

Does the diversification penalty crowd out R&D value?

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The Australian governments' R&D tax-concession policy targets large, diversified firms. The general consensus, however, is that corporate and geographic diversification leads to a value-discount. Our analysis will examine the impact of public policy and R&D expenditure on the value of firms. In particular we will examine the R&D relevance for diversified firms. This will allow us to evaluate whether the tax-concession is correctly targeted, or whether improvements to R&D public policy can be made.

A range of studies and techniques confirm the view that R&D activity adds value. Chan, Martin and Kensinger (1990) and Eberhart, Maxwell and Siddique (2004) are examples of event-based studies, while Chan, Lakonishok and Sougiannis (2001) employ asset-pricing theory. Griliches (1981), Hall (1993), Chung, Wright and Kedia (2003), Hall and Orani (2003) and Brooks and Davidson (2003 2004b), employ cross section techniques relating R&D to various measures of market value.

Despite a positive relationship between R&D expenditure and firm value, it is commonly believed that firms underinvest in R&D. The standard economic solution to underinvestment is some form of government subsidy. In Australia that subsidy takes the form of a non-debt tax shield. Firms can earn a 125 percent deduction on some types of R&D expenditure. In some instances that deduction may rise to 175 percent. The reason Australia provides the tax incentive is "to make eligible companies more internationally competitive" (Auditor-General 2003). This objective implies that firms with export earnings are the primary intended recipients of the R&D tax concession. Bosworth and Rogers (2001) and Brooks and Davidson (2004b) indicate that Australian firms undertaking R&D do tend to be large. Neither of these

studies, however, investigate whether R&D firms have large export earnings. Nor do they investigate the value relevance of R&D for such firms.

The conventional wisdom in finance indicates that corporate diversification destroys wealth, and diversified firms are less valuable than comparable stand-alone firms (see Martin and Sayrak 2003 for an extensive survey). The generally accepted rationale for the diversification discount is the inefficient investment hypothesis (Lamont 1997, Shin and Stulz 1998 and Rajan et al. 2000). The (related) corporate focus hypothesis argues that inefficient investment, inefficient cross-subsidisation and poor managerial incentives drive the diversification discount (Berger and Ofek 1995, and Dittmar and Shivdasani 2003). Denis, Denis and Sarin (1997) and Scharfstein (1998) argue, using US data, that agency problems cause the diversification discount. Some studies indicate that the diversification penalty is driven by omitted variable bias. This view is that diversified firms are 'different' from other types of firm, and were always different (Graham, Lemmon and Wolf 2002). Maksimovic and Phillips (2001) and Villalonga (2004) argue measurement error to be the source of diversification penalties. The literature is unsettled and some evidence of premia also exist. Morck and Yeung (2002), for example, document a diversification premium, but only for those firms that have firm-specific intangible assets (i.e. assets with similar characteristics to R&D). Fauver, Houston and Naranjo (2004) examine diversification penalties across 35 economies and report that high income, and common law, economies are more likely to exhibit diversification penalties. Fleming, Oliver and Skourakis (2003) using Australian data report that the diversification penalty only appears in some diversified (under-performing) firms. Christophe and Pfeiffer (2002) and Denis, Denis and Yost (2002) report that geographic diversification reduces firm value in the same way as does industrial diversification.

To the extent that R&D firms are large and diversified the Australian tax subsidy may well not encourage R&D activity. If this type of firm undertakes inefficient investments and is beset by agency problems it is less likely that optimal R&D investments will occur. Brooks and Davidson (2003) have investigated R&D in the presence of agency costs and find that R&D adds value in all instances and that the debt-control hypothesis constrains agency problems in some R&D firms. Hall and

Oriani (2003) and Brooks and Davidson (2003) report evidence consistent with over-investment in R&D.

This discussion suggests our research question: How does R&D activity interact with diversification penalties/premia? In answering this question we will need to consider a series of sub-questions. For example, to what extent are R&D firms diversified, either industrially and/or geographically? How does the value relevance of R&D vary by size, industrial diversification and geographic diversification?

APPROACH

(a) General Approach

We intend using a Tobin Q framework in our modelling similar to that employed in Brooks and Davidson (2003 and 2004b). A series of pooled time series, cross-section regressions will be estimated relating R&D activity to measures of firm value. Firm value will be calculated in a number of ways, including diversification measures. In essence our data will be an unbalanced panel. Following Brooks and Davidson (2004b) we would employ a fixed effects model. Due to selectivity biases and endogeneity issues we will need to employ a range of techniques, including treatments effect models, and Instrumental Variable models in our analysis. In all our modelling we will control for effects such as legal system and/or market or bank based financial systems.

(b) Data

The primary database that we will utilise is the Osiris Database. This database contains information on over 24,000 firms across 90 economies. We have used this database in previous research. We intend to augment Osiris' Australian coverage with the Intellectual Property Research Institute of Australia R&D database. We used this combination of datasets in our 2004b paper – we only require funding for the latest release.

(c) Project Outline

We will begin by calculating diversification penalties or premiums. Our contribution will consist of investigating the relationships between R&D activity and those discounts or premium. In this component of the research we will also investigate the efficacy of Australian R&D policy. For example, to what extent do firms with export

earnings undertake R&D activity? Are these firms more or less valuable than non-R&D firms?

We anticipate estimating the following model:

$$Y_i = \alpha + \beta X_i + \delta D_i + \gamma RD_i + \varepsilon_i \quad (1)$$

Where Y_i is an estimate of firm value (either Q , or a measure of excess value), X_i is a vector of firm characteristics, D_i is a diversification indicator (either industrial or geographic) and RD_i is a measure of R&D activity. α , β , δ , and γ are coefficients and ε is an error term. Due to self-selection biases we will model the firm's diversification decision:

$$D_i^* = \phi Z_i + \eta_i \quad (2)$$

Where D_i^* is a latent variable, $D_i = 1$ if $D_i^* < 0$, or $= 0$ otherwise. Z_i is a vector of variables affecting the decision to diversify, ϕ is a coefficient and η_i is an error term. One of the variables in Z_i is likely to be the measure of R&D. We anticipate modelling R&D along much the same lines as (2). A range of specifications will be adopted, from a raw R&D to sales statistic to an industry adjusted R&D to sales statistic, to a R&D indicator. Furthermore a range of interactions between R&D and Diversification will be investigated.

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