

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

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**Abstract:** *After the rapid appreciation of the yen after the Plaza Accord (1985) and the collapse of Japanese asset markets at the end of 1989 many observers expected dramatic transformation of the Japanese labour market, especially in terms of the system of permanent employment. As the 'lost decade' of the 1990's dragged on, however, there was a growing consensus that Japanese firms were unable or unwilling to restructure. From the end of the 1990's to the present, Japanese firms have undertaken many changes in order to adapt to the low growth environment. Among these has been a steady increase in the utilization of temporary employees. Despite this trend, we find that permanent employment continues to be important for research intensive firms. Such a finding is consistent with an environment where human capital acquisition is more 'firm specific,' as a way to avoid the loss of proprietary technologies.*

## Introduction

The so-called system of lifetime employment was once considered one of the 'three pillars' of the Japanese labor market (together with seniority compensation and enterprise unionism). It was generally considered that this would erode significantly after the post-Plaza Accord appreciation of the yen, and the later collapse of the bubble economy in late 1989. Ultimately, however, the business press and many analysts came to the opposite conclusion: that Japanese firms were very slow to restructure during the 1990's and that adjustment in the labor market was not evident. Indeed, in its 2001 downgrade of Japan, S&P cited slow restructuring in the corporate sector as the source of Japan's economic woes (Williams, Dvorak and Zukerman, 2001; Kamabayashi, 2015). In hindsight it should not be surprising that restructuring of the labor market was slow during the 1990's. After all, if indeed 'permanent employment' was considered one of the 'three pillars' of the Japanese labor market in the post-war period (Koike, 1984. Freeman and Weitzman, 1987. Ito, 1991. Hashimoto, 1982.), then it might be expected to change slowly.

In reality, the Japanese labor market has been changing, most notably in terms of the dramatic increase in the utilization of temporary employees. Using data from 3145 registered Japanese firms over the period 1990 to 2010 we find that the ratio of temporary to total employment has risen from roughly 10% in 1990 to over 30% in 2010 (see Figure 1).

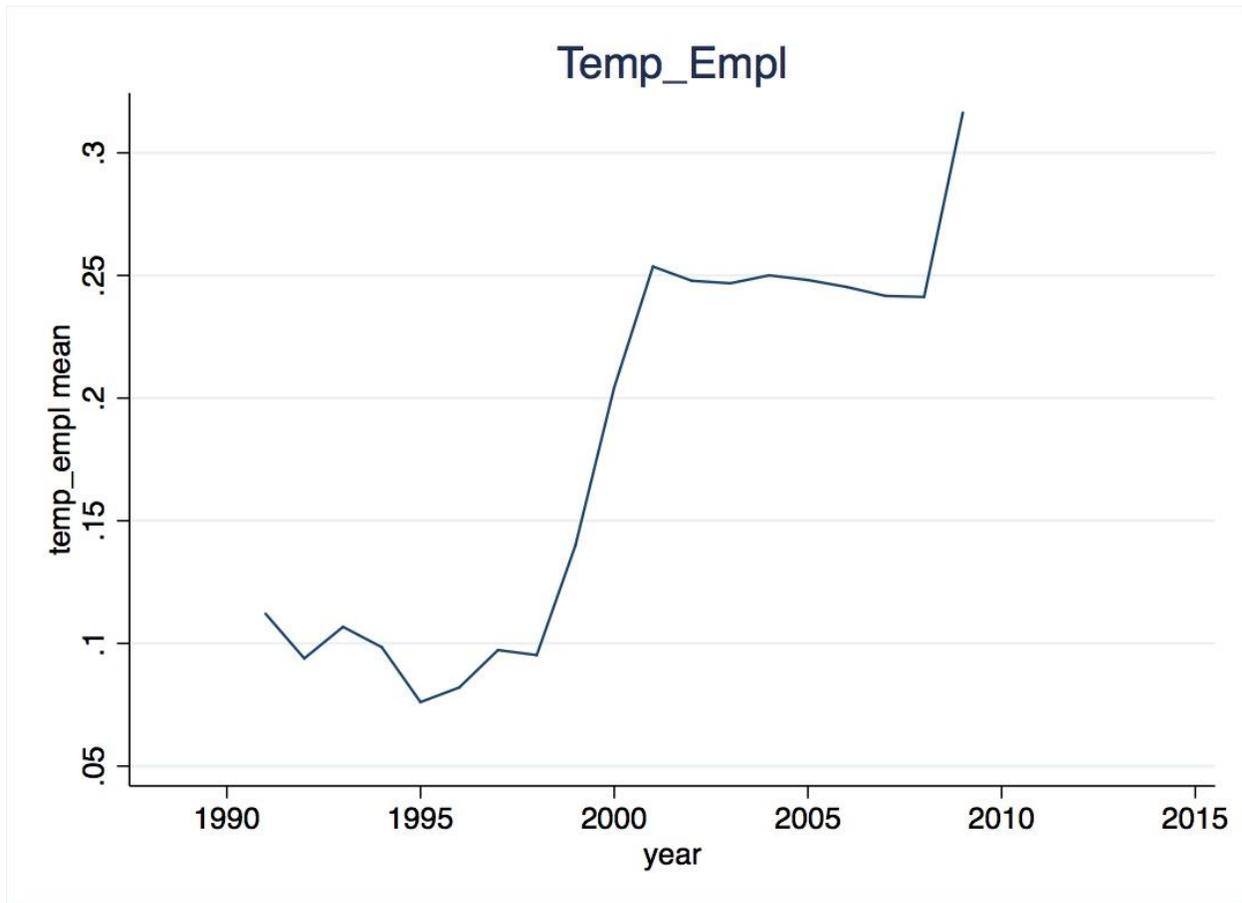
In terms of utilization of temporary employees, those who were skeptical about Japanese restructuring during the 'lost decade' were correct. That is, there was no discernible increase in the use of temporary employees during the period 1990 to 1999 and the 'lifetime employment' system seemed intact. While not entirely within the scope of our paper, there were a number of reasons for increased utilization of temporary employees after 2000. Among those were a number of accounting and tax related reforms that made it easier for firms to restructure. Also, as the decade of the 1990's progressed many firms were able to shed 'permanent employees' through attrition, allowing them to increasingly make up the difference with temporary employees. Furthermore, Japanese manufacturing firms increasingly began to relocate production facilities abroad, including Asian countries including Vietnam.

It is easy to focus on the overall trend in utilization of temporary employment and proclaim the end to lifetime employment. Such a conclusion would be overly simplistic and premature. Most economic explanations of lifetime employment in Japan during the high growth period (1955-1990) centered on the human capital model due to Becker (1962). Specifically, Hashimoto (1981) and others focused on human capital accumulation as a shared investment between the firm and its employees, especially where the acquired human capital was firm specific. It is widely understood that when human capital acquisition is firm specific that separations will be costly to both firms and workers, and therefore less common than in the case where human capital utilization and acquisition is more general.

**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.



We find that there are vestiges of lifetime employment in the post-bubble Japanese economy. Specifically, we find that the ratio of temporary employment is inversely and statistically significantly related to research and development expenditure for our sample of firms over the period 1990-2010. On the other hand, there seems to be no statistically significant relationship between investment in plant and equipment and the ratio of temporary employees (as the cash-flow investment literature might suggest).

This finding is not surprising when considered within the context of human capital literature. Firms that invest more intensively in R&D may have more proprietary technologies to protect and would suffer from a high degree of labor mobility. While not surprising, we think the results are interesting, and suggest that some form of lifetime employment can be expected to persist in Japan for the foreseeable future. The organization of this paper is as follows. In the next section we turn to an examination of

factors that have led to greater utilization of temporary employees in Japan since the end of the 1990's. We then turn to a discussion of the data, our empirical model and results, after which we offer conclusions.

### **Factors Affecting Greater Utilization of Temporary Employees**

A naïve interpretation of why Japanese firms have turned to greater utilization of temporary employees is simply that they wish to save money in the harsher low growth environment. While this may be true for many firms, such a result requires a theoretical basis given findings to the contrary (Becker and Huselid, 1992; Huselid, 1995). There is a well-developed and long-lived literature in finance that might explain the trend toward greater reliance on temporary employees. Specifically that literature is concerned with cash and other liquidity constraints that might affect a company's ability to undertake investment.

The issue of investment-cash flow constraints has been studied at least 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 Majluf (1984), whereby 'constrained firms' may be forced to finance investment from cash flow or cash stock. However, 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).

While the jury is still out on the more general question of cash flow-investment sensitivity, we believe that less tangible, more knowledge intensive investment, such as R&D expenditure, is more 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. Our 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. If this is indeed the case it is perfectly reasonable that overall utilization of temporary employees in Japan would grow as it has since the 'lost decade,' while some forms of 'permanent employment' continue to be important.

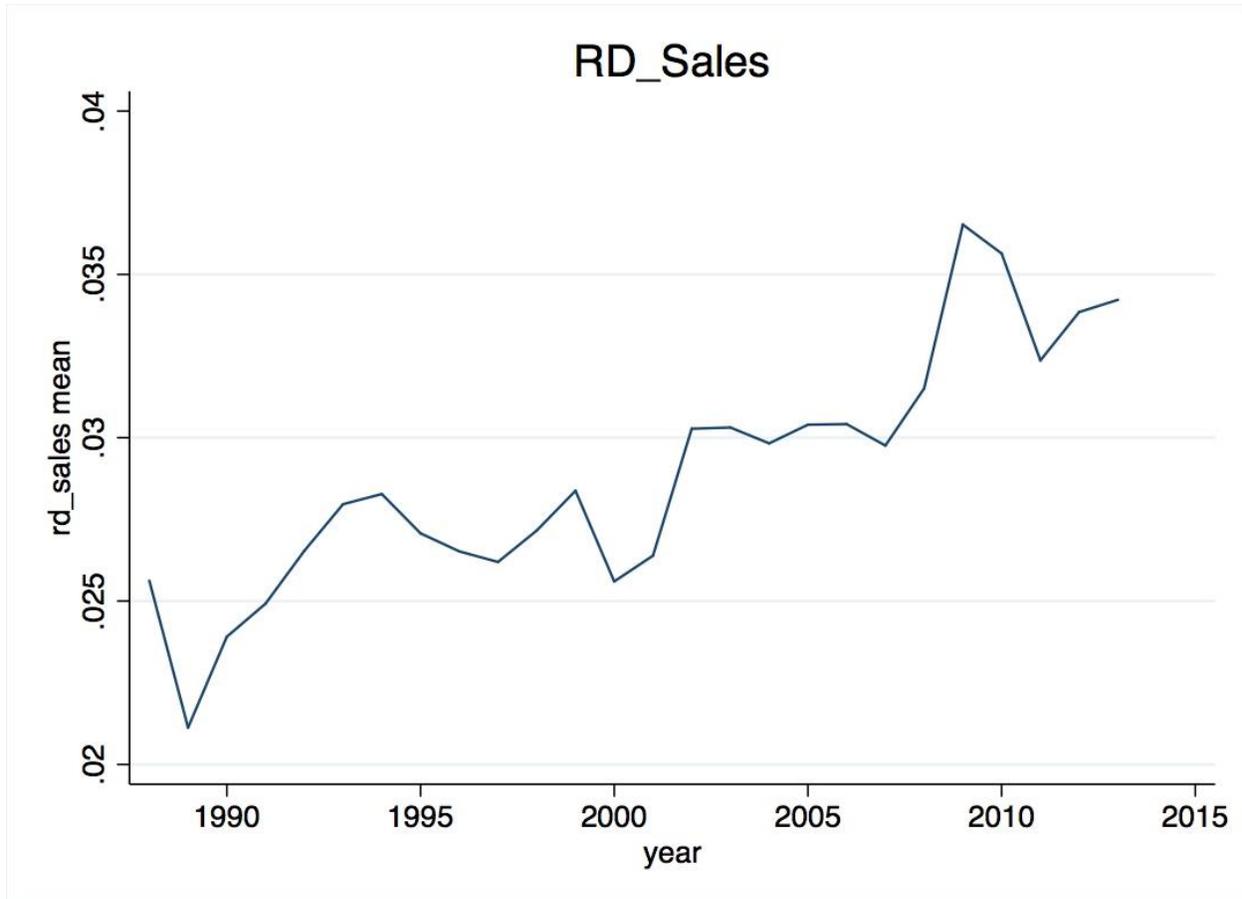
Ultimately, the question is an empirical one that can be framed as two alternative and exclusive hypotheses with respect to the nature of investment and therefore the sensitivity

with respect to the cash flow enhancing impact of greater utilization of temporary employees. One hypothesis is that R&D expenditure, being more intangible than brick and mortar capex, should exhibit greater positive cash flow sensitivity as a result of information asymmetry between the firm and suppliers of capital (Brown and Peterson, 2009). Under this hypothesis, greater utilization of temporary employees could presumably help to alleviate financial constraints among research intensive firms. 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 described above (and elsewhere, such as 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 (again, see Figure 1).

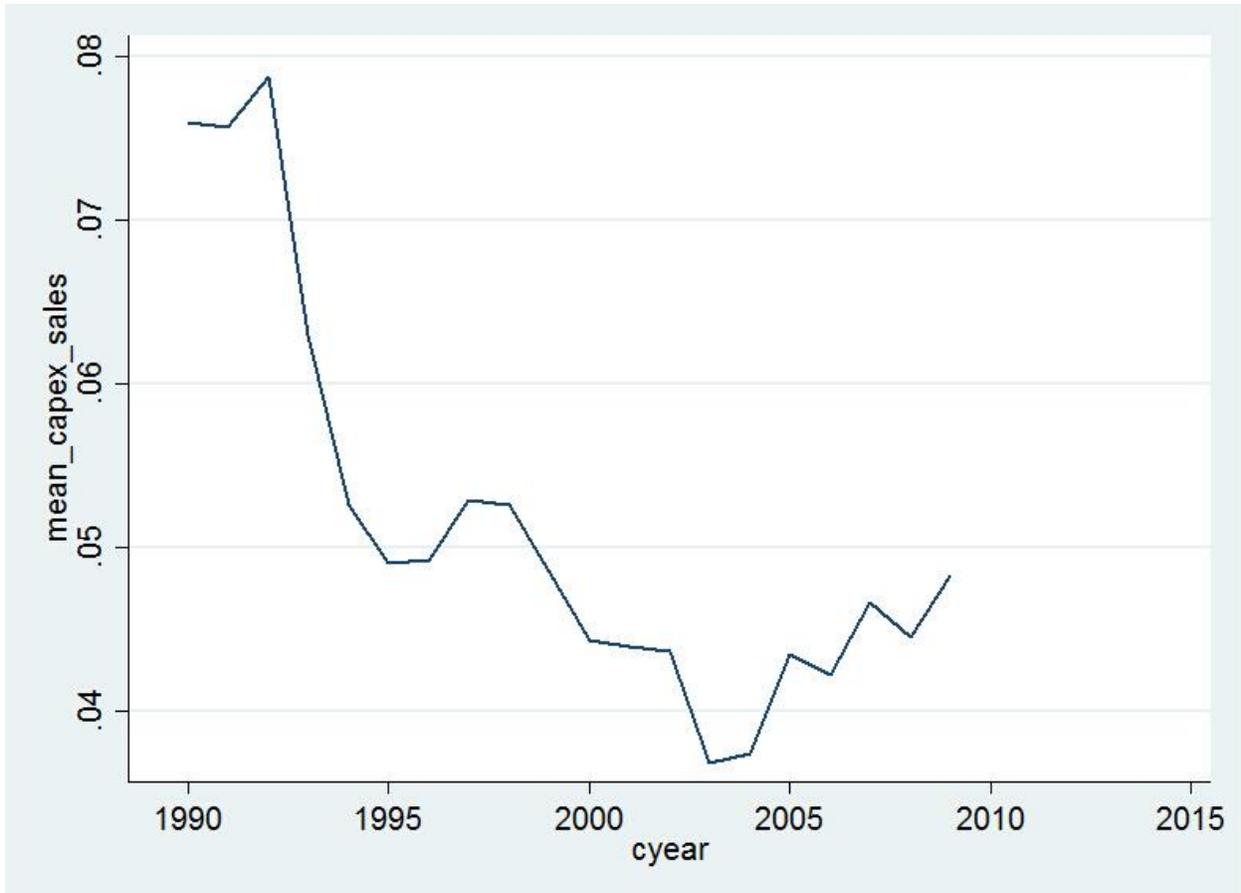
On first examination of the data, one might conclude that the investment-cash flow sensitivity hypothesis is correct with respect to idiosyncratic investment such as R&D during the 'lost decades.' After all, the ratio of R&D expenditure to sales has been on an increasing trend since the collapse of the bubble economy to the present, as has utilization of temporary employment since the late 1990's (see Figure 2).

**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



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.

**Figure 3**  
**Ratio of capital expenditure to sales for both listed and unlisted registered firms in Japan between 1990 and 2009**



#### Data and empirical model

The data set includes 3145 Japanese firms for the period 1990-2009 that are registered and present financial filings to the Treasury Ministry through the *Yuka shoken houkokusho* with market capitalization equivalent of over \$500 million USD. 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. Finally, not all firms report all the data items used in this analysis. Specifically, firms that are not publicly traded will have no price data with which to calculate Q proxies.

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:

$$(1) \text{ Investment/sales} = \alpha + \beta(Q) + \gamma(\text{GDP growth}) + \delta(\text{Temp/Employment}) + \sigma(\text{size}) + \varphi(\text{industry}) + \varepsilon$$

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 number of total employees, assets or sales, and industry is based on Japanese stock market 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, which would bias against any finding of significance of both the impact of GDP and the temporary employment variable on the two types of investment. Furthermore, some readers have suggested that our results might suffer from endogeneity issues, in that investment and the utilization of temporary employment will be partially driven by macroeconomic conditions.

While this is undoubtedly true, including GDP growth as an explanatory variable should alleviate this potential problem. As a robustness check, we have also performed our statistical analyses using a so-called two-step procedure. In the two-step procedure, the temporary employment ratio is first regressed as a function of GDP growth and residuals from this regression are saved and used in the second step. In the second step, the statistical analysis is performed as per model 1 above, except that the residuals from the first step are used in place of the actual temporary employment ratio as an explanatory variable. This two-step procedure would eliminate both the problem of reduced statistical inference resulting from possible multicollinearity, as well as any endogeneity bias. On the other hand, the two-step procedure introduces problems associated with generated regressors. Fortunately, we find no significant difference in our results whether we use the basic ordinary least squares method with GDP growth as an explanatory variable, or instead use the two-step procedure. Therefore, we report only the OLS results. Additional robustness tests were also performed in terms of specification of the quality variable (Q) and firm size measures with no significant change in results. Similarly, using random effects GLS estimation does not affect results in any material way. Therefore, we feel highly confident in terms of our results.

## **Results and discussion**

Results are presented in Tables 1 and 2. A positive and significant estimated coefficient on the temporary employment ratio would provide evidence of the so-called investment-cash flow constraint, discussed above. Generally speaking evidence for such a constraint seems to be waning internationally, perhaps due to better information, the growth of venture capital markets, etc. As we can see, there is no significant support for such a constraint in our findings. On the other hand, the negative and significant estimated coefficient found for R&D investment, but not capital expenditure, suggests that R&D investment may be idiosyncratic in nature and proprietary, meaning that high utilization of temporary

employees might endanger proprietary technology and strategies employed by the firm. Again, while not particularly surprising from a human capital perspective, the finding suggests that some form of 'permanent' or long-term employment can be expected to endure in Japan into the future.

**Table 1****R&D/Sales as a function of the temporary employment ratio and controls**

<b>Dependent variable: R&amp;D/Sales</b>	<b>Estimated Coefficient</b>	<b>t-value (For robust standard error)</b>	<b>p-value</b>
<b>Independent Variables</b>			
<b>Q proxy</b>	<b>.0034</b>	<b>2.59</b>	<b>.010</b>
<b>Temporary Employment Ratio</b>	<b>-.026</b>	<b>-4.23</b>	<b>.000</b>
<b>GDP growth</b>	<b>-.001</b>	<b>-.86</b>	<b>.390</b>
<b>Constant</b>	<b>.016</b>	<b>4.03</b>	<b>.000</b>
<b>Size</b>	<b>Yes</b>		
<b>Industry Dummies</b>	<b>Yes</b>		
<b>Time trend</b>	<b>Yes</b>		
<b>Regression F</b>	<b>45.87</b>		
<b>R-square</b>	<b>.126</b>		

**Table 2****Capex/Sales as a function of the temporary employment ratio and controls**

<b>Dependent Variable:Capex/sales</b>	<b>Estimated Coefficient</b>	<b>t-value (For robust standard error)</b>	<b>p-value</b>
<b>Independent Variables</b>			
<b>Q proxy</b>	<b>-.0008</b>	<b>-2.79</b>	<b>.005</b>
<b>Temporary Employment Ratio</b>	<b>-.01</b>	<b>-1.22</b>	<b>.221</b>
<b>GDP growth</b>	<b>-.0006</b>	<b>-0.43</b>	<b>.667</b>
<b>Constant</b>	<b>.069</b>	<b>10.34</b>	<b>.000</b>
<b>Size</b>	<b>Yes</b>		
<b>Industry Dummies</b>	<b>Yes</b>		
<b>Time trend</b>	<b>Yes</b>		
<b>Regression F</b>	<b>12.78</b>		
<b>R-square</b>	<b>.025</b>		

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