The Impact of Family Involvement on the Productivity of the Firm

Francesco Barbera
Department of Economics
School of Business, Technology and Sustainable Development
Bond University
Gold Coast, Queensland
Australia
Tel: +61 7 55951161
Fax: +61 7 55951160
Email: fbarbera@bond.edu.au

Professor Ken Moores
Director of the Australian Centre for Family Business
School of Business, Technology and Sustainable Development
Bond University
Gold Coast, Queensland
Australia
Tel: +61 7 55951161
Fax: +61 7 55951160
Email: kmoores@bond.edu.au

Abstract

Motivated by a lack of consensus in the current literature, this paper aims to shed light on whether family firms are more or less productive than non-family firms. As a first step, this paper links existing family business research to the theoretical notion that family involvement has an influence on the factors of production from a productivity standpoint. Secondly, utilising a Cobb-Douglas framework, we provide empirical evidence that family labour and capital indeed yield diverse output contributions relative to their non-family counterparts. In particular, family labour output contributions are significantly higher, and family capital output contributions significantly lower. Interestingly, differences in total factor productivity between family and non-family firms disappear once we allow for heterogeneous output contributions of family production inputs. These findings imply that the assumption of homogeneous labour and capital between family and non-family firms is inappropriate when estimating the production function.

IMPACT OF FAMILY INVOLVEMENT ON PRODUCTIVITY

ABSTRACT

Motivated by a lack of consensus in the current literature, this paper aims to shed light on whether family firms are more or less productive than non-family firms. As a first step, this paper links existing family business research to the theoretical notion that family involvement has an influence on the factors of production from a productivity standpoint. Secondly, utilising a Cobb-Douglas framework, we provide empirical evidence that family labour and capital indeed yield diverse output contributions relative to their non-family counterparts. In particular, family labour output contributions are significantly higher, and family capital output contributions significantly lower. Interestingly, differences in total factor productivity between family and non-family firms disappear once we allow for heterogeneous output contributions of family production inputs. These findings imply that the assumption of homogeneous labour and capital between family and non-family firms is inappropriate when estimating the production function.

INTRODUCTION

The impact of ownership structure on firm performance has gained relevance since the seminal work of Berle and Means (1932) (see Demsetz, 1983; Fama & Jensen, 1983; Jensen & Meckling, 1976; Morck, Shleifer, & Vishny, 1988). Recently, Palia and Lichtenberg (1999) have operationalized this impact by specifically focusing on the influence of managerial ownership on 'productivity' and find that managerial ownership changes do drive changes in productivity. What is less established, however, is the particular impact of *family* ownership or, more broadly, family involvement on the productivity of the firm. Measuring this impact would in turn necessitate a comparison of family and non-family firms.

Despite more contemporary investigations into financial performance differences between family and non-family firms (see Anderson & Reeb, 2003; Lee, 2006; Miller, Le Breton-Miller, Lester, & Cannella Jr., 2007; Sciascia & Mazzola, 2008), to date only a modest amount of analysis has been dedicated towards determining the specific effects of family involvement on the fundamental drivers of these performance differences, such as *productivity*. A review of previous studies reveals that while a consistent and significant relationship between family involvement and a firm's productivity has been found, there is no consensus as to the direction of this relationship. Granted, different definitions of a family firm, time periods, measures of productivity, methodologies and data sets would serve to vary these results; however, the inconsistencies beg the following fundamental question: *does family involvement have a positive or negative impact on firm productivity?*

To answer this question, it is important to first determine if there are differences in *how* family and non-family firms produce. Further to this, it is important to determine if family involvement influences the output contribution of production inputs, namely labour and capital. Despite the importance of unique resources and capabilities on firm productivity (Penrose, 1959), one of the more curious aspects of previous investigations is that those utilising a Cobb-Douglas framework have assumed fixed factor elasticities in the production process for both family and non family firms. In other words, it is assumed that labour and capital output contributions for both firm types are homogeneous. However, based on the established differences highlighted in the literature reviewed in this paper, such an assumption excludes the impact that family involvement may have on the firm's production process; thus, the purpose of this research is twofold:

1) To link the family business research to the theoretical notion that family involvement has an influence on the factors of production from a productivity standpoint.

2) To quantify these productivity differences in an estimation technique which allows the economist to make a traditional interpretation on producer behaviours as well as the productivity of inputs which they employ.

As a starting point, we review the family business literature which substantiates potential differences in the capital and labour inputs of family firms, and how such differences could impact specific factor output contributions as well as the overall total factor productivity of the firm. Based on this review, we formulate testable hypotheses. Subsequently, we outline our methodology. The data and analytical findings are then presented, and finally our concluding remarks are discussed.

THE NATURE OF FAMILY FIRMS

Understanding family concerns and preferences are crucial for understanding family business behaviour (Harris, Martinez, & Ward, 1994; Nelly & Rodríguez, 2008; Ward, 1988); thus we acknowledge that different motives may drive differences in behaviours between family and non-family firms. As a result, long term objectives akin to the continuity of the business, preservation of financial strength and maintenance of family control may receive greater precedence than immediate profits or other short term aims. Such objectives may in turn manifest themselves in the production process. More specifically, in order to meet production demands, family firms may utilise labour and capital in different respects than non-family firms. Despite this, previous studies which have investigated the impact of such control on productivity[1] have all curiously assumed that the labour and capital output contributions of both family and non-family firms are equal[2] (Barth, Gulbrandsen, & Schønea, 2005; Bosworth & Loundes, 2002; Kirchhoff & Kirchhoff, 1987; Martikainen et al., 2009; McConaughy, Walker, Henderson, & Mishra, 1998; Wall, 1998); however, this assumption does not account for the control that the family may exert over the firm's production process.

Further to the question of utilisation, the output contribution of both family firm labour and capital, when considered as heterogeneous production factors to those of non-family firms, may also be different. In other words, the notion that family firm labour and capital inputs yield exactly the same contribution toward output as non-family firm labour and capital may be flawed, and thus treating them as equal theoretically and empirically could be a mistake. Based on the literature to date, it is possible that family involvement may have both positive and negative effects on production inputs.

For example, family firms tend to avoid external debt and prefer to use internal financial resources instead. Manifestations of this behaviour have consistently been observed in that family firms have been found to have significantly lower leverage than non-family firms (Anderson, Mansi, & Reeb, 2003; Dreux, 1990; Gallo & Vilaseca, 1996; Villalonga & Amit, 2006). The rationale for such behaviour lies in the fact that inside equity holders of family firms typically have undiversified portfolios and the intent to pass the firm on to their descendents, and are thus less willing to subject the firm to the future cash flow risks that result from financing via debt (McMahon & Stanger, 1995).

It is for these reasons that Anderson and Reeb (2003) contend that inside family business equity holders are a unique class of shareholders. More specifically, there is a strong identification by inside

[1] Some studies have concentrated on the *partial* productivity of family firms in that they focus on the ratio of output to a single input factor, usually labour; however partial analysis only provides a general indication of total factor productivity, as it fails to consider tradeoffs between other input factors.

[2] One notable exception is Martikainen et al. (2009) who test whether factor elasticities (namely the coefficient estimates for both labour and capital) are invariant across both family and non-family firms. They find that, respective to their sample of 159 manufacturing firms, there is no such variance in elasticity parameters and proceed to test differences in productivity using fixed factor elasticities for both family and non-family firms.

owners between the family and the business (Gallo & Vilaseca, 1996), and family business owners, unlike other companies, have to satisfy the current and future needs of family members in addition to the needs of the business (Dreux, 1990). Since physical capital investments can represent large upfront costs and, once acquired, may yield irregular and uncertain returns over time, they represent a risk to the firm; and with the family's wealth so closely tied to the firm's future, it might become difficult for inside family owners to support such risk taking activities (Agrawal & Nagarajan, 1990; Gómez-Mejía, Takács Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007; Zahra, 2005). Ward (1988) outlines how such family considerations can limit the strategic aggressiveness of family firms; and Morck et al. (2000) also recognise the distaste for risk displayed by family owned firms arguing that they may be *excessively* risk averse, even to the point where they forego profitable expansion strategies, such as investments in physical capital.

Differences in the capital intensity of family firm production alone would not necessarily deem the capital owned by family firms more or less productive; however, a reluctance to invest in physical capital may also extend to investments in capital improving innovations. Further to this notion, Morck and Yeung (2003) consider situations where family firms may actively suppress capital improving innovation in order to protect their already established wealth. A suppression of capital enhancing innovations may in turn reduce the output contribution of capital during family firm production.

Other studies, however, portray family firms as more likely to invest in capital enhancing innovations. For example, Zellweger (2007) finds that family firms display a longer time horizon than non-family firms since they exhibit a longer CEO tenure and strive for long-term independence and succession within the family. Due to these extended horizons and the long-term presence of family owners, family-owned firms may be more likely to invest in longer-term value-maximizing projects. The lengthy presence of family owners may also provide superior knowledge of the firm's technology, which could induce improvements in productivity (Martikainen et al., 2009); thus there is a question as to whether family firm capital contributes more or less to output than non-family firm capital. To shed further light on this issue, it is not necessarily sufficient to simply determine whether family firms enhance their capital via innovation or not. Since it is the efficient *use* of capital that ultimately will impact output contribution, perhaps more central to the question is the issue of understanding how existing capital, enhanced or otherwise, is actually being utilised by family firms.

Family owners differ from non family shareholders in that the latter obtain only monetary benefits of control while family owners obtain also non pecuniary benefits such as the satisfaction of transferring the firm to descendants and, more importantly to the use of capital, consumption of amenities by the family at the expense of firm profits (Demsetz & Lehn, 1985). More specifically, Demsetz (1983) argues that combining ownership and control leads to such owners choosing non-pecuniary consumption thereby drawing scarce resources away from profitable projects.

Especially when managerial ownership is large, as in many family firms, there is ample evidence of managers pursuing private benefits once their control of the firm becomes 'entrenched' (Claessens & et al., 2002; Shleifer & Vishny, 1997; Stulz, 1988). Such benefits can take the form of advantageous dividend treatment (DeAngelo & DeAngelo, 2000), the preservation of 'socioemotional' wealth[3] (Gómez-Mejía et al., 2007), and shirking or other on-the-job consumption (Hoopes & Miller, 2006);

[3] According to Gómez-Mejía et al.(2007), "the socioemotional wealth of family firms comes in a variety of related forms, including the ability to exercise authority ... the perpetuation of family values through the business ... the preservation of the family dynasty ... the conservation of the family firm's social capital ... the fulfilment of family obligations based on blood ties rather than on strict criteria of competence ... and the opportunity to be altruistic to family members. Losing this socioemotional wealth implies lost intimacy, reduced status, and failure to meet the family's expectations".

thus the capital of family firms may be utilised for both production as well as non-production purposes. Such self serving behaviour may reduce the share of capital in the family firm's production process.

Despite the potential differences, the literature to date has largely assumed that capital output contributions between family and non-family firms are the same. To verify this assumption, we test the following null hypothesis.

> *Hypothesis 1. There is no difference between the output contribution of capital in family and non-family firms.*

Referring to our aforementioned definition of production, we acknowledge that any differences in physical capital intensity and production share between family and non-family firms may have implications for other production factor intensities and shares as well, namely labour. In fact, there is theoretical and empirical evidence demonstrating that family firms utilise labour in the production process differently than non-family firms, and that such labour yields unique contributions to output.

A reduction in capital intensity may compel family firms to increase the utilisation of labour as to meet production demand. Alternatively, family firms may prefer labour in the production process, not because they are deprived of capital, but because for family firms the use of labour may be particularly advantageous. Evidence for such an advantage is consistently found throughout the family business literature.

By assessing the human and organizational resources related to employees, Habbershon and Williams (1999) suggest that family firms manage and socialise their employees better than non-family firms potentially leading to a competitive advantage and improved performance. Such an advantage may be based on findings that family firms have a unique working environment that promotes employee dedication and commitment (Ward, 1988). Other cultural attributes pertaining to employees of family firms include a shared sense of identity, better communication with greater privacy and an emotional involvement among co-workers (Tagiuri & Davis, 1996). Greater employee loyalty and trust would serve to provide the family firm with access to employees who would potentially contribute more to output than otherwise (Bertrand & Schoar, 2006; Rutherford, Oswald, & Raymond, 2005).

In turn, more trusting and loyal employees can be an advantage in transaction cost economizing terms (Williamson, 1996). More specifically, the expense to audit employee performance as well as employee/employer contractual protection costs, such as union representation, may be considerably less for family firms (Ouchi, 1980).

Additional costs associated with labour may also be less for family firms relative to their non-family counterparts. For example, although we recognise that agency costs for family firms are greater than zero[4], based on recent evidence provided by Chrisman, Chua and Litz (2004), family involvement has been found to decreases *overall* agency problems. Empirically, lower agency costs in family firms have been shown by Moskowitz and Levering (1993) who find that family firms have lower recruitment costs, lower human resource costs, and are said to be more effective than other companies in labour intensive businesses. Further labour cost savings can be realised as family

[4] If both principal and agent have the same interests, then there is no conflict of interest and no 'agency problem'(Berle & Means, 1932; Ross, 1973); thus by virtue of their intra-familial altruistic element, family firms should be exempt from problems of agency (Becker, 1974; Daily & Dollinger, 1992; Eisenhardt, 1989; Jensen & Meckling, 1976; Parsons, Orley, & Richard, 1986). However, more recent investigations have looked into other types of agency problems that may be specific to family firms (Chrisman, Chua, & Litz, 2004; Morck & Yeung, 2003).

members employed in the firm usually contribute more unpaid hours than paid employees (Benedict, 1968; Rosenblatt, 1985) and can potentially be paid lower efficiency wages based on a less binding non-shirking condition (De Paola & Scoppa, 2009).

In addition to less costly labour, family firms may enjoy more flexible labour arrangements. Since family firms encourage informal, adaptive and flexible work practices for their employees (Goffee & Scase, 1985), those employees in turn may provide greater versatility in the production process. More specifically, family firm employees have greater occupational mobility within the firm (Becker, 1974) and many times are trained in all aspects of the business spanning various departments and roles (Aronoff & Ward, 1995; Fiegener, Brown, Prince, & Marie File, 1996). This attention to training develops through a lifetime of learning experiences inside the business leading to greater firm-specific employee knowledge, skills and capabilities; a phenomenon which may not occur in non-family firms. Bhattacharya and Ravikumar (2001) refer to such tacit knowledge as the firm's 'special business skill' and a distinguishing characteristic of a family firms. Such labour resources may be recruited to, or diverted from, specific production tasks with greater ease, further enhancing the flexibility of labour in the production process.

Despite the potential advantages, there are also some limitations on family firm labour. For example, family firms which hire employees who are also members of the family unit face a restricted labour pool from which to obtain qualified and capable talent (Anderson et al., 2003). In addition, it is recognised that there are further limits to family firm labour if family members are hired on the basis of nepotism, birth order, or gender rather than merit (Dyer, 1988).

As the case with capital, and despite the abovementioned differences, the assumption that labour output contributions between family and non-family firms are the same is prevalent in the existing literature. To test this assumption, our second hypothesis is as follows:

> *Hypothesis 2. There is no difference between the output contribution of labour in family and non-family firms.*

The stylised facts presented thus far lead us to an interesting question: *how does family involvement impact the total productivity of the firm?* That is, considering the potential bearing that family involvement may have on input factors such as labour and capital, are there any differences in total factor productivity for family firms? Previous studies have suggested that there are (see Barth et al., 2005; Bosworth & Loundes, 2002; Martikainen et al., 2009; Wall, 1998); however, those studies have assumed fixed labour and capital output contributions for family and non-family firms. Allowing for input heterogeneity, we formulate the following third and final hypothesis:

> *Hypothesis 3. Accounting for different input shares, there is no difference between total factor productivity of family and non-family firms.*

Referring back to previous studies, Hypothesis 3 in its specific form has yet to be addressed in previous studies. If it is rejected, we are also interested in the direction of the difference in productivity between family and non-family firms; thus, secondary to Hypothesis 3 we wish to know if family firms are *more* or *less* productive than non-family firms. As in previous studies, we employ a Cobb-Douglas production function to test these hypotheses, but with the additional specification of varying production factor shares between family and non-family firms. This model and the data used are discussed in the next section(s) of this paper.

METHODOLOGY

A production function expresses the maximum product obtainable from the input combination at the existing state of technical knowledge (Carlson, 1909); thus, in order to test this paper's proposed hypotheses, we respecify the standard Cobb-Douglas production function. Our specification extends beyond what has already been analysed in previous research since we allow for varying factor elasticities, or in other words different output contributions of labour and capital inputs, among family and non-family firms. Since the Cobb-Douglas framework measures output as a function of production inputs, we can observe the effect that family firm influence has in the production process, namely on the output contribution of labour and capital inputs and the total factor productivity of the firm.

It is well established in the economic literature that estimates of the parameters of production functions in cross section analysis are subject to bias resulting from the exclusion of a variable which measures management (Mundlak, 1961). This is mainly due to the difficulty in obtaining such a variable. More recently, it has become apparent that classifying family firms as a specific type of firm can be useful in solving this measurement problem. That said, in all other previous studies investigating family firm productivity using a Cobb-Douglas framework (see Barth et al., 2005; Bosworth & Loundes, 2002; Martikainen et al., 2009; Wall, 1998), the standard log transformed Cobb-Douglas production function has been re-specified to include a *family business* intercept variable, so that

$$(1) \qquad \ln(Y) = \ln(A_j) + \alpha \ln(L) + \beta \ln(K) \qquad (\alpha, \beta) > 0;\ j = 1,2.$$

Where Y is a measure of homogenous total output, L and K are measures of homogenous labour and capital inputs respectively[5] and A, otherwise known as total factor productivity, is a parameter of all qualitative forces which contribute to output yet are not represented in the quantitative measures of labour and capital. As specified in equation (1), total factor productivity differences between family and non-family firm types, denoted by *j*, are accounted for; however, α and β, which represent the computed proportionate share of labour and capital in the total product respectively, are assumed to be fixed for both firm types. Thus, the log transformation of the standard Cobb-Douglas production function for family and non-family firms differ only by the constant A in equation (1). As argued in section 2, fixing factor elasticities omits the impact a family may have on the output contribution of the firm's labour and capital, and could result in biased estimates of the total productivity parameter.

While such an assumption may be appealing when comparing total factor productivity for one firm to the next, it does not shed any light on which qualitative forces are accountable or which inputs, labour or capital, are affected. Further, assuming equal factor elasticities may be particularly problematic since the log transformation form of the Cobb-Douglas model implies that the factor elasticities for both labour and capital represent the percentage change in output with respect to labour (and holding capital constant) or capital (and holding labour constant), or in other words, the output contribution of labour and capital. The consequences of this assumption being violated when using a Cobb-Douglas framework are that actual differences in labour and capital output contribution, if present, are captured and aggregated in the total factor productivity constant[6]; thus the potential to

[5] In their analysis, Cobb and Douglas (1928) investigate production in manufacturing firms and, as a result, land is excluded as a factor of production.

[6] In the log transformed Cobb-Douglas production function, the value of the constant coefficient is independent of Labour and Capital. This assumption has been made to ignore the qualitative effects of any force for which there is no quantitative data. The coefficient is thus made a 'catch-all' for the effects of such forces (Cobb & Douglas, 1928).

find a statistically significant difference in total productivity between family and non-family firms is enhanced when fixing the factor elasticities for both groups (see Zellner, Kmenta, & Dreze, 1966).

To address this problem, we respecify equation (1), so that

$$(2) \qquad \ln(Y) = \ln(A_j) + \alpha_j \ln(L) + \beta_j \ln(K) + \theta X + e \qquad (\alpha, \beta) > 0;\ j=1,2.$$

It can be seen in equation (2) that we allow for heterogeneous labour and capital output contributions among the two types of firms, denoted by *j*. As a result the qualitative differences that one may find when using equation (1) are now permitted to be distributed among α_j and β_j. θX represents a vector of control variables such as the firm's industry and age. It is also important from a methodological standpoint to resolve any simultaneous equation bias that may be present in our sample data by using a two stage least squares, with instruments, regression technique (see Ramsey, 1969)[7].

Estimating the parameters specified in equation (2) allows us to test our proposed hypotheses. For example, Hypothesis 1 and 2 can be tested by observing whether there are any significant differences between family and non-family firms for estimated parameters α and β respectively. Hypothesis 3 can be tested by observing whether there are any significant differences between family and non-family firms for the estimated *A* parameter. The direction of any found differences is also interesting, as a positive (negative) *A* parameter for family firms would indicate an additive (subtractive) difference in total factor productivity specifically for family firms relative to their non-family firm counterparts, considering different capital and labour output contributions. To perform such tests, we must first have a reliable data source, which is discussed next.

Data and Sample

The Australian Bureau of Statistics' '*Business Longitudinal Survey*' (BLS) was designed to provide information on the growth and performance of privately held Australian small and medium-sized enterprises (SME), i.e. less than 200 employees. The BLS is the longitudinal component of several waves of the '*Business Growth and Performance Survey*'. As such, the structure of the data includes not only a cross-sectional component, but also a longitudinal aspect for the years 1994-95 to 1997-98 inclusive[8]. The BLS has the potential to inform many areas of research, including industrial relations, business, finance and economics (Hawke, 2000); however, for the purpose of our analysis, and the neo-classical theory of production, some narrowing of the data was required.

For example, based on the standard Cobb-Douglas production function, only those firms which reported positive values for our measures of output and inputs were included. Furthermore, to test our results over time, and to eliminate any selection or attrition bias, this study is exclusively focused on production output and inputs for those firms which participated in each year of the study. Consequently, firms which did not participate in each wave of the BLS, from 1994 to 1998, were

[7] An important consideration is the simultaneous equation bias that may arise when specifying management variables in the production function (see Hoch, 1958). In the case of the added family firm variable, we may find that productivity depends on whether the firm is a family firm as well as whether the firm is a family firm depends on productivity. For example, whether a firm remains in the control, management and ownership of the family may be endogenously determined by the performance of the firm. Poorly performing family firms may resort to outside management as a potential remedy and, on the other hand, families may be less inclined to relinquish ownership, management or control of a highly performing firm (Demsetz & Lehn, 1985; Demsetz & Villalonga, 2001). If correlations between the error term and independent variables exist, coefficient estimates of equation (1) and (2) may end up being biased and therefore inconsistent, since it is assumed that independent variables are in fact independent or exogenous.

[8] The BLS samples were drawn from the ABS Business Register, with 8745 business units being selected for inclusion in the 1994–95 survey. For the 1995–96 survey, 4948 of the original selections for the 1994–95 survey were selected, and this was supplemented by 572 new business units added to the ABS Business Register during 1995–96. The sample for the 1996–97 survey included 4541 businesses which were previously sampled, and an additional sample of 529 new businesses from the 1995–96 interrogation of the Business Register, and 551 new businesses from the 1996–97 interrogation of the Business Register.

excluded. This treatment has reduced our sample to 3364 firms per year. The sub-sample, classified by industry and year, can be seen in Table 1 below.

Insert Table 1 about here

Most importantly, for the purpose of this study, the BLS includes information on the degree of family involvement in each of the firms included in our sample, which, along with other relevant variables, is discussed further in the next section.

Variable Treatment

Referring to equation (2), where Y is a measure of total physical output, and considering that the BLS does not offer data on 'output' per se, an index number for value added (VA) is constructed and used as a proxy for total output. Such an index follows Kenneth Arrow's (1974) generally accepted 'real value added' measure and is constructed by taking sales plus the change in inventories less purchases of intermediate inputs and other operating expenses. Although from a purely theoretical standpoint we would rather use actual output, in terms of number of units produced, the value added index allows us to analyse those firms which do not necessarily have a tangible output, such as the case of services rendered. Furthermore, the value added index has been found to accurately measure the dependent variable in the production function that explains value added in terms of the tangible and intangible primary factors, like labour and capital, and as such the function is independent of non-primary inputs (see Sato, 1976).

Similar to our treatment of the dependent variable, the independent variables specified in equation (2) deviate slightly from the theoretical notion of primary production inputs in the sense that they are derived from the BLS data. Table 2 outlines our proxies and operationalization of the dependent and independent variables using the BLS data.

Insert Table 2 about here

In order to determine the interaction between family involvement and a firm's production inputs, we first need a measure for family involvement. The BLS data offers unique information in this regard since the following questions, asked of all businesses which participated, were included in the survey.

1. *Do you consider the business to be a family business? Yes/No*

2. *If yes, why do you consider this a family business? Family member are:*

   i. *Working directors or proprietors. Yes/No*
   ii. *Employed in the business. Yes/No*
   iii. *Not working, but contribute to decisions. Yes/No*
   iv. *Business acquired from parents. Yes/No*
   v. *Close working relationship between management and staff. Yes/No*
   vi. *Other. Yes/No*

Based on the question listed above, a family firm is defined as those who answered 'yes' to question 1. Furthermore, considering one's business as a family firm could be due to one or more of the reasons listed under question 2. It is important to note that the options listed under question 2 are not mutually exclusive of one another and thus identifying different 'types' of family firms within these

options does not offer any practical classifications[9]; thus, for the purpose of our analysis and given equation (2), we only consider the overarching question 1 and, based on a standard Hausman test, use elements of question 2 as instrument variables in our econometric analysis as to control for simultaneous equation bias.

Using the variables outlined above, we now proceed to estimate our model specified in Section 3, the results of which are discussed next.

EMPIRICAL RESULTS

It can be seen in equation (2) that we allow for heterogeneous inputs for both family and non-family firms, which is the main difference between our analysis and what has already been estimated in previous research. As mentioned, we also control for firm industry and age. In this section, the empirical results for each of our stated hypotheses are presented.

As a first step, and replicating what has already been analysed in the literature (see Barth et al., 2005; Bosworth & Loundes, 2002; Martikainen et al., 2009; Wall, 1998), we estimate the coefficients for equation (1), which assumes homogeneous output contributions of labour and capital, and accounts for management bias in a family business intercept dummy alone. These results are listed in Table 3.

Insert Table 3 about here

Consistent with Barth (2005), Bosworth & Loundes (2002) and Wall (1998), we find that family firms are significantly less productive, from a total factor productivity standpoint, than non-family firms. This productivity gap is identified as the *Family firm* intercept in Table 3 and ranges from as little as 11 percent in 1997 to nearly 14 percent in 1998. Also consistent with previous findings, this gap is enlarged once endogeneity problems are addressed using the two-stage least squares technique (seen in the right column).

The problem with the above analysis is that the labour and capital production inputs are assumed to yield the same output contributions for both firm types. As this paper has argued, such an assumption ignores the influence that the family may have on its labour and capital inputs. In fact, we have yet to establish whether this total factor productivity gap remains once we account for heterogeneous production inputs between family and non-family firms. To test this and our remaining hypotheses, we estimate equation (2), the results of which are listed in Table 4. Both the ordinary least squares (left column) as well as a two stage least squares estimates (right column) are presented.

Insert Table 4 about here

Based on the results listed in Table 4, we find that differences in the output contribution of family firm capital (denoted as *ln Family Capital*) are significant relative to their non-family counterparts. As a semi-log, the negative coefficient indicates that family capital contributes less to output than non-family firm capital by the order of 2 to 8 percent, depending on time period and estimation technique. This estimate can be interpreted as for all capital utilised, family firm capital contributes *less* to total output than the benchmark non-family firm capital (denoted as *ln Capital*). This finding refutes Hypothesis 1. Furthermore, this relationship is consistent throughout time with the exception

[9] Of all family firms responding to question 2, 34.91 percent selected *i* only; 27.45 percent selected both *i* and *ii*; 11.79 percent selected *i*, *ii* and *v*; 4.39 percent selected *i* and *v*; 3.18 percent selected *i*, *ii*, *iv* and *v*; and 3.18 percent selected *i*, *ii* and *iv*. Based on this, and out of 64 possible permutations, nearly 95 percent of all family firms at least selected *i*, which is understandable since we would expect small to medium sized family firms to have a more operational classification; however, not excluding these, approximately 37 percent also selected *iv* and *v*.

of 1997 in the two stage least squares technique. Despite this, the coefficient is still negative and it is worth noting that the ordinary least squares technique estimates a significant and negative coefficient for family firm capital in 1997.

Also apparent in Table 4 is the positive and consistent interaction between family firms and labour employed in the production process. Depending on the time period and estimation technique, we find differences in the output contribution of family firm labour (denoted as *ln Family Labour*) are significant in that it is greater than the output contribution of non-family firm labour; this difference ranges from as little as 6 percent to as large as 15 percent. This estimate can be interpreted as for all labour employed, family firm labour contributes *more* to total output than the benchmark non-family firm labour (denoted as *ln Labour*). This result refutes Hypothesis 2 and is consistent across all time periods and remains after correcting for potential simultaneous equation bias.

Moving on to Hypothesis 3, interestingly, the intercept representing family firm total factor productivity differences (denoted as *Family Firm*) has become statistically insignificant once heterogeneous inputs are specified in the Cobb-Douglas production function. That is, family firm labour and capital are found to yield significantly different output contributions and, once accounting for these differences, total factor productivity differences disappear. In this sense, Hypothesis 3 is confirmed in that there are no unquantifiable productivity differences between family and non-family firms once heterogeneous inputs have been considered. This leads us to believe that previous investigations suffer from omitted variable bias in that they do not consider the family differences in output elasticity of labour and capital.

CONCLUSION

Despite numerous investigations into the impact of firm ownership on performance, very little analysis has focused specifically on the firm's productivity; even less research has been dedicated to studying the impact of family involvement on productivity. Those few studies which have tackled the issue unfortunately fail to reach a consensus as to the direction of the relationship. Different time periods and estimation techniques contribute to the dilemma; however, the curious assumption of homogeneous output contribution of production inputs for both family and non-family firms has consistently been made in examinations which estimate total factor productivity via a Cobb-Douglas production function. This assumption, as argued in this paper, is perhaps missing family firm differences in the efficient use of labour and capital and may lead to omission bias.

Although a review of the family business literature reveals that family involvement does impact the output contribution of labour and capital, the evidence is primarily anecdotal. In this paper, we have linked this evidence to the theoretical notion of heterogeneous production factors for family firms and empirically show that family labour and capital are indeed diverse in that they yield significantly different output contributions to the firm; to our knowledge, this is the first study which disaggregates the labour and capital components of the production function in this manner.

In particular, we have found that family firm labour contributes significantly more, and family capital significantly less, to output than comparable non-family firms. We attribute these differences to the unique impact that family involvement has on its production inputs. We have also found that these effects, in terms of labour contribution, weaken as the firm gets larger. Contrary to previous studies, this study has shown that once we account for heterogeneous production inputs all previously found unquantifiable differences in total factor productivity disappear. This result leads us to believe that previously found qualitative productivity differences between family and non-family firms can be better explained by attributing those differences to the output contributions embodied in the firm's heterogeneous production factors.

Despite offering a theoretical explanation for different output contributions between family and non-family firms based on the relatively contemporary family business research, it is important to note that the production function technique merely estimates the presence of the phenomenon and does not offer any insight into the definitive cause(s) of the found relationships. Future research would preferably explore these causes in greater depth. As this study has investigated the impact of family involvement on Australian SMEs from 1995 to 1998, we cannot claim to have definitively established whether family firms are more or less productive than non-family firms; however, we can claim that the assumption of homogeneous labour and capital shares between family and non-family firms is inappropriate. Moreover, based on the unique characteristics of family firms, heterogeneous production inputs do matter empirically. Therefore, if we account for the role for family involvement and allow for unequal factor elasticities, perhaps we could better understand the differences in production strategy, planning and other important productivity drivers between family and non-family firms. These results hopefully shed further light on the unique attributes of family firms and bring us closer to understanding the specific economic impact family involvement may have on a firm level.

REFERENCES

Agrawal, A. & Nagarajan, N. J. 1990. Corporate Capital Structure, Agency Costs, and Ownership Control: The Case of All-Equity Firms. ***American Finance Association, Journal of Finance***, 45(4): 1325-1331.

Anderson, R. C., Mansi, S. A., & Reeb, D. M. 2003. Founding family ownership and the agency cost of debt. ***Journal of Financial Economics***, 68(2): 263-285.

Anderson, R. C. & Reeb, D. M. 2003. Founding-Family Ownership and Firm Performance: Evidence from the S&P 500. ***Journal of Finance***, 58(3): 1301-1328.

Aronoff, C. E. & Ward, J. L. 1995. Family-Owned Businesses: A Thing of the Past or a Model for the Future? ***Family Business Review***, 8(2): 121-130.

Arrow, K. J. 1974. ***The Measurement of Real Value Added***. New York, NY: Academic Press.

Barth, E., Gulbrandsen, T., & Schønea, P. 2005. Family ownership and productivity: the role of owner-management. ***Journal of Corporate Finance***, 11(1-2): 107-127.

Becker, G. S. 1974. A Theory of Social Interactions. ***Journal of Political Economy***, 82(1): 1063–1093.

Benedict, B. 1968. Family Firms and Economic Development ***Southwestern Journal of Anthropology***, 24(1): 1-19

Berle, A. & Means, G. 1932. ***The Modern Corporation and Private Property***. New York, NY: Harcourt, Brace, & World.

Bertrand, M. & Schoar, A. 2006. The Role of Family in Family Firms. ***The Journal of Economic Perspectives***, 20(2): 73-96.

Bhattacharya, U. & Ravikumar, B. 2001. Capital Markets and the Evolution of Family Businesses. ***The Journal of Business***, 74(2): 187-219.

Bosworth, D. & Loundes, J. 2002. The Dynamic Performance of Australian Enterprises. ***Melbourne Institute of Applied Economic and Social Research, The University of Melbourne*** (Melbourne Institute Working Paper Series).

Carlson, S. 1909. ***A study on the pure theory of production*** New York, NY: Kelley & Millman, Inc.

Chrisman, J. J., Chua, J., H. , & Litz, R., A. . 2004. Comparing the Agency Costs of Family and Non-Family Firms: Conceptual Issues and Exploratory Evidence. ***Entrepreneurship Theory and Practice***, 28(4): 335-354.

Claessens, S. & et al. 2002. Disentangling the Incentive and Entrenchment Effects of Large Shareholdings. ***Journal of Finance***, 57(6): 2741-2771.

Cobb, C. W. & Douglas, P. H. 1928. A Theory of Production. ***The American Economic Review***, 18(1): 139-165.

Daily, C. M. & Dollinger, M. J. 1992. An Empirical Examination of Ownership Structure in Family and Professionally Managed Firms. ***Family Business Review***, 5(2): 117-136.

De Paola, M. & Scoppa, V. 2009. The Role of Family Ties in the Labour Market. An Interpretation Based on Efficiency Wage Theory. ***Review of Labour Economics and Industrial Relations***, 15(4): 603-624.

DeAngelo, H. & DeAngelo, L. 2000. Controlling stockholders and the disciplinary role of corporate payout policy: a study of the Times Mirror Company. ***Journal of Financial Economics***, 56(2): 153-207.

Demsetz, H. 1983. The Structure of Ownership and the Theory of the Firm. ***Journal of Law and Economics***, 26(2): 375-390.

Demsetz, H. & Lehn, K. 1985. The Structure of Corporate Ownership: Causes and Consequences. ***The Journal of Political Economy***, 93(6): 1155-1177.

Demsetz, H. & Villalonga, B. 2001. Ownership structure and corporate performance. ***Journal of Corporate Finance***, 7(3): 209-233.

Dreux, D. R. I. V. 1990. Financing Family Business: Alternatives to Selling Out or Going Public. ***Family Business Review***, 3(3): 225-243.

Dyer, W. G. 1988. Culture and Continuity in Family Firms. ***Family Business Review***, 1(1): 37-50.

Eisenhardt, K. M. 1989. Agency Theory: An Assessment and Review. ***Academy of Management Review***, 14(1): 57-74.

Fama, E. F. & Jensen, M. C. 1983. Separation of Ownership and Control. ***Journal of Law and Economics***, 26(2): 301-325.

Fiegener, M. K., Brown, B. M., Prince, R. A., & Marie File, K. 1996. Passing on Strategic Vision: Favored Modes of Successor Preparation by CEOs of Family and Nonfamily Firms. ***Journal of Small Business Management***, 34(1): 15-26.

Gallo, M. A. & Vilaseca, A. 1996. Finance in Family Business. ***Family Business Review***, 9(4): 387-401.

Goffee, R. & Scase, R. 1985. Proprietorial control in family firms: some functions of 'quasi-organic' management systems. ***Journal of Management Studies***, 22(1): 53-68.

Gómez-Mejía, L. R., Takács Haynes, K., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. 2007. Socioemotional Wealth and Business Risks in Family-controlled Firms: Evidence from Spanish Olive Oil Mills. ***Administrative Science Quarterly***, 52(1): 106-137.

Habbershon, T. G. & Williams, M. L. 1999. A Resource-Based Framework for Assessing the Strategic Advantages of Family Firms. ***Family Business Review***, 12(1): 1-25.

Harris, D., Martinez, J. I., & Ward, J. L. 1994. Is Strategy Different for the Family-Owned Business? ***Family Business Review***, 7(2): 159-174.

Hawke, A. 2000. The Business Longitudinal Survey. ***The Australian Economic Review***, 33(1): 94-99.

Hoch, I. 1958. Simultaneous Equation Bias in the Context of the Cobb-Douglas Production Function. ***Econometrica***, 26(4): 566-578.

Hoopes, D. G. & Miller, D. 2006. Ownership Preferences, Competitive Heterogeneity, and Family-Controlled Businesses. ***Family Business Review***, 19(2): 89-101.

Jensen, M. C. & Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. ***Journal of Financial Economics***, 3(4): 305-360.

Kirchhoff, B. A. & Kirchhoff, J. J. 1987. Family Contributions to Productivity and Profitability in Small Businesses. ***Journal of Small Business Management***, 25(4): 25-31.

Lee, J. 2006. Family Firm Performance: Further Evidence. ***Family Business Review***, 19(2): 103-114.

Martikainen, M., Nikkinen, J., & Vähämaa, S. 2009. Production functions and productivity of family firms: Evidence from the S&P 500. ***The Quarterly Review of Economics and Finance***, 49(2): 295-307.

McConaughy, D. L., Walker, M. C., Henderson, G. V., & Mishra, C. S. 1998. Founding family controlled firms: Efficiency and value. ***Review of Financial Economics***, 7(1): 1-19.

McMahon, R. G. P. & Stanger, A. M. J. 1995. Understanding the Small Enterprise Financial Objective Function. ***Entrepreneurship: Theory and Practice***, 19(4): 21-39.

Miller, D., Le Breton-Miller, I., Lester, R. H., & Cannella Jr., A. A. 2007. Are family firms really superior performers? ***Journal of Corporate Finance***, 13(5): 829-858.

Morck, R., Shleifer, A., & Vishny, R. W. 1988. Management ownership and market valuation: An empirical analysis. ***Journal of Financial Economics***, 20: 293-315.

Morck, R. & Yeung, B. 2003. Agency Problems in Large Family Business Groups. ***Entrepreneurship: Theory & Practice***, 27(4): 367-382.

Morck, R. K., Stangeland, D. A., & Yeung, B. 2000. ***Inherited Wealth, Corporate Control and Economic Growth: The Canadian Disease?*** Chicago, IL: University of Chicago Press.

Moskowitz, M. & Levering, R. 1993. The ten best companies to work for in America. ***Business and Society Review***, 85(1): 26-38.

Mundlak, Y. 1961. Empirical Production Function Free of Management Bias. ***Journal of Farm Economics***, 43(1): 44-56.

Nelly, R. & Rodríguez, T. 2008. ***Strategic Planning and Organizational Integrity in Family Firms: Drivers for Successful Postintegration Outcomes in M&A Procedures***. Charlotte, NC: Information Age Publishing Inc.

Ouchi, W. G. 1980. Markets, Bureaucracies, and Clans. ***Administrative Science Quarterly***, 25(1): 129-141.

Palia, D. & Lichtenberg, F. 1999. Managerial ownership and firm performance: A re-examination using productivity measurement. ***Journal of Corporate Finance***, 5(4): 323-339.

Parsons, D. O., Orley, C. A., & Richard, L. 1986. ***Handbook of Labor Economics***. Columbus, OH: Elsevier.

Penrose, E. 1959. ***The Theory of the Growth of the Firm***. New York, NY: John Wiley and Sons.

Ramsey, J. B. 1969. Tests for Specification Errors in Classical Linear Least-Squares Regression Analysis. ***Journal of the Royal Statistical Society. Series B (Methodological)***, 31(2): 350-371.

Rosenblatt, P. C. 1985. ***The Family in business***. San Francisco, CA: Jossey-Bass.

Ross, S. A. 1973. The Economic Theory of Agency: The Principal's Problem. ***American Economic Review***, 63(2): 134-139.

Rutherford, M., Oswald, S., & Raymond, J. 2005. Commitment to Employees: Does It Help or Hinder Small Business Performance? ***Small Business Economics***, 24(2): 97-111.

Sato, K. 1976. The Meaning and Measurement of the Real Value Added Index. ***The Review of Economics and Statistics***, 58(4): 434-442.

Sciascia, S. & Mazzola, P. 2008. Family Involvement in Ownership and Management: Exploring Nonlinear Effects on Performance. ***Family Business Review***, 21(4): 331-345.

Shleifer, A. & Vishny, R. W. 1997. A Survey of Corporate Governance. ***Journal of Finance***, 52(2): 737-783.

Stulz, R. 1988. Managerial control of voting rights: Financing policies and the market for corporate control. ***Journal of Financial Economics***, 20: 25-54.

Tagiuri, R. & Davis, J. 1996. Bivalent Attributes of the Family Firm. ***Family Business Review***, 9(2): 199-208.

Villalonga, B. & Amit, R. 2006. How do family ownership, control and management affect firm value? ***Journal of Financial Economics***, 80(2): 385-417.

Wall, R. A. 1998. An empirical investigation of the production function of the family firm. ***Journal of Small Business Management***, 36(2): 24-32.

Ward, J. L. 1988. The Special Role of Strategic Planning for Family Businesses. ***Family Business Review***, 1(2): 105-117.

Williamson, O. E. 1996. Transaction cost economics and the Carnegie connection. ***Journal of Economic Behavior & Organization***, 31(2): 149-155.

Zahra, S. A. 2005. Entrepreneurial Risk Taking in Family Firms. ***Family Business Review***, 18(1): 23-40.

Zellner, A., Kmenta, J., & Dreze, J. 1966. Specification and Estimation of Cobb-Douglas Production Function Models. ***Econometrica***, 34(4): 784-795.

Zellweger, T. 2007. Time Horizon, Costs of Equity Capital, and Generic Investment Strategies of Firms. ***Family Business Review***, 20(1): 1-15.

TABLE 1
BLS Data Sub-Sample

BLS defined industry	firms in 1994-95 sub-sample	firms in 1995-96 sub-sample	firms in 1996-97 sub-sample	firms in 1997-98 sub-sample	Average proportions by industry from 95-98	family firms in sub-sample	Average proportion of family firms from 95-98
Mining	27	26	26	27	0.79%	7	24.53%
Manufacturing	1372	1374	1369	1358	40.67%	735	53.72%
Construction	185	189	190	190	5.60%	138	73.08%
Wholesale Trade	564	561	562	565	16.74%	296	52.53%
Retail Trade	348	353	354	353	10.46%	215	61.15%
Accommodation, Cafes & Restaurants	120	120	121	123	3.60%	59	48.55%
Transport & Storage	126	124	123	123	3.69%	72	57.86%
Finance & Insurance	65	66	67	69	1.98%	35	52.43%
Property & Business Services	429	424	425	428	12.68%	149	34.94%
Cultural & Recreational Services	61	61	61	61	1.81%	16	26.23%
Personal & Other Services	67	66	66	67	1.98%	37	56.02%
Total	**3364**	**3364**	**3364**	**3364**	**100.00%**	**1758**	**52.26%**

TABLE 2
BLS Proxies for Dependent and Independent Variables

Concept	*Proxy variable*	*Operationalization*[a]
Production output	Value added	$VA_{i,t}$ = $Sales_{i,t}$ + Closing $inventory_{i,t}$ – Opening $inventory_{i,t}$ – $Purchases_{i,t}$.
Labour input	Full-time equivalent employees	$FTE_{i,t}$ = Full-time $employees_{i,t}$ + Part-time $employees_{i,t}$* Equivalent $ratio_{t.}$[b].
Capital input	Total assets	$Capital_{i,t}$ = Total $liabilities_{i,t}$ + Total $equity_{i,t}$.
Family business	Structure and essence based definition	*Do you consider the business to be a family business?* Yes = 1; No = 0
Capital intensity	Capital to Labour ratio	$K/L_{i,t}$ = Capital $input_{i,t}$/Labour $input_{i,t}$

[a] *i* denotes an individual firm in time period *t.*

[b] The equivalent ratio is simply calculated as average part-time hours per week divided by average full-time hours per week for all non-managerial employees. This information is sourced from the Australian Bureau of Statistics' '*Employee Earnings and Hours, Australia*' report as of 1998, as well as the previously known '*Earnings and Hours of Employees, Distribution and Composition, Australia*' report.

TABLE 3
Family Firm Production Technology with Homogeneous Inputs

	Equation 1 (OLS)				Equation 1 (2SLS)			
	1995	**1996**	**1997**	**1998**	**1995**	**1996**	**1997**	**1998**
Intercept	2.796***	2.668***	2.723***	2.719***	2.795***	2.672***	2.722***	2.721***
Family firm	-0.124***	-0.128***	-0.114***	-0.139***	-0.123***	-0.132***	-0.113***	-0.141***
ln Labour	0.709***	0.678***	0.649***	0.629***	0.709***	0.678***	0.649***	0.629***
ln Capital	0.329***	0.364***	0.370***	0.383***	0.328***	0.364***	0.370***	0.382***
R^2	0.854	0.873	0.863	0.871	0.854	0.873	0.863	0.871
R^2 adj	0.854	0.873	0.862	0.871	0.854	0.873	0.862	0.871
N	3364	3364	3364	3364	3364	3364	3364	3364

Equation (1) is specified as $\ln(Y) = \ln(A_j) + \alpha\ln(L) + \beta\ln(K)$.Where j=1,2 (family or non-family firm). A_j (labelled *Family Firm*) measures the difference between family firm and non-family firm total factor productivity and thus indicates whether family firms are more or less productive. Both an ordinary least squares (left column) as well as a two-staged least squares (right column) technique was implemented. Instrument variable for *Family Firm* is question 2, subsection *i* of the BLS. Level of significance: ***1%; **5%; *10%.

TABLE 4
Family Firm Production Technology with Heterogeneous Inputs

	Equation 2 (OLS)				Equation 2 (2SLS)			
	1995	**1996**	**1997**	**1998**	**1995**	**1996**	**1997**	**1998**
Intercept	2.557***	2.343***	2.602***	2.583***	2.557***	2.362***	2.637***	2.614***
Family firm	0.019	0.012	-0.061	0.022	0.019	-0.024	-0.128	-0.039
ln Labour	0.757***	0.798***	0.835***	0.681***	0.753***	0.802***	0.843***	0.689***
ln Capital	0.308***	0.343***	0.281***	0.347***	0.309***	0.339***	0.274***	0.339***
ln Family Labour	0.141***	0.108***	0.077***	0.083***	0.152***	0.100***	0.062**	0.064***
ln Family Capital	-0.075***	-0.059***	-0.035**	-0.051***	-0.079***	-0.051***	-0.019	-0.035**
R^2	0.866	0.885	0.878	0.884	0.866	0.885	0.878	0.884
R^2 adj	0.865	0.884	0.877	0.883	0.865	0.884	0.877	0.883
N	3364	3364	3364	3364	3364	3364	3364	3364

Equation (2) is specified as $\ln(Y) = \ln(A_j) + \alpha_i\ln(L) + \beta_j\ln(K)$. Where j = 1,2. Estimates of A_j (labelled Family Firm) for family firms measure the difference between family and non-family firms from a total factor productivity point of view and estimates of α_j (labelled Family Labour) and β_j (labelled Family Capital) measure the output contribution differences of family labour and capital respectively. Dummy intercept and slope variables were also included to control for firm industry and age; the results of which are not mentioned in Table 4 in the interest of brevity. Both an ordinary least squares (left column) as well as a two-staged least squares (right column) technique was implemented. Instrument variable for *Family Firm* is question 2, subsection *i* of the BLS. Level of significance: ***1%; **5%; *10%.