TAXATION OF KNOWLEDGE-BASED CAPITAL: SOME ADDITIONAL ISSUES FOR POLICYMAKERS' CONSIDERATION

Non-R&D investments, Average Effective Tax Rates, Internal Vs. External KBC Development and Tax Limitations

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Motivation

- Previous analyses have focused principally on tax incentives for R&D investment.
- The typical rationale for R&D tax incentives is that the social return from many R&D investments exceeds the private return to the initial innovator.
- But:
  - R&D is just a fraction of the overall KBC investment
  - Other types of KBC investments might generate positive spillovers.
  - Different business models and fact scenarios

Composition of Knowledge-Based Capital

Major types of KBC capital as a percentage of total KBC capital stock for selected countries, 2010

	Computer software	Innovative Property	Economic Competencies
Austria	10.5%	58.4%	31.2%
Belgium	11.6%	47.1%	41.3%
Czech Republic	9.7%	56.7%	33.5%
Denmark	23.6%	52.2%	24.3%
Finland	14.2%	63.4%	22.4%
France	16.8%	51.9%	31.3%
Germany	9.0%	63.5%	27.5%
Ireland	8.6%	45.9%	45.5%
Italy	12.8%	53.3%	33.9%
Netherlands	15.1%	44.4%	40.6%
Slovenia	9.9%	59.8%	30.3%
Spain	19.5%	53.7%	26.9%
Sweden	17.4%	59.9%	22.8%
United Kingdom	17.6%	43.3%	39.1%
United States	9.4%	65.3%	25.4%
Average	**13.7%**	**54.6%**	**31.7%**

Source: Corrado et. al. (2012).

- Only 55% of KBC is innovative property.
- Scientific R&D accounts for 29% of the innovative property capital stock.

ETRs on KBC investment

- Tax policy analysis of capital taxation typically focuses on the impact of taxation on a marginal investment, earning a competitive rate of return and zero economic rent.
- This assumption might not be appropriate for:
  - KBC investments that are lumpy and finite
  - KBC investments that generate unique products with market power
  - Firms facing financing constraints or start-up companies (without other taxable income and tax liabilities to be offset by losses and credits).

Alternative Average ETRs

- This analysis uses a discrete project model to calculate forward-looking average effective tax rates (AETRs).
- Two measures of AETRs are used:
  - The AETR(IRR), computed as the pre-tax internal rate of return (IRR) less the after-tax IRR divided by the pre-tax IRR, is more likely to be an accurate representation of tax burden on a marginal investment.
  - The second, AETR(PV), computed as the ratio of the present value of taxes to the present value of pre-tax income, is more likely to be an accurate representation of the expected tax burden on a project that earns significant economic rents.
  - The AETR(PV) calculation is similar to the Devereux-Griffith (1998) EATR, which is the most appropriate measure to evaluate mutually-exclusive investment projects.

AETRs with expensing and credit

Average effective tax rates on KBC with and without tax credit

Knowledge-based capital investment	AETR (IRR)	AETR (PV)
R&D with 100% expensing and no tax credit	0.0%	20.8%
R&D with 100% expensing and 5% tax credit	-7.0%	18.0%

- The AETR(IRR) is zero with immediate expensing and not credit. The AETR(IRR) is negative with the credit.
- The AETR(PV) is below the statutory tax rate (25%), but above 0.
- If taxpayers are evaluating the cash flow streams with discount rates below the project's pre-tax rate of return (i.e., earning above-normal returns or economic profits), the AETR(PV) is the appropriate measure of the project tax burden.

AETRs with different depreciation rules

AETR on different types of KBC with different tax depreciation rules

Type of KBC	Economic Depreciation	Tax Depreciation	Tax credit	AETR (IRR)	AETR (PV)
Scientific R&D	7.7% SL - useful life 13 years	expensed	No	0.0%	20.8%
		useful life	No	25.0%	25.0%
		SL 10 years	No	23.1%	24.3%
		expensed	5%	-7.0%	18.0%
		useful life	5%	20.4%	22.1%
		SL 10 years	5%	18.4%	21.4%
Computerised information	33% SL - useful life 3 years	expensed	No	0.0%	20.8%
		useful life	No	25.0%	25.0%
		SL 5 years	No	31.0%	26.9%
Organisational Capital	10% SL - useful life 10 years	expensed	No	0.0%	20.8%
		useful life	No	25.0%	25.0%
		SL 15 years	No	28.1%	26.5%

- When tax depreciation rules are the same as economic depreciation, then both the AETRs are equal to the statutory tax rate.
- With tax credit, then the AETR will be lower than the statutory tax rate.
- When tax depreciation is slower than economic depreciation, then the AETR(PV) is slightly lower than the AETR(IRR).

AETRs with different business models

Effective tax rates on internally developed KBC vs acquired KBC

Internal vs. external KBC development	AETR (IRR)	AETR (PV)
Internally-developed KBC for production	0%	22.5%
Externally-acquired KBC for production	17.3%	25.0%

- Assumes KBC developed over 3 years and used in production if internally developed, or is sold (sales price provides a 30% IRR to the innovator) at the beginning of the 4th year and used by acquirer in production.
- AETR on the externally-acquired KBC measures the tax burden on both the innovator and the producer.
- AETR in both cases is below the statutory tax rate, but the internally-developed KBC has a lower AETR than the externally-acquired KBC. The difference is quite large in the case of AETR(IRR).
- Tax rules provide an incentive for internal development of KBC when it might be more economically efficient to have a separate company develop the KBC and sell it.

AETRs with tax loss carryforwards

Effective tax rates with full refundability of tax losses versus if tax losses have to be carried forward

Development of KBC scenarios	AETR (IRR)	AETR (PV)
Development of scientific R&D KBC then sale		
Expensing with immediate refundability	0.0%	25.0%
Non-refundable with loss carry forward	21.8%	29.1%
Internally-developed KBC plus production		
Expensing with immediate refundability	0.0%	22.5%
Non-refundable with loss carry forward	11.9%	23.4%

- When tax losses from expensing are not immediately refundable, the developing firm's AETR increases from 0% to 21.8% in the case of the AETR(IRR) and from 25.0% to 29.1% in the case of the AETR(PV).
- A similar effect occurs in the case of internally-developed KBC, which is used by a vertically integrated firm in its production.

Investment tax credit equivalent of lower tax rate on future income

Investment tax credit equivalents of lower tax rates on KBC returns

Ordinary rate 35%, IP Box rate 5%				
IP Box status	**AETR (IRR)**	**AETR (PV)**	**Tax credit equivalent (IRR)**	**Tax credit equivalent (PV)**
No IP Box	0.0%	29.2%	0.0%	0.0%
Yes with **symmetric** treatment of expenses	0.0%	4.2%	0.0%	43.6%
Yes with **asymmetric** treatment of expenses	-60.2%	-13.9%	30.4%	75.2%

- In this example with 30% pre-tax return and tax expensing, the investment tax credit equivalent rate is zero for AETR (IRR), since tax rate doesn't matter with expensing. If IP box expenses can be taken at higher ordinary tax rate, then -60% AETR and 30% tax credit equivalent.
- Tax credit equivalent for IP box with symmetric treatment of expenses is 44% with AETR(PV), with asymmetric treatment 75%
- Income tax rate reductions can provide significant tax benefits for profitable firms undertaking KBC, similar to investment tax credits.

Conclusions and future research

- Tax policy can play an important role in encouraging KBC.
- Research on the spillover effects of non-R&D KBC investments is an important area for future research.
- Additional analysis is needed of the economic depreciation of different types of KBC investments.
- The design of tax incentives must be carefully designed to ensure the benefit to all companies undertaking all types of KBC investments generating positive spillovers.
- KBC investments are affected by a country's general tax rules with respect to depreciation and limitations on losses.
- Under certain circumstances, expensing of capital investments can effectively eliminate income tax on such investments. Those circumstances don't apply to many types of KBC investments.

Conclusions and future research (2)

- The different tax treatment of internally-developed KBC compared to externally-acquired KBC favours larger firms that have the ability to both innovate and commercialise through vertical integration.
- Lack of immediate refundability of tax incentives reduces the value of incentives for companies in a tax loss position, which is particularly problematic for start-up companies and some small firms.
- Tax incentives lowering the tax rate on the income from KBC investments, such as intellectual property or patent boxes, can provide significant tax benefits to high-return KBC, equivalent to very high R&D tax credit rate, and potential opportunities for geographic income shifting without carefully designed rules to prevent harmful tax competition.