Firm specificity, cash flow and investment among Japanese firms: Evidence from the lost decades

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Abstract: In this paper we examine whether cash flow enhancing activity, such as greater reliance on temporary employees since the 1990's in Japan, has had a positive impact on investment. Ex ante the impact is ambiguous since greater utilization of temporary workers might enhance cash flow, but might also reduce viability of firm-specific investment. Research in labour economics has long suggested that reliance on temporary employees might act as an impediment to intangible investment (Hashimoto, 1981). Changes in the Japanese labour market create an opportunity to distinguish whether greater reliance on temporary employment has acted to enhance investment, as in the cash flow investment literature, or to hinder it as in the firm specific human capital literature. Our findings are consistent with the latter view.

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Introduction

The issue of investment-cash flow constraints has been studied since the paper by Fazzari, Hubbard and Petersen (1988). The argument is that financially constrained firms (defined variously) must rely more heavily on cash in order to undertake investment. This is an information asymmetry argument, as in Meyers and Maijuf (1984), whereby 'constrained firms' may be forced to finance investment from cash flow or cash stock. Indeed, it is increasingly argued that cash flow-investment sensitivity has declined over time as information asymmetry has declined (Chen and Chen, 2012). Others argue that cash flow-investment sensitivity may still be prevalent but difficult to measure as intangible investment has grown relative to more traditional capital expenditure (Almeida and Campello, 2007; Zhu, et al, 2014).

The alternative view, explored here, is that intangible investment, such as R&D expenditure, is typically firm specific in nature, and therefore incompatible with some cash flow enhancing activities such as greater reliance on temporary employees (Williamson, 1979, 1984). Unlike many previous studies, our Japanese data set includes information on traditional capital expenditure and R&D investment as separate items. An example of this alternative view is Gary Becker's (1962) seminal paper on investment in human capital and its numerous extensions. Hashimoto (1981) explored both theoretically and empirically the issue of investment in firm-specific human capital as a 'shared investment' by the firm and its employees resulting in the creation of firm-specific assets. Viewed this way, firms that invest heavily in R&D would be constrained in their ability to increase cash flow through utilization of temporary employees. That is, separations become costly to both the firm and employee when human capital is more firm specific. Indeed, in such a case there would be a *negative* relationship between intangible (R&D) investment and utilization of (cash flow enhancing) temporary employees.

We can therefore distinguish between two alternative and exclusive hypotheses with respect to investment tangibility and investment-cash flow sensitivity with respect to the cash flow enhancing utilization of temporary employees. One hypothesis is that R&D expenditure, being more firm specific and intangible, should exhibit greater positive sensitivity to temporary employees who presumably alleviate financial constraints among research intensive firms (Brown and Peterson, 2009). The alternative hypothesis, especially as related to Japan during the high growth period and possibly beyond, is based in the literature on firm specific human capital investment (Okimoto and

Saxonhouse, 2010; Hashimoto, 1981; Lee and O'neil, 2003). That is, firms that engage in a higher degree of R&D investment will also tend to hire employees with whom they have shared human capital investment. While increasing the use of temporary employees would, all else equal, help to relieve financial constraints for these firms, the firm specific nature of R&D investment will generally dictate a greater reliance on permanent employees (see also Williamson, 1985).

Japan over the 'lost decades' represents an excellent opportunity to examine these two alternative hypotheses: that greater R&D investment will be enhanced by higher utilization of temporary employees (the cash flow-investment hypothesis) or that such investment will be negatively related to greater reliance on temporary employees (the firm specific human capital hypothesis). The outcome will be interesting given the fundamental changes in the Japanese labour market during the low growth period of the past 25 years, a period during which reliance upon temporary employees has grown dramatically (see Figure 1).

On first examination of the data, one might conclude that the investment-cash flow sensitivity hypothesis is correct with respect to idiosyncratic investment such as R&D during the 'lost decades.' After all, the ratio of R&D expenditure to sales has been on an increasing trend since the collapse of the bubble economy to the present, as has utilization of temporary employment since the late 1990's (see Figure 2). On the other hand, investment in plant and equipment (Capex) steadily fell from 1990 until 2003, with some recovery thereafter (see Figure 3). However, after we control for industry and firm level fixed effects, we find that R&D investment is negatively related to utilization of temporary employment, while the relationship between Capex and temporary employment is statistically nugatory.

Data and empirical model

The data set includes 3145 Japanese firms for the period 1990-2008 that are registered and present financial filings to the Treasury Ministry through the *Yuka shoken houkokusho* with market capitalization of over 500 billion yen. Due to the market capitalization cut-off in the dataset, some firms are added to the sample during the period, so observations would not be available for such firms for the entire period. Furthermore, a small number of firms would also become insolvent during the period. Total observations read are much greater than observations used for two reasons: the data base used to calculate variants of Q for our sample is much larger than that for the sample of firm-years, and our estimates are based on firms for which all variables are available or

can be calculated.

In order to distinguish empirically between the alternative hypotheses of cash flow enhancing labor market activity giving rise to greater investment (investment-cash flow sensitivity approach) and the firm-specific human capital approach, we model investment (both capital expenditure and R&D separately) as:

(1) Investment/sales=a+b(Q)+c(GDP growth)+d(Temp/Employment)+e(size)+f(industry)+error

The simple empirical model has investment as a function of 'observable' firm quality, firm size, and industry fixed effects. Temp/Employment is the ratio of temporary employees to total, size was measured alternatively as either assets or sales, and industry is based on Japanese ticker classification. Several alternative proxies for Q and its lag were used, all essentially variants of market to book value and incremental values thereof with no change in fundamental results. GDP growth is also included in order to capture macroeconomic impact on the dependent variable as well as that on cash flow enhancing activity. We therefore expect multicollinearity between GDP growth and the (Temp/Employment) variable.

Results and conclusions

As we can see in Table 1, our findings are consistent with the notion that greater reliance on temporary employment is associated with lower firm specific (R&D) investments. Rather than cash flow enhancing activity in terms of greater use of temporary employees boosting investment in firm specific investment (R&D), we find that such investment is negatively related to the temporary employee ratio. The relationship is negative and significant. The relationship between capital investment and utilization of temporary employees is also negative, but insignificant. Indeed, consistent with many previous studies, capital expenditure is not well behaved with respect to any of the explanatory variables.

Therefore, we find no evidence for the hypothesis that cash flow enhancing activity such as greater utilization of temporary employment has positive impact on investment, for both capital expenditure and R&D. We do find that idiosyncratic firm specific investment such as R&D is negatively related to greater utilization of temporary employment. The result is consistent with the finding that investment in firm-specific human capital remains a shared investment in Japan,

meaning such investment is enhanced in an environment with more permanent employment, despite other changes that may have occurred in the labour market since the 1990's.

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Figure 1

Ratio of temporary to total employment in Japan

The ratio is calculated as temporary labor to permanent employees at each firm for both listed and unlisted registered firms in Japan between 1991 and 2009.

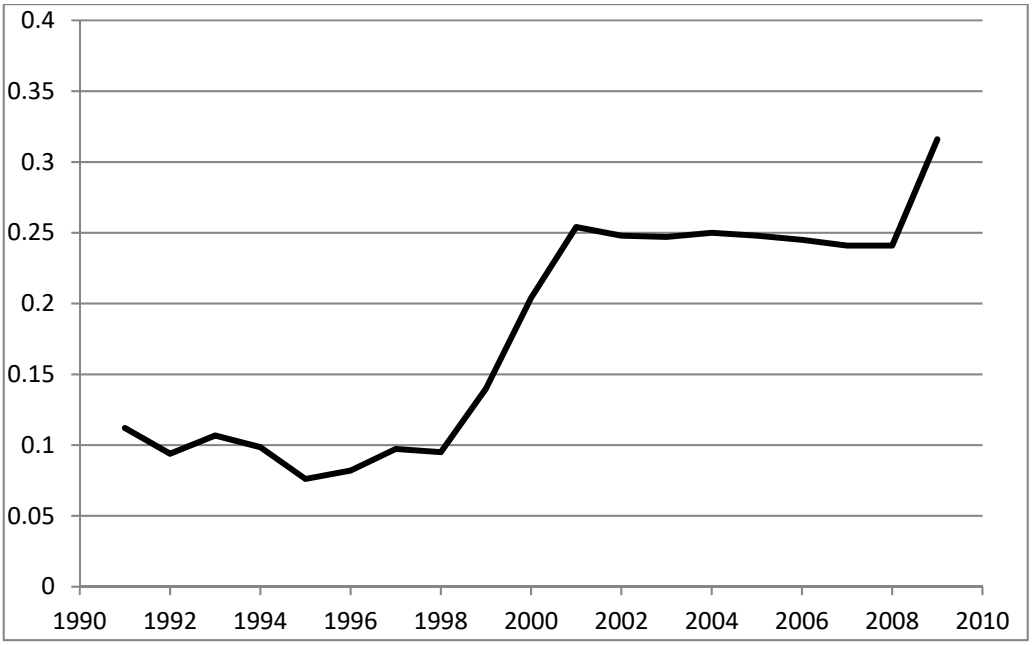

Figure 2

Ratio of R&D expenditure to sales in Japan

Ratio of R&D expenditure to sales for both listed and unlisted registered firms in Japan between 1990 and 2009

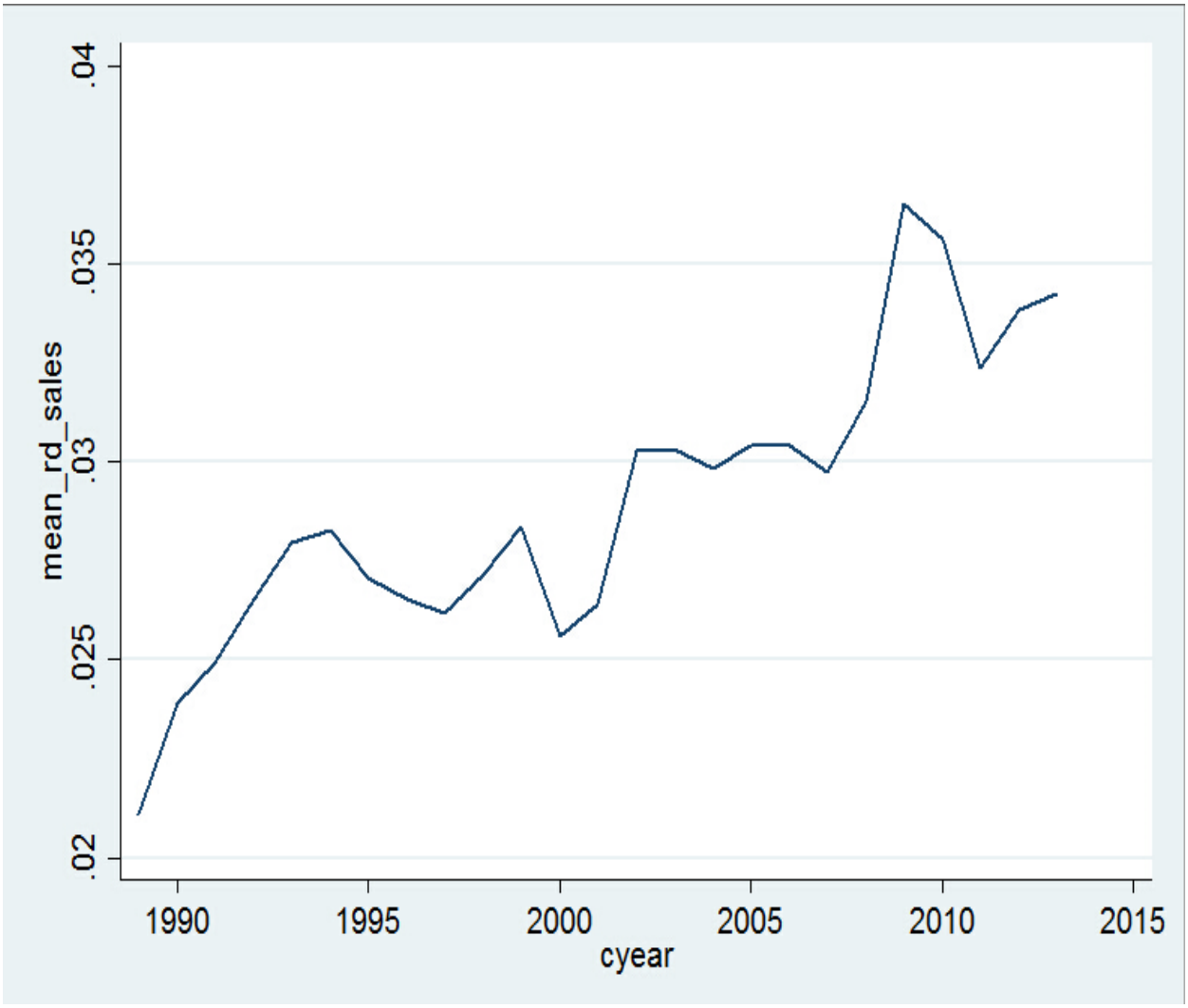

Figure 3

Ratio of capital expenditure to sales for both listed and unlisted registered firms in Japan between 1990 and 2009

Table 1

Research and development expenditure

The dependent variable is R&D/Sales. Temporary employment is defined as the workforce that is not permanent and is scaled by total employment. Size is the value of assets in billions of yen. Industry is defined on the basis of two digit Japanese industry codes. Standard errors are heteroscedasticity consistent.

Variable	**Estimate**	**t-value**	**p-value**
Intercept	0.016	3.95	0.0001
Temporary employment	-0.024	-4.09	0.0001
Q	0.0028	2.07	0.039
Lag Q	-.00036	-0.39	0.700
GDP growth	-.0008	-0.70	0.481
Size	Yes		
Industry	Yes		
Adj. R-square	0.13		
Regression F	37.65		
N. Obs Read	87,276		
N. Obs Used	1977		

Table 2

Capital investment

The dependent variable is Capex/Sales. Temporary employment is defined as the workforce that is not permanent and is scaled by total employment. Size is the value of assets in billions of yen. Industry is defined on the basis of two digit Japanese industry codes. Standard errors are heteroscedasticity consistent.

Variable	**Estimate**	**t-value**	**p-value**
Intercept	0.0696	10.54	0.0001
Temporary employment	-0.008	-0.99	0.325
Q	-0.00073	-1.76	0.078
Lag Q	-.00004	-.14	.890
GDP growth	-0.0009	-0.63	0.529
Size	Yes		
Industry	Yes		
Adj. R-square	0.0255		
Regression F	11.79		
N. Obs Read	87,276		
N. Obs Used	2815		