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Acquired In-Process Research Development and Earnings Management

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Summary at a glance

We examine whether and how changes in accounting regulations influence acquired in-process research and development (IPR&D) costs.

Abstract

New accounting standards, namely SFAS 141 and 142, were adopted in 2001. The release of these two regulations offers a unique opportunity to explore how managers have changed their earnings manipulation behavior by using IPR&D costs. In this study, we examine whether and how the amount of IPR&D at the acquisition deals is associated with discretionary accruals, which serve as a proxy for earnings management. We use a sample of firms reporting acquired IPR&D over the period of 1993 to 2007 with a matched group based on size and industry. Our results provide evidence that managers strategically use the IPR&D costs as an income-

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decreasing earnings management tool, and SFAS 141 and 142 effectively reduced the use of IPR&D cost to manipulate earnings. Furthermore, we examine the effect of SFAS 141R which was adopted in 2008, on earnings management by using IPR&D. We use a sample of firms reporting acquired IPR&D at the firm level over the period of 1993 to 2011 with a matched group based on size and industry. Results indicate that IPR&D is no longer related to income-decreasing earnings management after the adoption of SFAS 141R. These findings can help accounting regulators determine how to curb the misleading use of IPR&D for earnings management purposes.

Classification code
M41, M48

Author biography

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1. INTRODUCTION

In a September 1998 speech at the New York City Center for Law and Business, SEC chairman Arthur Levitt brought attention to practices of earnings management that involve abuses of accounting judgment (Slavin and Khan, 2006). One of the abuses that Levitt spoke about was in-process research and development (IPR&D) reported by acquiring companies in business acquisitions. Levitt noted: "Companies classify an ever-growing portion of the acquisition price as 'in-process' research and development, so… the amount can be written off in a 'one-time' charge, removing any future earnings drag."

In-Process Research and Development (IPR&D) costs is the value that acquiring firms allocate out of the acquisition price to the incomplete research and development projects acquired from target firms. Due to the lack of specific guidance, allocating IPR&D cost can be subjective and managers' decisions can be discretionary (Dowdell et al., 2009). Prior to SFAS 141 and 142 in 2001, managers who wanted to avoid "future earnings drag" could do so by allocating more of the acquisition price to IPR&D expense. This cost allocation would reduce earnings in the acquisition year because of the one-time expense to IPR&D; however, it would ensure less goodwill amortization in subsequent periods and thus improve future earnings.

In the late 1990s, the SEC and the FASB expressed concern about IPR&D because it is often recognized as a major portion of the value of an acquisition (Clem et al., 2004). For example, in the acquisition of Ares Software by Adobe Systems in 1996, 95 percent of the purchase price was written off as an IPR&D (Clem et al., 2004). The SEC and the FASB agreed that the matter needed to be investigated thoroughly (Hall, 2003). In response, the FASB ratified SFAS 141 and 142 in 2001 and SFAS 141R in 2007. In June 2001, the FASB issued SFAS 141 and 142, which eliminated the pooling method and goodwill amortization, respectively. They

further required firms to periodically test many intangibles, including goodwill, for impairment. The compromise offered by the FASB was that firms would no longer be required to systematically amortize goodwill. Instead, SFAS 142 requires that firms test goodwill for impairment at least annually. Therefore, the proportion of acquisition price allocated to IPR&D vis-à-vis goodwill will depend on the extent to which managers expect goodwill impairment charges in the near future. After SFAS 141 and 142 became effective in 2001, managers viewed IPR&D write-offs and future goodwill impairments as tradeoffs (Slavin and Khan, 2006). As a result, managers appear to have managed earnings to avoid two years of large write-offs by strategically choosing to either write off the IPR&D at the time of the acquisition or at the time of a future impairment, but not both.

In this study, we investigate how firms have altered their allocation behavior using IPR&D costs in order to manage their earnings in response to the release of new accounting standards. We examine whether the amount of IPR&D expense allocated following an acquisition is significantly associated with discretionary accruals, our proxy for earnings management. We hypothesize that the implementation of SFAS 141 and 142 significantly changed firms' incentives to use IPR&D expense to manipulate earnings, particularly because SFAS 142 eliminates the long-standing requirement for the periodic amortization of goodwill and replaces it with the requirement for regular impairment testing. To find the effect of the adoption of SFAS 141 and 142 on earnings management using IPR&D costs at the acquisition level, we compare a sample of 457 acquisitions with a significant level of IPR&D to a control sample (matched on firm size and industry) of 457 acquisitions without IPR&D over the period 1993-2007. We find a statistically significant relationship between allocated IPR&D expense and income-decreasing earnings management during the sample period. We also find that after the

adoption of SFAS 141 and 142, the effect of the IPR&D expenses allocated following an acquisition is no longer related to income-*decreasing* earnings management. This result suggests that the adoption of SFAS 141 and 142 effectively reduced managers' earnings manipulating behavior using IPR&D costs as intended.

We substantiate our results by conducting an additional test. Specifically, we examine the effect of SFAS 141R on earnings management.[2] To find the effect of the adoption of SFAS 141R on earnings management using IPR&D costs at the firm level, we compare a sample of 684 firms with IPR&D to a control sample (matched on firm size and industry) of firms without IPR&D over the period 1993-2011. We find that the relative proportion of total IPR&D at the firm level is positively related to income-decreasing earnings management. We also find that after the adoption of SFAS 141R, the relative proportion of total IPR&D at the firm level is no longer associated with income-decreasing earnings management. This finding provides evidence that companies modified their decisions on how to allocate portions of the acquisition price after the SFAS 141R standard was adopted. Overall, our results support the FABS's decision to adopt SFAS 141 and 142 in June 2001 and the release of SFAS 141R in December 2007. We believe the new accounting standards limit managers' ability to use IPR&D costs to manipulate earnings as FASB intended.

This study makes a number of contributions to the literature that examines the effect of SFAS 141, 142, and 141R. First, one of the main reasons the SEC and the FASB created these standards was because they feared firms used IPR&D to manage earnings. The extant literature fails to substantiate this concern (e.g., Hsu et al., 2009). However, we use a more direct test of earnings management and find significant evidence that firms did indeed use IPR&D to manage

[2] SFAS 141R was released in December 2007. It requires companies to capitalize IPR&D costs as an identifiable intangible asset instead of expenses then in the business acquisition year. More information regarding SFAS 141R is located at Section 6.

earnings. Second, we show that after the issuance of SFAS 141 and 142, firms no longer used IPR&D as a tool to manage earnings. This provides support that accounting regulations can curb the misleading use of IPR&D for earnings management purposes.

Our paper should be of interest to standard-setters and fellow researchers. Ours is the first paper, to the best of our knowledge, to examine the changes in the three accounting rules (i.e., SFAS 141, 142, and 141R) that restrict managers' earnings management behavior by using IPR&D.[3] By doing so, this paper makes several contributions. From a methodological perspective, our more rigorous estimation method and larger sample size enable us to rely with greater assurance on the results. From a policy perspective, our findings are particularly relevant to the FASB's intention to limit the use of income-decreasing earnings management by using IPR&D. Beatty (2007) argues that standard-setters should pay attention to how managers' behavior changes as a result of changes in accounting standards. Findings in this paper may provide insights for standard-setters. The evidence in this study indicates that SFAS 141, 142 and 141R set the limit on managers' earnings management behavior by using IPR&D.

The next section presents the prior literature on IPR&D and earnings management and develops our hypotheses. Section 3 describes the research design. Section 4 provides a description of our sample, basic descriptive statistics, and correlation table. Section 5 presents the empirical results. Section 6 presents additional tests on our results. Section 7 concludes the study.

2. PRIOR LITERATURE ON IPR&D AND HYPOTHESES DEVELOPMENT

[3] Recent studies examine the effect of changes in accounting regulation. Dowdell and Lim (2015) examine the effect of SFAS 141R on the frequency of acquisitions with IPR&D. Beatty and Weber (2006) and Jordan and Clark (2011) examine the effect of SFAS 142 on goodwill impairment. Andrews et al. (2009) compare the major differences between SFAS 141 and SFAS141R. Unlike this paper, those studies do not comprehensively examine the effect of three accounting regulation, such as SFAS 141, 142, and 141R on earnings management by using IPR&D.

2.1. Prior Literature on IPR&D and Earnings Management

Due to the material and subjective nature of IPR&D on assets and earnings, IPR&D can be used as a tool to manage earnings. Deng and Lev (1998) find that companies increase their earnings an average of 25 percent and return on equity by 37 percent when IPR&D costs are expensed rather than capitalized. Dowdell et al. (2009) argue that ensuring proper financial reporting of IPR&D write-off continues to be challenging and requires significant judgment, suggesting that IPR&D costs can be manipulated in nature. Slavin and Khan (2006) argue that "The IPR&D value is then estimated by calculating the present value of expected incremental cash flows from the project, using a discount rate reflecting the risk of the research project. These complexities make the valuation of IPR&D inherently difficult and subjective (page 63)." Dowdell and Press (2004) find that restatements reduce the IPR&D expense on average by 62%, and increase pre-tax income by 142%, with a median change of 32%. The United States General Accounting Office (2002) reports that IPR&D is one of nine possible reasons for the restatement.

Hsu et al. (2009), however, find that IPR&D write-off is inconsistent with an earnings management hypothesis. There are at least two reasons why our results differ from Hsu et al (2009). First, IPR&D research is sensitive to sample size (Dowdell and Lim, 2015) and our sample is significantly larger than Hsu et al. (2009). Specifically, Hsu et al. (2009) limit their sample to high-tech and pharmaceutical industries, whereas our sample encompasses a broad range of industries including high-tech and pharmaceutical industries. In addition, our sample covers a longer time period than Hsu et al. (2009). Specifically, our sample period covers the years 1993 to 2007,[4] whereas theirs covered the period 1994 to 2004. Due to a larger sample size, our study may provide more comprehensive evidence than Hsu et al. (2009).

[4] Our sample period for additional tests (Section 6 in this paper) covers the years 1993 to 2011.

Second, the proxy for earnings management in our study is different from the proxy of Hsu et al. (2009). They use buy-and-hold returns and changes in ROA and ROE of acquirers as proxies of earning management. Instead, we use discretionary accruals to measure earnings management, which is a more direct proxy for earnings management. Specifically, we use two different types of discretionary accruals: a modified version of the Jones model (Dechow et al., 1995) and performance matched discretionary accruals (Kothari et al., 2005). By using these proxies for earnings management, our study more directly tests the relationship between the effect of IPR&D and earnings management.[5]

2.2. Hypotheses Development

In 1998, SEC chairman Arthur Levitt brought attention to practices of earnings management that involve abuses of accounting judgment (Springsteel, 1998).[6] This speech indicates that management has considerable discretion in estimating the variables and components used to value IPR&D (Slavin and Khan, 2006). Dowdell et al. (2009) find that some acquirees have low R&D costs prior to the acquisition, while the acquirers record high IPR&D write-offs subsequent to the acquisition, suggesting that the amount of the IPR&D write-offs may have been inappropriate. Their results, however, indicate that the extensive use of IPR&D write-offs by acquiring firms as a part of widespread earnings manipulation, as claimed by the SEC and anecdotes, may be exaggerated in general.

[5] Evidence from prior studies supports the use of discretionary accrual proxies to detect earnings management. For example, Ayers et al. (2006) find that the associations between discretionary accrual proxies and earnings management are strengthened in those settings where firms have greater incentives to manage earnings. In addition, Dechow et al. (2010) articulate that the discretionary accruals isolate the managed component of accruals, and thus the use of these discretionary accruals models are the accepted methodology in accounting to capture management discretion.

[6] In a September 1998 speech, chairman Levitt stated, "In the zeal to satisfy consensus earnings estimates and project a smooth earnings path, wishful thinking may be winning the day over faithful presentation. As a result, I fear that we are witnessing an erosion in the quality of earnings and therefore the quality of financial reporting (Springsteel, 1998, page 21)."

There are several reasons why managers are more likely to use IPR&D expense allocated following an acquisition as a tool to decrease income. Historically, IPR&D write-off has been a perfect place to record acquisition costs, allowing managers to avoid future net losses as well as negative goodwill (Mulford and Yang, 2008). Next, managers could encourage financial analysts to discount the IPR&D write-off as a nonrecurring item while at the same time inflate the future earnings prospects provided by newly purchased research and development (Mulford and Yang, 2008). Lastly, by writing-off IPR&D, total shareholder's equity and total assets are lower, improving measures of efficiency, such as asset turnover and return on equity (Mulford and Yang, 2008).

For these reasons, we contend that IPR&D is used as a tool to decrease earnings when it is necessary. Specifically, we expect that the IPR&D expense allocated following an acquisition is associated with income-*decreasing* earnings management. Therefore, we hypothesize:

H1: The amount of IPR&D expense allocated following an acquisition is positively related to income-decreasing earnings management.

SFAS 141 and 142 significantly changed the landscape of the regulatory environment (Jarva, 2009; Jahmani et al., 2010). We believe these new standards present managers with a limited set of options and new incentives that did not exist prior to 2001. In particular, since SFAS 142 eliminated goodwill amortization and replaced it with periodic impairment testing, the old argument that IPR&D write-offs could alleviate the future drag on profits caused by goodwill amortization no longer applied. Unlike amortization expense, goodwill impairment losses are likely to occur irregularly and in varying amounts (Jarva, 2009; Chen et al., 2015). These new

goodwill impairment rules lead to different predictions regarding how firms would allocate acquisition price between IPR&D and goodwill in the post-2001 period (Slavin and Khan, 2006). If managers were concerned about current period operating performance, they could have attempted to improve the appearance of current earnings by allocating more of the purchase price to goodwill (Jordan and Clark, 2011). This would give them more flexibility in determining when (if ever) the goodwill impairment will hit the income statement (Watts 2003; Jarva, 2009).[7] Thus, the positive relationship between IPR&D expenses allocated following an acquisition and income-*decreasing* earnings managements would be diminished. Therefore, we hypothesize:

H2: After the adoption of SFAS 141 and 142, the effect of the amount of IPR&D expense allocated following an acquisition is no longer related to income-decreasing earnings management.

3. RESEARCH DESIGN

To investigate whether IPR&D at the acquisition level influences earnings management (H1 and H2), we use following regressions:

$$DA_{it} \text{ (or } P\_DA) = \beta_0 + \beta_1 \times IPRD_{it} + \beta_2 \times S141_{it} + \beta_3 \times IPRD_{it} \times S141_{it} + \beta_4 \times SIZE_{it} + \beta_5 \times LEV_{it} + \beta_6 \times NOA_{it} + \beta_7 \times S\_GROWTH_{it} + \beta_8 \times BTM_{it} + \beta_9 \times ROA_{it} + \varepsilon_{it} \quad (1)$$

Where,

DA	=	Modified Jones discretionary accruals following Dechow et al.(1995);
P_DA	=	Performance matched discretionary accruals following Kothari et al. (2005);
IPRD	=	IPR&D ratio measured using IPR&D costs divided by total acquisition costs;
S141	=	An indicator variable which takes the value of 0 if a firm-year is prior to the SFAS 141 and 142 effective date (June 30, 2001), and 1 otherwise;

[7] Watts (2003) argues that the use of estimation and judgment in determining fair value of goodwill and future cash flow would provide potential opportunities for earnings management.

SIZE	=	Market capitalization of acquirers one month before the merger and acquisition deal;
LEV	=	Short-term debt plus long-term debt due in one year, divided by total assets;
NOA	=	Net Operating Assets (NOA) following Nissim and Penman (2001);
S_GROWTH	=	Current year sales (SALE) less prior year sales, divided by prior year sales;
BTM	=	Book to Market; and
ROA	=	Return (Income before extraordinary items and discontinued operations) on Assets.

Our research period for research model (1) is from 1993 to 2007. *DA* is discretionary accruals that are measured using modified Jones (Dechow et al., 1995). We also use performance adjusted discretionary accruals (*P_DA)* following Kothari et al. (2005). We expect that the coefficient on *IPRD* (β_1) is negative to support our first hypothesis. The sum of coefficients β_1 and β_3 should be insignificant to support our second hypothesis.

Several control variables are added to the research model following prior studies. Prior studies find that firm size is related to earnings management. Larger firms are more restricted on earnings management because large firms are subject to scrutiny by financial analysts, regulators and market forces (Lee and Masulis, 2011). Therefore, we control for firm size in our regression analysis. Firms with high leverage are more likely to be associated with increasing discretionary accruals because they have strong incentives to meet their debt covenants (Watts and Zimmerman, 1990). Therefore, we control for leverage on our analysis. Further, we control for net operating assets, sales growth, and book to market to be consistent with most of the earnings management literature (Cormier et al., 2014).

4. DATA SELECTION

To develop the sample for our study we first identify all public companies within *Compustat North America* with IPR&D data from 1993 to 2007.[8] Then, we hand-collect the

[8] *Compustat* provides IPR&D data from 1993. Our sample period ends in 2007 because *SFAS 141R* became effective on December 15th, 2008.

dollar amounts for each individual acquisition and the allocation of IPR&D data (variable *IPRD*) from the 10-K annual reports.[9] After collecting the acquisition price allocations, we obtain 457 merger and acquisition deals over the 15-year period from 1993 to 2007. We match the 457 "IPR&D write-off" merger and acquisition deals with 457 "non write-off" mergers and acquisitions deals from Securities Data Corporation (SDC) Merger & Acquisitions Database based on the acquirers' firm size (market capitalization of acquirers one month before the acquisition is announced) and firm industry (3-digit SIC codes) because acquirer's return around the time of merger and acquisition is related to their size (Hsu et al., 2009).[10] Our final sample size for testing the two hypotheses is 914 (457 test sample plus 457 matched control sample). Table 1 contains a summary of the IPR&D sample selection process.

To create size and industry matched samples, we do the following. First, we identify companies that performed merger and acquisition and allocate IPR&D expenses. We refer to this sample as the treatment sample (IPR&D sample in Table 3). Second, we find companies that perform merger and acquisitions, but do not allocate any IPR&D expenses from *Compustat*. Each company allocating IPR&D expense is matched with a company with no allocation of IPR&D expense in the same three-digit SIC code and closest in market capitalization (Matched Control Sample in Table 3). By adopting Roberts and Whited (2012), all matching is conducted with replacement.[11]

[9] After obtaining the sample firm names for years 1993 to 2007, we collect their purchase price allocation data, including IPR&D, by reading the acquisition footnotes in Form 10-K filings submitted to the SEC by the firms. Firms usually disclose detailed information about how they allocated their acquisition prices to IPR&D, goodwill, and other intangible assets in their footnotes.

[10] We thank the anonymous reviewer for the comment. We use SDC platinum acquisition data for matching deals. SDC platinum do not disclose IPR&D allocation, so we use *Compustat* annual data to check whether acquirers use any IPR&D in the acquisition year.

[11] According to Roberts and Whited (2012), "Matching with replacement allows for better matches and less bias, but at the expense of precision...We prefer to match with replacement since the primary objective of most empirical corporate finance studies is proper identification. Additionally, many studies have large amounts of data at their disposal, suggesting that statistical power is less of a concern" (page 74-75).

[Insert Table 1 here.]

Table 2 reports the industry distribution of IPR&D sample based on a three-digit standard industrial classification. The majority of industries at the acquisition level is electronic and other electronic equipment (117 out of 457 frequencies), chemicals and allied products (102 out of 457 frequencies), computer and data processing services (93 out of 457 frequencies), and instruments and related products (77 out of 457 frequencies).

[Insert Table 2 here.]

Table 3 reports basic descriptive statistics. The mean values of *DA* for the IPR&D sample and matched control sample are -2.028 and -0.135, respectively. The *p-value* from a *T-test* of the difference of *DA* between IPR&D sample and matched control sample shows that the mean values are significantly different at the 1% level. This finding is similar to variable *P_DA*. Our main variable of interest, *IPRD*, is 0.293 in the IPR&D sample, suggesting that on average, in each acquisition, acquirers allocate 29 percent of the deal price to IPR&D. Firm size (*SIZE*) is calculated as market capitalization of acquirers one month before the merger and acquisition deal. The mean value of firm size for the IPR&D sample is slightly larger (7.161) than that for the matched control sample (7.141), but the difference is not statistically significantly different from zero. This result follows from using market size as one of the matching criteria.

[Insert Table 3 here.]

Table 4 shows a correlation matrix among variables used in the analysis of the IPR&D sample at the acquisition level. *IPRD* is negatively and statistically significantly correlated with

S141, suggesting that the adoption of SFAS 141 and 142 is significantly correlated with decreasing IPR&D expenses.

[Insert Table 4 here.]

We use a difference-in-differences (DID) design to test whether there are significant changes in discretionary accruals for the IPR&D sample group relative to the matched control sample group after the regulation of SFAS 141 and 142 are introduced. Table 5 shows that IPR&D sample group has a higher proportion of discretionary accruals compared with the matched control sample group. We aggregate the observations into pre-SFAS 141 and 142 and post-141 and 142 windows. Results from Table 5 indicate that the IPR&D sample group seems to be engaged in earnings management significantly more than the matched control sample group in both the pre-event window and the post-event window. However, the difference of *DA* between the IPR&D sample group and matched control sample group becomes insignificant after SFAS 141 and 142 are introduced. That is, we find no difference in earnings management for the IPR&D sample groups relative to the matched control sample group after the regulations are imposed. This result remains unchanged when we use performance based discretionary accruals (*P_DA*). Overall, these results support our view that SFAS 141 and 142 effectively reduced the use of IPR&D cost to manipulate earnings.

[Insert Table 5 here.]

5. EMPIRICAL RESULTS

5.1. Effect of IPR&D Allocation on Earnings Management

In this section, we test our first hypothesis. We use two model specifications using two different measures (*DA* and *P_DA*) of earnings management concerning the effect of the amount

of IPR&D allocated following an acquisition on earnings management (*DA* and *P_DA*). Columns 1, 2, 3 and 4 report the coefficient estimates and *p-values* from research model (1), where the matched sample is the industry and size control group. Results are presented in Table 6. The dependent variable of the first two columns in Table 6 is discretionary accruals measured by modified Jones (*DA*) and the dependent variable of the next two columns is performance matched discretionary accruals (*P_DA*). The coefficients on *IPRD* are negative and statistically significant under all model specifications, suggesting that IPR&D allocation is positively related to income-decreasing discretionary accruals.

Next, we add control variables *SIZE*, *LEV*, *NOA*, *S_GROWTH*, *BTM*, and *ROA* in Column (2). Both highly leveraged firms and more profitable firms are more likely to increase their discretionary accruals, resulting in upward earnings management. When the residuals are correlated across observations, OLS standard errors can be biased and either over or underestimate the true variability of the coefficient estimates. Petersen (2009) shows the correct method to estimate standard errors. Following his paper, we also adjust standard errors clustered by firm and year in Column (2). Our results remain significantly negative after adjusting for firm and time effect. In terms of economic significance, a one-standard deviation (0.270, 27%) increase in the IPR&D ratio implies a 63% (= -2.335 multiplied by 0.270) increase in income-decreasing earnings management based on Column (2). These illustrations suggest that the magnitude of IPR&D's impact on earnings management is economically meaningful. Another way to analyze the effect of IPR&D is to compare the relative influence of firm size and IPR&D cost. A one-standard-deviation (1.821) increase in size is associated with an income-decreasing earnings management increase of 94% (= -0.515*1.821). Thus, the IPR&D cost is substantially influential for earnings management. This result supports Hypothesis 1 and provides evidence of

managers' "big-bath" earnings management behavior by expensing an excessive amount of IPR&D cost prior to the adoption of SFAS141 and 142. Overall, results from Table 6 support SEC's concerns about the possibility that IPR&D could distort financial results (Levitt, 1998).

The signs of the control variables are consistent with prior studies. Specifically, the coefficients on *SIZE* are negative and statistically significant, consistent with findings of Lee and Masulis (2011). The coefficients on leverage (*LEV*) are positive and statistically significant, consistent with findings of Morsfield and Tan (2006). In Panel B, we find similar results using performance adjusted discretionary accruals (*P_DA*) as a proxy of earnings management. Again, the coefficient on *IPRD* is significantly associated with income-decreasing earnings management, supporting our first hypothesis.

[Insert Table 6 here.]

5.2. Effect of the Adoption of SFAS 141 and 142 on Earnings Management

In this section, we test whether the adoption of SFAS 141 and 142 affected managers' earnings management behavior on IPR&D expenses allocated following an acquisition. We use two model specifications using two different measures (*DA* and *P_DA*) of earnings management concerning the effect of adoption of SFAS 141 and 142 on IPR&D allocation following an acquisition. Results are presented in Table 7. The dependent variable of the first two columns in Table 7 is discretionary accruals measured by modified Jones (*DA*) and the dependent variable of the last two columns is performance matched discretionary accruals (*P_DA*). Columns 1, 2, 3 and 4 report the coefficient estimates and *p-values* from estimating research model (1), where the matched sample is the industry and size control group.

To examine the total effect of the adoption of SFAS 141 and 142 on earnings management, we perform a joint (sum) test of *IPRD* and the interaction term of *IPRD* and *S141*.[12] In Table 7, the results of the joint test of *IPRD* and the interaction terms of *IPRD* and *S141* are not statistically significant (the test of $\beta_1 + \beta_3 = 0$, fail to reject H2). This result suggests that after the adoption of SFAS 141 and 142, the amount IPR&D expense allocated following an acquisition is no longer related to income-decreasing earnings management. We also find similar results in Panel B using performance adjusted discretionary accruals, suggesting that our results are not driven by different measurement of discretionary accruals.

Consistent with results in Table 6, we find that the coefficient on *IPRD* is negative and statistically significant in column 1, 2, 3, and 4. This result suggests that the amounts of IPR&D expenses allocated following an acquisition is positively related to income-decreasing earnings management, supporting our first hypothesis. In addition, our results from joint test provide evidence that SFAS 141 and 142 succeeded in lowering income-decreasing earnings management.

[Insert Table 7 here.]

6. ADDITIONAL TESTS

There is one additional new accounting standard that may have influenced the effect of IPR&D on earnings management: SFAS 141R. In December 2007, the Financial Accounting Standards Board (FASB) released SFAS 141R, which requires firms to recognize acquired IPR&D as an identifiable intangible asset. The provisions of SFAS 141R became effective beginning December 15, 2008. According to SFAS 141R, "Research and development assets acquired in a business combination [are] to be recognized regardless of whether they have an

[12]Following Cormier et al. (2014), we conduct a joint (sum) test of *IPRD* and the interaction term of *IPRD* and *S141*.

alternative future use."[13] Specifically, IPR&D "shall be considered indefinite lived until the completion or abandonment of the associated research and development efforts. During the period those assets are considered indefinite lived they shall not be amortized but shall be tested for impairment."[14] If the IPR&D is abandoned, the capitalized costs are written off (Mulford and Yang, 2008). In other words, SFAS 141R requires IPR&D costs to be measured at fair value, capitalized, and annually tested for impairment (Andrews et al., 2009).

In this section, we examine the effect of SFAS 141R on earnings management by using IPR&D costs. We develop the following research model for testing.

$$DA_{it} \text{ (or } P\_DA) = \beta_0 + \beta_1 \times FIRM\_IPRD_{it} + \beta_2 \times S141R_{it} + \beta_3 \times FIRM\_IPRD_{it} \times S141R_{it} + \beta_4 \times SIZE_{it} + \beta_5 \times LEV_{it} + \beta_6 \times NOA_{it} + \beta_7 \times S\_GROWTH_{it} + \beta_8 \times BTM_{it} + \beta_9 \times ROA_{it} + \varepsilon_{it} \quad (2)$$

Where,

FIRM_IPRD	=	IPR&D at the firm level measured using IPR&D expenses divided by sales revenues; and
S141R	=	An indicator variable which takes the value of 0 if a firm-year is prior to the SFAS 141R effective date (December 15th, 2008), and 1 otherwise.

Other control variables are as defined in model (1).

All variables except for *FIRM_IPRD* and *SFAS141R* are the same as research model (1) above. Our research period for regression model (2) is from 1993 to 2011. We expect that the coefficient β_1 is negative so that the relative proportion of total IPR&D at the firm level is positively related to income-decreasing earnings management. Also, we expect that the sum of coefficients β_1 and β_3 is insignificant so that the effect of the relative proportion of total IPR&D at

[13] SFAS No. 141 (R), Businesses Combinations (Norwalk, CT: Financial Accounting Standard Board, December 2007), page 130, paragraph B150.
[14] SFAS No. 141 (R), Businesses Combinations (Norwalk, CT: Financial Accounting Standard Board, December 2007), page 261, paragraph h.

the firm level is not related to income-decreasing earnings management after the adoption of SFAS 141R. This result would suggest that the adoption of SFAS 141R mitigates income-decreasing earnings management via IPR&D allocation. We use the same control variables used in research model (1).

In research model (2), we use the total dollar amounts of IPR&D (variable *FIRM_IPRD*) because a firm may have multiple acquisitions per year. According to Fuller et al. (2002), economically significant takeover activities involve multiple acquisitions instead of purchasing just one firm. For example, 24 petroleum and natural gas acquirers purchased 119 target firms (accounting for 72.8% of bids in the own industry) within three years during the period 1990 to 2000. Due to the significance of a firm's multiple acquisitions, we examine the effect of the relative proportion of total IPR&D at the firm level on earnings management in this section.

The total dollar amounts of IPR&D (variable *FIRM_IPRD*) can be found in *Compustat*. We obtain detailed data for 684 acquisitions at the firm level over the 19-year period from 1993 to 2011. We obtain our data on merger and acquisitions from the Securities Data Corporation (SDC) Mergers & Acquisitions Database. We match the IPR&D "write-off" with other "non write-off" mergers and acquisitions at the firm level based on the industry (3-digit SIC codes) and acquirers' size (market capitalization of acquirers one month before the deals) following Hsu et al. (2009). The final sample for our additional test is 1,368, including 684 merger and acquisitions with subsequent firm level's IPR&D write-offs and 684 matched non write-offs.

We use two model specifications using two different measures (*DA* and *P_DA*) of earnings management. Results are presented in Table 8. The dependent variable in the first two columns in Table 8 is discretionary accruals measured by modified Jones (*DA*) and the dependent variable in the last two columns is performance matched discretionary accruals

(*P_DA*). Columns 1, 2, 3 and 4 report the coefficient estimates and *p-values* from estimating research model (2), where the matched sample is the industry and size control group.

The coefficients for *FIRM_IPRD* using discretionary accruals (*DA*) as the dependent variable are negative and statistically significant in columns (1) and (2), suggesting that IPR&D at the firm level is positively associated with income-decreasing earnings management. The results using performance adjusted discretionary accruals (*P_DA*) as the dependent variable in columns (3) and (4) are similar.

Overall, our results indicate that both IPR&D at the acquisition and firm levels are positively related to income-decreasing earnings management. Considering that the acquiring-firm's managers have to make several judgments to value IPR&D during an acquisition (Slavin and Khan, 2006), our results indicate that managers use IPR&D as a tool to manage earnings downward.

[Insert Table 8 here.]

Next, we examine the effects of SFAS 141R adoption on the association between IPR&D at the firm level and income-decreasing earnings management. Results are presented in Table 9. Similar to Tables 6 through 8, the dependent variable in the first two columns in Table 9 is discretionary accruals measured by modified Jones (*DA*) and in the last two columns is performance matched discretionary accruals (*P_DA*). To test the effect of SFAS 141R, we use a *S141R* dummy variable, equal to 1 if after adoption of SFAS 141R, and otherwise 0. Our variable of interest is the sum of the *FIRM_IPRD* variable and the interaction term of *FIRM_IPRD* and *S141R*. Columns 1, 2, 3 and 4 report the coefficient estimates and *p-values*

from estimating research model (2), where the matched sample is the industry and size control group.

To examine the total effect of adoption of SFAS 141R on earnings management by using IPR&D, we perform a joint test of *FIRM_IPRD* and the interaction term of *FIRM_IPRD* and *S141R*. We find that the coefficient of the joint test is not statistically significant (the test of $\beta_1 + \beta_3 = 0$). This result suggests that after the adoption of SFAS141R, the effect of the relative proportion of total IPR&D at the firm level is not related to income-decreasing earnings management. This result also implies that the adoption of SFAS 141R is effective in mitigating income-decreasing earnings management. When SFAS 141R becomes effective, IPR&D should be capitalized as indefinite-life intangible assets (Dowdell and Lim, 2015). Prior to SFAS 141R, managers have strong incentive to allocate more purchase price to IPR&D and less to goodwill and other intangible assets (Dowdell and Lim, 2015). However, with SFAS 141R, managers do not have strong incentives to allocate more of the purchase price to IPR&D (Dowdell and Lim, 2015), suggesting that SFAS 141R somewhat mitigates the manager's incentive to manage earnings by using IPR&D.

[Insert Table 9 here.]

7. CONCLUSION

IPR&D is defined as the value allocated to incomplete research and development projects in business combinations and asset purchases (Dowdell and Lim, 2015). In June 2001, the Financial Accounting Standards Boards (FASB) issued SFAS 141, *Accounting for Business Combinations* and SFAS 142, *Accounting for Goodwill and Other Intangible Assets*. The release of new accounting standards offered a unique and rare opportunity to investigate how managers altered their earnings management behaviors over time as the regulatory environment changed.

In this study, we examine the association between IPR&D allocation and discretionary accruals, a proxy for earnings management, to explore how managers changed their earnings management behavior through the allocation of IPR&D write-off in response to the issuance of new IPR&D accounting standards.

Our results provide consistent evidence that managers have strategically modified the use of IPR&D as an earnings management tool as the regulatory environment changed. We find that before the adoption of SFAS141 and 142, the amount of IPR&D expense allocated following an acquisition is positively related to income-decreasing earnings management. In addition, we find that after the adoption of SFAS141 and 142, the effect of the amount of IPR&D expense allocated following an acquisition on income-decreasing earnings management is removed. Results from our additional test show similar results at the firm level. These results support FASB's decision to release SFAS 141R, which mandated firms to capitalize IPR&D as an intangible asset.

Our study extends Hsu et al. (2009) by using a larger sample, more direct measurement of earnings management, and a more rigorous method. Our finding that managers' earnings management behavior changes when new accounting standards, such as SFAS 141, 142, and 141R are adopted is consistent with an earnings management hypothesis.

According to Beatty (2007) and Dowdell and Lim (2015), standard-setters should pay attention to changes in managers' behavior as a result of changes in accounting standards. Our study addresses those concerns by answering the question of whether IPR&D costs are associated with earnings management and how new accounting standards can influence IPR&D. This study has implications for accounting regulators and companies outside the U.S. GAAP umbrella. We find evidence that managers strategically use the IPR&D costs as an income-

decreasing earnings management tool. Furthermore, our findings indicate that SFAS 141, 142, and SFAS 141R effectively reduced the use of IPR&D costs to manipulate earnings. These findings can help international accounting regulators determine how to curb the misleading use of IPR&D for earnings management purposes and help companies with their accounting for IPR&D acquisitions. We leave the investigation of the long-term consequences of SFAS 141, 142, and 141R adoption, including the managers' earnings management behavior by using IPR&D allocation and goodwill impairment, to future research.

APPENDIX: Variable Definitions

Dependent Variables

DA	=	Modified Jones discretionary accruals following Dechow et al. (1995).
P_DA	=	Performance matched discretionary accruals following Kothari et al. (2005).

Independent Variables

IPRD	=	IPR&D ratio measured using IPR&D costs divided by total acquisition costs.
FIRM_IPRD	=	IPR&D at the firm level measured using IPR&D expenses divided by sales revenues.
S141	=	An indicator variable which takes the value of 0 if a firm-year is prior to SFAS 141 and 142 effective date (June 30, 2001), and 1 otherwise.
S141R	=	An indicator variable which takes the value of 0 if a firm-year is prior to SFAS 141R effective date (December 15th, 2008), and 1 otherwise.

Control Variables

SIZE	=	Market capitalization of acquirers one month before the merger and acquisition deal.
LEV	=	Short-term debt plus long-term debt due in one year, divided by total assets.
NOA	=	Net operating assets (NOA) following Nissim and Penman (2001) net financial obligations (NFO) + common equity (CSE) + minority interest (MI), where: NFO = Financial Obligations (FO) - Financial Assets (FA) FO = debit in current liabilities (DLC) + total long-term debt (DLTT) + preferred stock (PSTK) – preferred stock in treasury (TSTKP) + preferred dividends in arrears (DVPA) FA = cash and short-term investments (CHE) + other investments and advances (IVAO) CSE = common equity (CEQ) + preferred stock in treasury (TSTKP) – preferred dividends in arrears (DVPA) MI = minority interest (MIB)
S_GROWTH	=	Current year sales (SALE) less prior year sales, divided by prior year sales.
BTM	=	Book to market.
ROA	=	Returns (Income before extraordinary items and discontinued operations) on assets.

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Table 1: Construction of IPR&D Sample

	No. of Obs
Individual acquisition IPR&D data (10-K footnote)	589
Less: key variables are missing	27
Less: outliers (when IPR&D ratio is greater than 1)	89
Less: lack of matching firms	16
Final sample of individual acquisition IPR&D data	457

This table reports the IPR&D sample selection process. To develop the IPR&D sample, we first identify all public companies within *Compustat North America* with IPR&D data from 1993 to 2007. Then, we hand-collect the dollar amounts for each individual acquisition and the allocation of IPR&D data from the 10-K annual report. This produces 589 potential firm-year observations. After eliminating observations that have missing regression variables and those that are outliers, we obtain 473 observations. Then, we match the "IPR&D write-off" merger and acquisition deals with "non IPR&D write-off" mergers and acquisitions deals using Securities Data Corporation (SDC) Merger & Acquisitions Database based on the acquirers' firm size and industry. Our final sample size for testing the two hypotheses is 914 (457 test sample plus 457 matched control sample) over the 15-year period from 1993 to 2007.

Table 2: IPR&D Sample by Industry

Industry	Frequency
Agricultural production	3
Oil and gas field services	3
Chemicals and allied products	102
Rubber & misc. plastics products	1
Industrial machinery & equipment	45
Electronic & other electric equipment	117
Instruments & related products	77
Wholesale trade-durable goods	1
Miscellaneous retail	1
Security and commodity brokers	1
Real estate operations and lessors	1
Holding & other investment offices	3
Personal services	2
Computer and data processing services	93
Engineering & management services	7
Total sample	457

The overall sample consists of 457 firm-years over the period 1993–2007. This table reports industry distribution based on a three-digit of standard industrial classification (SIC).

Table 3: Basic Descriptive Statistics

	IPR&D Sample						Matched Control Sample							
	N	Mean	Std. Dev.	Min.	Median	Max.	N	Mean	Std. Dev.	Min.	Median	Max.	Mean Diff.	*p-values*
DA	457	-2.028	10.666	-32.357	-1.152	30.898	457	-0.135	8.657	-32.357	-0.321	30.898	-1.893 ***	(0.003)
P_DA	457	-2.170	10.415	-31.230	-1.402	28.035	457	-0.258	8.574	-31.230	-0.349	30.499	-1.912 ***	(0.003)
IPRD	457	0.293	0.270	0.000	0.186	0.900	457	0.000	0.000	0.000	0.000	0.000	0.293 ***	(0.000)
S141	457	0.700	0.459	0.000	1.000	1.000	457	0.700	0.459	0.000	1.000	1.000	0.000	(1.000)
SIZE	457	7.161	1.821	3.478	7.079	12.222	457	7.141	1.916	1.325	7.146	12.215	0.020	(0.868)
LEV	457	0.132	0.169	0.000	0.036	0.602	457	0.131	0.159	0.000	0.062	0.728	0.000	(0.889)
NOA	457	0.792	0.918	-0.187	0.571	6.571	457	0.483	0.328	-0.780	0.473	1.908	0.309 ***	(0.000)
S_GROWTH	457	0.421	0.767	-0.717	0.246	4.600	457	0.210	0.536	-1.000	0.118	4.822	0.210 ***	(0.000)
BTM	457	0.390	0.304	0.038	0.303	1.593	457	0.389	0.310	0.019	0.308	3.260	0.000	(0.984)
ROA	457	-0.128	0.366	-2.908	-0.026	0.194	457	-0.018	0.258	-2.365	0.051	0.482	-0.110 ***	(0.000)

Our final sample consists of 914 observations (457 test sample plus 457 matched control sample) over the period from 1993 to 2007. This table reports summary statistics for the variables in our sample, and compares means for the test sample and the matched control sample. All variables are defined in the Appendix. *** indicate statistical significance at 1 percent, respectively using two-sided t-test for mean difference

Table 4: Pearson's Correlations

	DA	P_DA	IPRD	S141	SIZE	LEV	NOA	S_GROWTH	BTM
P_DA	**0.995**								
IPRD	-0.012	-0.020							
S141	0.065	0.080	**-0.310**						
SIZE	-0.004	-0.028	**0.123**	**-0.226**					
LEV	**0.166**	**0.168**	-0.027	0.037	**0.133**				
NOA	-0.030	-0.031	-0.296	**-0.085**	**0.197**	**0.135**			
S_GROWTH	**-0.143**	**-0.013**	**-0.051**	**-0.143**	0.081	-0.089	**0.306**		
BTM	0.023	0.032	**-0.283**	**0.315**	**-0.396**	**-0.115**	0.020	**-0.166**	
ROA	**0.289**	**0.261**	**-0.059**	**-0.180**	**0.308**	0.058	**0.118**	-0.085	**-0.198**

This table reports the Pearson's Correlations in the IPR&D sample. The sample includes 457 observations over the period 1993-2007. All variables are defined in the Appendix. Bold values are statistically significant at the 1% level or better.

Table 5: Changes in Discretionary Accruals for IPR&D Sample and Matched Control Sample for Pre- and Post-SFAS 141 and 142

	IPR&D Sample	Matched Control Sample	IPR&D vs. Matched t-stat
DA			
Pre-SFAS 141&142	-3.093	0.333	2.40**
Post-SFAS 141&142	-1.573	-0.335	1.60
P_DA			
Pre-SFAS 141&142	-3.444	0.065	2.50**
Post-SFAS 141&142	-1.624	-0.396	1.61

***, **, * Denote that the differences between the treatment and control groups are statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively (two-tailed).

Table 6: Effect of IPR&D Allocation on Earnings Management

	Panel A		Panel B	
	DA		P_DA	
	(1)	(2)	(3)	(4)
Intercept	10.998	6.887	10.877	7.084
	(0.197)	(0.212)	(0.194)	(0.326)
IPRD	**-4.046*****	**-2.335****	**-4.172*****	**-2.664****
	(0.002)	**(0.050)**	**(0.001)**	**(0.036)**
S141		-2.760**		-2.496**
		(0.022)		(0.032)
SIZE		-0.515*		-0.565**
		(0.076)		(0.052)
LEV		6.336**		6.582**
		(0.039)		(0.027)
NOA		-0.342		-0.381
		(0.831)		(0.807)
S_GROWTH		-0.303		-0.036
		(0.729)		(0.967)
BTM		0.607		0.672
		(0.623)		(0.578)
ROA		9.384***		8.391***
		(0.000)		(0.000)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Two way clusters	No	Yes	No	Yes
Adj. R-Square	2.12%	10.13%	2.20%	8.89%
No. Obs.	914	914	914	914

This table presents the multivariate regression analysis to test Hypothesis 1. We estimate the regression models using the pooled data over the period of 1993– 2007. The dependent variable for regression (1) and (2) is discretionary accruals measured by modified Jones model (*DA*). The dependent variable of (3) and (4) is performance matched discretionary accruals (*P_DA*). All other variables are defined in the Appendix. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively (*P-values* are presented in parentheses below the coefficients).

Table 7: Effect of the Adoption of SFAS 141 and 142 on Earnings Management

	Panel A		Panel B	
	DA		P_DA	
	(1)	(2)	(3)	(4)
Intercept	8.102	8.482	8.481	8.661
	(0.276)	(0.164)	(0.245)	(0.275)
IPRD	-6.594***	-5.460***	-6.719***	-5.734***
	(0.002)	(0.001)	(0.001)	(0.001)
S141	-0.974	-4.308***	-0.827	-4.017***
	(0.731)	(0.002)	(0.766)	(0.003)
IPRD×S141	4.478	5.431**	4.478	5.336**
	(0.112)	(0.024)	(0.105)	(0.035)
SIZE		-0.523*		-0.573**
		(0.069)		(0.048)
LEV		6.078**		6.329**
		(0.042)		(0.030)
NOA		-0.351		-0.390
		(0.827)		(0.802)
S_GROWTH		-0.339		-0.071
		(0.697)		(0.935)
BTM		0.568		0.633
		(0.650)		(0.605)
ROA		9.449***		8.455***
		(0.000)		(0.000)
Joint Test				
IPRD + IPRD×S141	**-2.116**	**-0.029**	**-2.241**	**-0.398**
	(0.252)	**(0.987)**	**(0.217)**	**(0.827)**
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Two way clusters	No	Yes	No	Yes
Adj. R-Square	2.29%	10.44%	2.38%	9.19%
No. Obs.	914	914	914	914

This table presents the multivariate regression analysis to test Hypothesis 2. All variables are defined in the Appendix. The dependent variable for regression (1) and (2) is DA. The dependent variable for regression (3) and (4) is P_DA. Data are from 1993 to 2007. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively. *P-values* are presented in parentheses below the coefficients. For joint test, the coefficient is *F-stat* for tests of sums of coefficients.

Table 8: Effect of IPR&D at the Firm Level on Earnings Management

	Panel A		Panel B	
	DA		P_DA	
	(1)	(2)	(3)	(4)
Intercept	-1.422	2.946	-1.634	2.946
	(0.455)	(0.154)	(0.190)	(0.155)
FIRM_IPRD	**-0.312****	**-0.232*****	**-0.288****	**-0.232*****
	(0.039)	**(0.001)**	**(0.022)**	**(0.001)**
S141R		-2.394***		-2.394***
		(0.001)		(0.001)
SIZE		-0.534**		-0.533***
		(0.012)		(0.006)
LEV		2.294		2.294
		(0.285)		(0.284)
NOA		0.350		0.350
		(0.765)		(0.765)
S_GROWTH		-1.000**		-0.999**
		(0.042)		(0.042)
BTM		-0.620		-0.620
		(0.615)		(0.307)
ROA		3.811***		3.811***
		(0.001)		(0.001)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Two way clusters	No	Yes	No	Yes
Adj. R-Square	2.22%	6.31%	2.16%	5.67%
No. Obs.	1,368	1,368	1,368	1,368

This table reports the multivariate regression results presented in additional tests. All variables are defined in the Appendix. The dependent variable for regression (1) and (2) is DA. The dependent variable for regression (3) and (4) is P_DA. Data are from 1993 to 2011. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively (*P-values* are presented in parentheses below the coefficients).

Table 9: Effect of the Adoption of SFAS 141R on Earnings Management at the Firm Level

	Panel A		Panel B	
	DA		P_DA	
	(1)	(2)	(3)	(4)
Intercept	-1.391	2.919	-1.604	2.960**
	(0.466)	(0.182)	(0.387)	(0.015)
FIRM_IPRD	-0.335**	-0.262***	-0.311**	-0.245***
	(0.035)	(0.001)	(0.039)	(0.001)
S141R	-2.028*	-2.493***	-1.950*	-2.404***
	(0.084)	(0.000)	(0.097)	(0.000)
FIRM_IPRD×S141R	0.365	0.374**	0.375*	0.400**
	(0.131)	(0.032)	(0.109)	(0.023)
SIZE		-0.491**		-0.535***
		(0.016)		(0.005)
LEV		2.094		2.304
		(0.172)		(0.282)
NOA		0.369		0.354
		(0.758)		(0.762)
S_GROWTH		-1.119**		-1.001*
		(0.035)		(0.084)
BTM		-0.777		-0.635
		(0.552)		(0.610)
ROA		4.450***		3.805***
		(0.000)		(0.001)
Joint Test				
FIRM_IPRD + FIRM_IPRD×S141R	**0.030**	**0.099**	**-2.241**	**0.141**
	(0.972)	**(0.541)**	**(0.217)**	**(0.377)**
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Two way clusters	No	Yes	No	Yes
Adj. R-Square	2.16%	6.34%	2.10%	5.61%
No. Obs.	1,368	1,368	1,368	1,368

This table reports the multivariate regression results presented in additional tests. All variables are defined in the Appendix. The dependent variable for regression (1) and (2) is DA. The dependent variable for regression (3) and (4) is P_DA. Data are from 1993 to 2011. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively. *P-values* are presented in parentheses below the coefficients. For joint test, the coefficient is *F-stat* for tests of sums of coefficients.