the program exceed the cost if it is assumed that MIC finance was essential for these businesses to be able to trade. Thus, in one respect there was a commercial benefit in emphasising private sector management in the implementation of the program.

However, the failure to achieve appropriate industry structures reflects on the divergence between private and public objectives. The use of incentives rather than regulation or direct control through other means assumed that the private sector would respond in accordance with broader objectives of the program. Despite the intervention of the MIC program, investors remain reticent to invest in long-term, strategic development, there are some indications that the skills required to successfully manage these industries are not present in Australia, and the program has not developed an industry structure to sustain future development.

The MIC program highlights the limitations on government intervention. Government is limited by its own institutions, policy communities and its relationship with private sector markets. During the time in which this program was developed, agencies supporting free-market policies had become influential because of the economic problems which had resulted from protectionist policies. In liberal democracies governments rely heavily on investment from the private sector to achieve its economic goals. These influences shaped the form of the MIC program. However, the mechanisms employed were insufficient to the needs of emerging technology industries. Importantly, the government allowed implementing actors considerable latitude to manipulate the program to suit their agenda. Future programs will need to limit the possibilites for these distortions to program objectives.

NOTES AND REFERENCES

1. L. Gunn, 'Why is implementation so difficult?', *Management Services in Government,* 33, November, 1978.
2. C. Hood, *The Limits of Administration,* Wiley, London, 1976.
3. R. Elmore, 'Organizational models of social program implementation', *Public Policy,* 26, 2, 1978.
4. J. Pressman and A. Wildavsky, *Implementation: How Great Expectations in Washington are Dashed in Oakland,* University of California Press, Berkeley, 1973.
5. For example, see J. Warhurst, 'Industry assistance issues: state and federal governments', in B. Head (ed.), *The Politics of Development in Australia,* Allen and Unwin, Sydney, 1986.
6. Department of Industry, Technology and Commerce, *MIC Program Extended to 1991,* Press Release, 29 May 1988.
7. Department of Science and Technology, *The Management and Investment Companies Program,* Canberra Publishing Co., Canberra, 1984, p. 1.
8. Bureau of Industry Economics (BIE), *Review of Venture Capital in Australia and the MIC Program: Program Evaluation Report 4,* Australian Government Publishing Service (AGPS), Canberra, 1987, p. 24.
9. H. Emy, *Public Policy: Problems and Paradoxes,* Macmillan, South Melbourne, 1976, p. 29.
10. For example, A. Raiche, 'CSIRO — who has the long term view', *Search,* 21, 1, 1990 and D. Widdup, 'Politics is people', *Search,* 21, 1, 1990. This whole edition of *Search* focuses on S&T policy and Australia's political parties.
11. Although the scientific community has some interest in developing these new industries, they have been mainly concerned with securing resources of R&D. See, N. Ryan,

'Financing innovation: a federal/state perspective', in Australian Science and Technology Council (ASTEC) (ed.), *Science, Technology and Australian Federalism: Getting the Best from the System,* ASTEC, Canberra, 1991.

12. For example, see R. Rothwell and W. Zegveld, *Reindustrialisation and Technology,* Longman, Harlow, 1985, ch. 3.
13. The industry policy text commonly associated with this view is P. Hall, *Governing the Economy,* Polity Press, Cambridge, 1986.
14. MICLB, *Annual Report 1989-90,* AGPS, Canberra, 1990, p. 3.
15. Markets are not homogeneous, and differ widely in structure and requirements.
16. M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance,* Free Press, New York, 1985, p. 270.
17. J. Brander, 'Rationales for strategic trade and industrial policy', in P. Krugman (ed.), *Strategic Trade Policy and the New International Economics,* Institute of Technology Press, Massachusetts, 1987, p. 15.
18. P. Krugman, 'Introduction: new thinking about trade policy', in P. Krugman (ed.), 1987, *op. cit.*
19. F. Chesnais, 'Science, technology and competitiveness', *STI Review,* 1, OECD, Paris, 1986, p. 111.
20. H. Ergas, *Why Do Some Countries Innovate More Then Others?,* Centre for European Economic Studies, Brussels, 1984.
21. W. Bygrave, 'The structure of the investment networks of venture capital firms', *Journal of Business Venturing,* 3, 2, 1988, p. 137.
22. W. Sandberg, and C. Hoffer, 'Improving new venture performance: the role of strategy, industry structure, and the entrepreneur', *Journal of Business Venturing,* 2, 1987.
23. M. Fraser, *We're Not Waiting For the World: Policy Speech,* authorised by T. Eggleton, 15 February 1983, p. 8; and Australian Labor Party, *Platform Resolutions and Rules 1988,* R. Hogg, Barton, 1988, p. 150.
24. Espie Committee — Australian Academy of Technological Sciences, *Developing High Technology Enterprises for Australia,* Australian Academy of Technological Sciences, Parkville, 1983.
25. N. Ryan, 'The MIC program and the politics of science policy', *Prometheus,* 7, 1, June 1989.
26. P. Keating, *Taxation Deductions for Capital Prescribed to Licensed Management and Investment Companies,* Press Release No. 71, 16 May 1984; and P. Keating, *Venture Capital Market: Clawback Provisions to Apply to Tax Incentives for High Risk/High Technology Investment,* Press Release No. 9, 23 January 1984.
27. Parliamentary Debates (Hansard), *The House of Representatives,* AGPS, Canberra, 7 June 1984.
28. Income Tax ruling 2271.
29. CCH Australia Ltd, *Australian Income Tax Rulings, CCH Australia, loose leaf service,* p. 9704.
30. The effect of these macroeconomic policies on the development of an Australian venture capital industry has been reported in N. Ryan, 'Policy issues for government in developing an Australian venture capital market', *Australian Journal of Public Administration,* 50, 1, March, 1991.
31. However, this information has not been publicly available.
32. A more detailed discussion of these cycles can be found in J. Utterback, 'Innovation and industrial evolution in manufacturing industries', in B. Guile and H. Brooks (eds), *Technology and Global Industry: Companies and Nations in the World Economy,* National University Press, Washington, 1987.
33. W. Bygrave, N. Fast, R. Khoylian, L. Vincent, and W. Yue, 'Early rates of return of 131 venture capital funds started 1978-1984', *Journal of Business Venturing,* 4, 1989.
34. This is an adaptation of the 'Export propensity indicator', developed by the BIE. This indicator represents the ratio of export sales to total sales. See, BIE, *Trade Performance of Australian Manufacturing,* AGPS, Canberra, 1989, ch. 3.
35. Australian Bureau of Statistics, *Catalogue No. 8203.0.*
36. See, BIE, 1987, *op. cit.,* p. 94, for a discussion of this issue.

37. The amount of taxes reported here is less than the actual amount paid because data collections in these areas were not complete, and does not include former investee businesses which continued to operate outside the program after receiving initial support. These should be considered minimum figures. This was highlighted by C. Calver, Assistant Director of the Development Capital Section, Department of Industry Technology and Commerce (DITAC), Private correspondence to the author of this paper, 7th November 1991.
38. This is probably a conservative figure since most employees are skilled employees whose salaries or wages are likely to attract taxation rates in excess of 38 cents per dollar: the rate paid by taxpayers earning in excess of $20,000 per year, for most of the 1980s.
39. S. Crean, *Science and Technology Budget Statement 1990-91,* Budget Related Paper No. 7, AGPS, Canberra, p. 80.
40. The MICs and their employees are taxed similarly to all other corporations.
41. Tax imputation is a credit given to shareholders (companies or individuals) for taxation paid by a company. If the taxation paid is reduced by deductions such as the MIC tax concession, the credit bestowed on the shareholder is less. Thus, government will recover much of the tax concession given to corporate and institutional investors in MIC by reducing the imputed credit passed on to its shareholders.
42. Up until the end of June 1988, the MICLB approved a maximum amount of capital that an MIC may raise. It has been assumed that the tax revenue cost of these capital raisings were 50 cents for every dollar raised. It is unlikely to be this high since capital raised from taxpayers in lower tax brackets would represent a smaller cost to revenue. Indeed, in 1990-91 the average tax rate was about 42 cents in the dollar. See C. Calver, private correspondence, *op. cit.*
43. Also, related to the ability of businesses to trade is their ability to fund new employment positions. Whilst the skilled labour employed in these positions would probably be employed elsewhere, the positions they occupy could still be considered new jobs, or additional employment.
44. See, N. Ryan, 'Selectivity in Australian government support for innovation', *Science and Public Policy,* 17, 4, August, 1990.
45. It is possible that investments were also made in conjunction with non-MIC sources of venture capital. The data on these investments are not available but would be expected to be small since MICs have been the main source of venture capital in Australia in recent years.
46. W. Bygrave, 1988, *op. cit.,* p. 143.
47. This includes MIC, parallel MIC and non-MIC funds. A parallel MIC is a venture capital fund set up by the management team of some MICs to raise capital outside the program. These funds do not attract the 100 per cent tax concession and are not subject to MICLB control.
48. BIE, 1987, *op. cit.,* p. 60.
49. These predictions were based on a question in the BIE survey. The question asked investors to anticipate future investments. BIE, 1987, *op. cit.,* p. 60.
50. However, it should be noted that central financial agencies have a very dry perspective on government involvement in these areas.
51. BIE, 1987, *op. cit.*
52. See N. Ryan, 1991, *op. cit.*
53. In the later stages of the program these restrictions were relaxed.