

The Economics of Fraudulent Accounting

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Abstract

We study the consequences of earnings management for the allocation of resources in the economy, and we argue that fraudulent accounting has important macroeconomic consequences. We first build a model where the costs of earnings management are endogenous, and we show that, in equilibrium, bad managers hire and invest too much, distorting the allocation of real resources. We test the predictions of the model using new historical and firm-level data. We first show that periods of high stock market valuations are systematically followed by large increases in reported frauds. We then show that, during periods of suspicious accounting, insiders sell their company's stocks and managers hire and invest a lot. We also argue that the existence of earnings management can explain periods of "jobless growth". Finally, we show that governance provisions that favor shareholders interests significantly reduce the likelihood of a restatement in the following years.

PRELIMINARY. All comments welcome.

Introduction

On November 8, 2001, Enron Corporation announced that it would restate its earnings for the period 1997 through 2001. The restatement recorded a previously announced \$1.2 billion reduction to shareholders' equity. Reported net income was reduced by \$96 million in 1997, \$113 million in 1998, \$250 million in 1999 and \$132 million in 2000. Consolidation of various special purpose entities increased Enron's debt by \$711 million in 1997, \$561 million in 1998, \$685 million in 1999 and \$711 million in 2000. Enron's stock price collapsed from more than \$30 to less than \$1 between October 16, 2001 and November 28, 2001, and the company, together with 13 of its subsidiaries, filed for Chapter 11 bankruptcy protection on December 2, 2001. In the years prior to its bankruptcy, Enron's insiders sold substantial amounts of their company's stocks. **Figure 1** shows the sales of Enron's stock by former CEO Kenneth Lay, as well as the average transaction price. The product of the two is by construction equal to the dollar amount received by M. Lay in any given year. During the same period, the company was growing extremely quickly: the book value of Enron's assets increased from \$23.5 billion in 1997 to \$65.5 billion in 2000, while Tobin's Q increased from 1.32 to 1.8. At its peak, Enron employed more than 20,000 employees worldwide. Today, about 500 employees remain, and Enron's creditors expect to receive about one-fifth of the estimated \$63 billion they are owed.

In this paper, we focus on the consequences of earnings management for the allocation of resources in the economy. We argue that Enron's story is typical – if somewhat extreme – of periods of high financial valuation. We also argue that fraudulent accounting has important macroeconomic consequences, in particular for the dynamics of employment and investment.

We first build a model where the costs of earnings management are endogenous. We show that when hiring and investment decisions are observable, bad managers who want to hide their poor quality must not only manage their earnings, but also hire and invest like good managers. In equilibrium, they hire and invest too much, distorting the allocation of real resources. As long as managerial rewards are tied to the perceived performance of companies, the model predicts that one should observe more fraudulent accounting in periods of high financial valuations.

We test the predictions of the model using new historical and firm-level data. Using the

records of the Securities and Exchange Commission (SEC), from 1936 to 2003, we first show that periods of high valuations (high stock market over GDP, high price-earnings ratios) are systematically followed by large increases in civil injunctive actions and administrative proceedings by the SEC.

We then move to firm level data on earnings restatements for the period 1997-2002. We show that the dynamics of restating firms resemble the dynamics of Enron. During periods of suspicious accounting, insiders sell the stock, managers hire and invest a lot, and they report high profits. After the restatements are announced, the firms shrink quickly. The macroeconomic consequences are easily visible: the publicly traded firms that restated their earnings in 2000 or 2001 lost between 250,000 and 500,000 jobs between 2000 and 2002. Moreover, in industries where there were a lot of restatements, non-restating firms also shrank or grew substantially more slowly than in other industries. At the same time, labor productivity grew relatively faster in these industries. The existence of earnings management can therefore explain periods of "jobless growth". Finally, we show that governance provisions that favor shareholders' interests, measured in 1997, significantly reduce the likelihood of a restatement in the following years.

There is a large existing literature on earnings management. In their review of the literature, Healy and Wahlen (1999) argue that "prior research has focused almost exclusively on understanding whether earnings management exists and why." They conclude that it does, and that the main proximate causes are managerial compensation and regulatory intervention. Recent research has shown that managers with large stock options portfolios are more likely to manipulate earnings (measured by accruals in Bergstresser and Philippon (2002), and restatements in Burns and Kedia (2004)), and that they succeed in manipulating stock prices and in making money on concurrent insider trading (Beneish and Vargus (2002)). However, Healy and Wahlen (1999) also point to a crucial question that the academic research has left unanswered: What is the effect of earnings management on the allocation of resources? To the best of our knowledge, our paper is the first to address this issue. On the theoretical front, following Stein (1989), previous models have assumed ad-hoc specifications for the costs of earnings management. We show that these assumptions are not necessary, since real costs arise endogenously when hiring and investment decisions are observable.

1 Model

We now present a model of earnings manipulation. We first describe the case where the underlying cash flows are exogenous. This case has been the main focus of the literature so far, but it is not very useful to think about the real effects of fraudulent accounting. We then show that the real inefficiencies arise from the *interaction* between endogenous hiring and investment decisions, and the opportunity to manipulate earnings.

1.1 Exogenous Fundamental Earnings

The model has two periods $t = 1, 2$ and a large number of firms whose fundamental earnings (x) are constant over time and depend on the quality of their managers. There are two types of managers. Half are bad ($x = x_L$) and half are good ($x = x_H$). The type of the manager is known only to the manager. Reported earnings (y) are equal to fundamental earnings plus discretionary accruals (a) :

$$\begin{aligned}y_1 &= x + a , \\y_2 &= x - a .\end{aligned}$$

Each firm has one share, and all earnings are paid out as dividends. Hence, each stock holder receives y_t in period t . Managers know x , and they own $\alpha \in (0, 1)$ shares that they *have to sell between the two periods*. The appendix shows how to extend the model to allow for endogenous trading. If they manage their earnings, they are caught and punish with some probability, and we let γ be the expected punishment.

Let λ be the fraction of bad managers who manipulate (strategy m) and $1 - \lambda$ the fraction of bad managers who report honestly (strategy o). Let $\hat{\lambda}$ be the market belief about λ . We focus throughout on equilibria where good managers report honestly. The set of equilibria depends in general on the details of the information structure¹, and on the functional form for the punishment technology (γ)². In this respect, our setup is clearly special, but it is not arbitrary. One of the clearest results in the literature on earnings management is that stock prices react strongly to announcements of earnings restatements.

¹See Guttman, Kadan, and Kandel (2004)

²It is easy to construct examples where good managers also manipulate. It is also possible that they succeed in separating from the bad types, if, for instance, the probability of detection increases with the amount of manipulation.

Therefore, pooling does occur in the real world. We do not pretend to show theoretically that this should be expected, but rather, we focus on pooling equilibria because they appear empirically relevant.

Let p be the desired price-earnings ratio³. Assuming efficient financial markets, the market value of the firm will be:

$$V(y_1, \hat{\lambda}) = pE[y_2 | y_1] = \left\{ \begin{array}{l} V_L = px_L \text{ if } y_1 = x_L \\ V_H(\hat{\lambda}) \text{ if } y_1 = x_H \end{array} \right\},$$

where

$$V_H(\hat{\lambda}) = p \frac{\hat{\lambda}(x_L - a) + x_H}{\hat{\lambda} + 1},$$

and

$$a = x_H - x_L.$$

The expected utilities of managers under strategies o and m are

$$U^o = \alpha V_L; U^m = \alpha V_H - \gamma.$$

Definition 1 *An equilibrium is a market belief $\hat{\lambda}$ such that bad managers choose $\max(U^o, U^m)$ and $\lambda = \hat{\lambda}$.*

Condition 1: $\alpha p(x_H - x_L) > \gamma$

Under condition 1, $\hat{\lambda} = 0$ is not an equilibrium. On the other hand, $\hat{\lambda} = 1$ is not an equilibrium either, since $V_H(1) = px_L$. The equilibrium condition $U^o = U^m$ implies

$$\frac{1 + \hat{\lambda}}{1 - \hat{\lambda}} = \frac{\alpha p}{\gamma} (x_H - x_L). \quad (1)$$

Equation (1) has all the intuitive properties one would expect. Earnings management increases with the amount of stocks owned by the manager, and with the difference between the fundamental values of good and bad managers.

³Remember that earnings are equal to dividends.

1.2 Endogenous Factor Demands

Our main focus in this paper is on the allocation of resources in the economy. To study this question, we extend the model to incorporate production decisions by the managers. By assumption, when fundamental earnings are exogenous, earnings manipulation does not affect the efficiency of the economy. To overcome this problem, the literature has typically introduced ad-hoc costs of manipulation. Here we show that this assumption is unnecessary: inefficiencies arise automatically when the hiring and investment decisions are endogenous (and observable), because the need to mimic the good types distort all the observable actions by the bad types.

Suppose that the production technology is Leontief with scale θ that is private information of the manager. Assume for simplicity that labor is the only factor of production, supplied at price w . Profits are given by

$$x = \min(n, \theta) - wn .$$

Assume that $w < 1$, and that $\theta \in \{1, 1 + \Delta\}$ for bad and good managers respectively. The first best level of employment is always

$$n^*(\theta) = \theta = \left\{ \begin{array}{l} 1 \text{ for bad managers} \\ 1 + \Delta \text{ for good managers} \end{array} \right\} ,$$

but since n is observable, bad managers who manipulate have to hire just like good ones, therefore

$$n^m = 1 + \Delta .$$

So we have the following true profits:

$$\begin{aligned} x_H^* &= (1 - w)(1 + \Delta) , \\ x_L^* &= 1 - w , \\ x_L^m &= 1 - w(1 + \Delta) . \end{aligned}$$

Discretionary accruals have to make up not only for the fundamental difference in quality $\Delta(1 - w)$, but also for the inefficient allocation of resources Δw :

$$a = x_H^* - x_L^m = \Delta .$$

Making n observable creates misallocation and real costs. Unlike previous models (Stein (1989)), we do not need to assume that manipulating accruals is costly in and of itself. The market value of a firm reporting high earnings is

$$V_H(\hat{\lambda}) = p \frac{\hat{\lambda}(x_L^* - a) + x_H^*}{1 + \hat{\lambda}},$$

and the equilibrium condition

$$\begin{aligned} U^o &= U^m \Leftrightarrow \alpha(V_H - V_L) = \gamma \\ \gamma &= \frac{\alpha p}{1 + \hat{\lambda}} (x_H^* - x_L^* - \hat{\lambda}a), \end{aligned}$$

leads to

$$\frac{1 + \hat{\lambda}}{(1 - \hat{\lambda}) - w} = \frac{\alpha p \Delta}{\gamma}.$$

Proposition 1 *The fraction $(\hat{\lambda})$ of managers who manipulate their earnings increases with the desired price-earnings ratio (p) and with the number of stocks owned by managers (α), and decreases with the real wage (w) and the costs of manipulation (γ).*

The only critical assumption we have made is that good managers should optimally hire more than bad managers, an assumption that seems highly plausible. The Leontief technology makes the formula easier to read, but the results generalize to any production function super-modular in (n, θ) .⁴

Bergstresser and Philippon (2002) and Burns and Kedia (2004) have already confirmed the comparative statics with respect to α . In the empirical analysis below, we want to focus on the other predictions of the model:

1. Fraudulent accounting is more likely when price-earnings ratios are high.
2. Insider trading is higher during fraudulent periods.

⁴An example is when managers influence the productivity of their companies and output is $y = \theta f(n)$ for some increasing function $f(\cdot)$. A case that would not deliver the same result is $y = \theta + f(n)$ because it makes optimal employment independent of the type of the manager. The evidence clearly supports the super-modular case, since, for instance, managers of large companies are paid more than managers of small companies.

3. The fraudulent firms mimic the hiring and investment decisions of successful firms.

A direct implication of prediction 3 is that fraudulent firms end up larger than predicted by their technology. Hence, one would expect to see these firms shrink after they caught. Finally, an open question is whether fraudulent firms have adverse externalities on non-fraudulent firms.

2 Historical Evidence from SEC actions

We first look at the historical evidence and we ask if it is indeed true that high market valuations (high P/E ratios) are followed by high numbers of reported accounting frauds.

The data come from the annual reports of the Securities and Exchange Commission (SEC), from 1936 to 2003. The recent reports (from 1997 on) are available online. The other reports are available on paper from the SEC. The SEC classifies its actions into several categories. We use the longest available series, that combines civil injunctive actions and administrative proceedings initiated in each year (ACT_t). Civil judicial actions usually involve securities fraud. Administrative proceedings involve allegations that a firm or individual has violated GAAP or that an individual has caused a firm or other individuals to act unlawfully. Finally, we use the logarithm of the market value of listed securities (V_t) over GDP (Y_t) as our proxy for the desired price-earnings ratio, because P/E ratios are not available before 1951⁵.

Figure 2 plots the number of actions initiated by the SEC and the average of $\log\left(\frac{V_t}{Y_t}\right)$ over the past 5 years. Both series share an upward trend, and it is also clear that they are positively correlated at medium run frequencies. To confirm the visual impression, we ran the simple regression (standard errors are below the coefficients):

$$ACT_t = \alpha + \underset{(21)}{137} \times \frac{\sum_{i=0}^4 \log\left(\frac{V_{t-i}}{Y_{t-i}}\right)}{5} + \underset{(0.5)}{4.2} \times t + u_t$$

The t-statistic on the P/E proxy is more than 6 even after removing the common trend. We conclude that the link between SEC actions and market valuations is not exclusively

⁵In the post 1951 sample, using actual P/E ratios gives very similar results. Note however, that P/E ratios are constructed with the earnings reported by firms, and, as the model makes clear, these need not be the correct earnings. In this case, using GDP (or any other measure based on NIPA data) is conceptually better. The issue of course is that the fraction of listed companies has increased over time, hence the trend in $\frac{V}{Y}$.

driven by the late 1990's experience.

The main issue here is that the reports are endogenous. An increase in the number of reported cases can come from an increase in frauds, an increase in scrutiny, or both. To interpret the data, we maintain the assumption that the SEC is (at least partly) run rationally. In this case, the SEC should try to increase its investigations when frauds go up. Therefore, the increase in reported cases could over-estimate the true increase in fraud. Note however, that this does not affect our interpretation of the evidence. It simply means that we may need to scale down our estimated elasticity of fraud cases to valuations. On the other hand, there are good reasons to believe that the number of reported cases might under-estimate the truth. The SEC has limited resources and cannot expand quickly. In the short run, we would therefore expect the detection technology to exhibit decreasing returns to scale, and the number of reported cases could increase less than one for one with the true number of frauds.

3 Firm Level Evidence from the 1990's

The historical evidence of section 2 is informative, but more direct tests of the model presented above can be performed only at the firm level. We start by compiling an original data set for the US in the late 1990's.

3.1 Data

There are three data sources.

First, we need to find a good measure of accounting fraud. We start from a list of firms that restated their earnings in the late 1990's. The list was compiled by the General Accounting Office in 2002 (GAO (2002)). A financial restatement occurs when a company, either voluntarily or prompted by auditors or regulators, revises public financial information that was previously reported. Using Lexis-Nexis, the GAO "identified 919 financial restatements by 845 public companies from January 1, 1997 to June 30, 2002, that involved accounting irregularities resulting in material misstatements of financial results."⁶ 645 of these companies were publicly traded. The number of identified restatements rose from 92

⁶These announcements exclude stock splits, changes in accounting principles, and other restatements that were not made to correct mistakes in the application of accounting standards.

in 1997 to 225 in 2001. "The proportion of listed companies on NYSE, Amex and NASDAQ identified as restating their financial reports tripled from 0.89% in 1997 to 2.5% percent in 2001. From January 1997 through June 2002, about 10% of all listed companies announced at least one restatement." Moreover, recent restatements have involved larger firms: the average market capitalization of restating companies quadrupled between 1997 and 2002, from \$500 millions to \$4 billions, while the average size of listed companies increased only about 60% over the same period. GAO also reports the reasons for the restatements. Errors in revenue recognitions account for roughly 40% of the cases. Restatements due to improper cost accounting explain 16%, issues with loans (write-offs, reserves, bad loans, etc..) 14%, and assets and inventories (goodwill, write downs, inventory valuation, etc..) 9%. The remaining 20% of cases are linked to R&D, M&A, securities (with Enron for instance), reclassifications (of debt payments) and related party transactions. Restatements are not fully anticipated by the market: the market-adjusted return over the three trading days surrounding the initial announcement is -10%. For the 575 restatements for which 6 months of data were available around the announcement, the 6 months abnormal holding period return was -18%.

Second, we use the name of each company to match the GAO data to COMPUSTAT. Out of the 645 publicly traded companies, we were able to match 562 announcements. When we impose the requirement that there be at least 4 observations without missing values for sales, assets and number of employees between 1997 and 2002, we drop to 485 matches. In 459 cases, we were able to obtain the beginning and end dates of the restated periods, in addition to the date on which the restatement was announced. Out of these 485, only 357 are present every year from 1997 to 2002, because companies are often delisted for failure to meet minimum listing standards. In addition, at least 25 firms filed for bankruptcy shortly after the announcement, and 18 were acquired or merged with another company.

Finally, we use the EXECUCOMP database to obtain information about insider trading for a sub-sample of the COMPUSTAT firms. EXECUCOMP covers only the largest firms, and we were able to match only 122 firms (118 with beginning and end dates for the restated period).

Descriptive statistics are presented in **table 1** for the different samples. Restating firms have the same age as non-restating firms, but they were somewhat larger in 1994.

EXECUCOMP firms are much larger than the rest of the sample. The distribution of announcements per year shows the clear upward trend already mentioned (recall that 2002 is not complete since the data stop in June). The restated period covers a bit less than 5 quarters on average, and it takes a bit more than 2 quarters for the announcement to be made after the end of the suspicious period. It is useful to keep in mind that only 16% of the restatements can be formally attributed to external parties' actions (like the SEC or independent auditors), but also that many firms do not mention in their reports the real reason for their restatements, unless they are somehow forced to do so.

3.2 Earnings Restatement, Firm Dynamics and Insider Trading

The historical evidence has confirmed the first prediction of the model. We now turn to predictions 2 and 3. We want to compare the dynamics of restating firms during and after the restated period, to other firms in the same industries. Before turning to the econometric analysis, we can get a good sense of the data by looking at **figures 3 and 4**. These figures display the raw (no industry or size controls) data based on the firms that announced a restatement in 2000 (111 firms) or in 2001 (120 firms).

Figure 3 shows the total number of people employed at restating firms, from 1997 to 2002. One issue is that many firms drop out of the sample after the announcements, because of delisting, sometimes due to bankruptcy. A prime example is Enron for which we have complete data only until 2000. The left panel includes all 238 firms, and compares their employment to the aggregate non-farm payrolls: it went up by half a million (+20%) between 1997 and 1999, and down by 0.6 million (-20%) between 2000 and 2002. Over the same periods, non-farm payrolls went up by 6.7% and then down by 1.5%. The relative increases and decreases are clearly much larger than for the economy as a whole. However, to the extent that some firms drop out of the sample but continue operating, these number may over-estimate the true dynamics. The right panel uses a constant sample of firms (73 firms in 2000, and 92 firms in 2001) and compares them to the constant sample of all of non-restating firms in COMPUSTAT. Restating firms grew more than non-restating firms before the announcement, and shrank much faster afterwards. Finally, the right panel also gives a sense of the coverage of our data set: a bit less than a third of total non-farm

payrolls.⁷ **Figure 4** compares the mean growth rates of restating and non-restating firms (for the unbalanced sample since this is not an issue with year-to-year growth rates). The left panel shows the average growth rate of total market values for the two groups, and the right panel shows the average growth rate of book assets. The same picture emerges as in figure 3.

We now turn to more formal econometric tests. Let $I(i)$ be the industry of firm i , and let $\tau(i)$ be the restated period for firm i ($\tau(i) = \emptyset$ for firms that do not restate). We will estimate

$$y_{it} = \beta^{pre} \mathbf{1}_{t \in \tau(i)} + \beta^{post} \mathbf{1}_{t > \tau(i)} + \gamma' X_{i,94} + \alpha_{t,I(i)} + u_{it} \quad , \quad t = 1994..2002 \quad (2)$$

where $X_{i,94}$ includes the $\log(\text{age})$ and $\log(\text{book assets})$ for firm i in 1994. We use 22 industries and $\alpha_{t,I(i)}$ captures 198 *industry* \times *year* dummies. We will look at all the relevant dependent variables (y_{it}): insider trading, and the growth rates of market values, book assets, number of employees, sales and sales per employee. The coefficients β^{pre} will show if the restating firms grew faster than initially comparable firms in their industry during the suspicious period, and $\beta^{post} \mathbf{1}_{t > \tau(i)}$ show if they grew more slowly after the restatement.

The insider trading variable is only available in the EXECUCOMP sample. We want to test whether insiders exercise relatively more options in the suspicious period, so we need to normalize the amount of options exercised. Normalizing by the market value of equity or the number of outstanding shares clearly biases the results against large firms. We choose to work with the Value Realized from Options Exercised (by the CEO) divided by the Value Realized from Options Exercised plus the Black-Scholes Value of Exercisable Options (of the CEO).

The results are presented in **table 2**, for the EXECUCOMP sub-sample and COMPU-STAT separately. During the period of suspicious accounting, CEOs exercise more stock options, and invest and hire more than comparable firms, and also significantly more than they will after the restatement is announced. The p-values show that we can safely conclude that growth rates of assets, employees and market values were higher during the restated periods than after, as predicted by the model. The results for sales are more noisy, as

⁷But a much larger share of output (more than 1/2) since only large firms with relatively high labor productivity are included.

expected since sales are not directly controlled by the manager. Interestingly, the growth rates of sales per employee are not significantly different across firms and over time. Taken together, these findings provide strong support for the model of section 1

There are two main alternative interpretations that we wish to discuss. First, one might argue that earnings restatement do not reflect genuine frauds, but rather excessive optimism by the manager. This might explain the relatively higher growth rates before the restatement, and relatively lower growth rates afterwards. However, this interpretation is inconsistent with the manager selling the stock of his or her company⁸. Second, one could argue that managers foresaw the arrival of a negative shock, and decided to hide it for a while by managing earnings. In this sense, the firms were bound to shrink, and the managers simply delayed the inevitable. We would argue that this is just a reinterpretation of the model presented above. The model explains why these firms decided to expand so much despite knowing they were likely to shrink even faster in the near future.

3.3 Industry Dynamics and Externalities

An open question is whether restatements also affect firms that do not restate. There are two main reasons to think that this may be the case. First, some non-restating firms surely engaged in earnings management, but probably to a lesser extent than firms that eventually had to restate. In this case, our control group is not valid and our results under-estimate the true impacts of earnings management. Second, investors may draw negative inferences about all firms that belong to an industry where many accounting frauds have been revealed, even if some of the firms were actually honest.

On the other hand, there are equilibrium reasons to expect that non-restating firms may benefit from the announcements of restatements by their competitors. If they did not themselves manage their earnings, and if investors do not become suspicious of them, non-restating firms should expand in response to the negative shocks affecting other firms in their industry.

We investigate which effect dominates by estimating

$$y_{it} = \beta \bar{A}_{I(i),t-1} + \gamma' X_{i,94} + \alpha_t + \alpha_{I(i)} + u_{it} \quad , t = 1994..2002 \quad (3)$$

⁸Ofek and Yermack (2000), looking at US executives, document that nearly all executive stock option exercises are followed by share sales.

for firms that *do not restate* ($\tau(i) = \emptyset$, at least between January 1997 and June 2002). $\bar{A}_{I(i),t-1}$ is the fraction of firms in industry $I(i)$ that restated at time $t - 1$. As in equation 2, $X_{i,94}$ includes the log(age) and log(book assets) for firm i in 1994. We cannot use year/industry dummies, since our identification comes from time variation in restatements at the industry level, but we include 9 year dummies (α_t) and 22 industry dummies ($\alpha_{I(i)}$). The results are in **table 3**. Non-restating firms grow more slowly when they belong to an industry that had a lot of announced restatements in the preceding years. The effect is clear and strong for assets and employees, and just significant for sales. Interestingly however, sales per employee grow faster following a wave of restatement, because the number of employees shrinks faster than the sales. In other words, fraudulent industries are characterized by high labor productivity growth together with negative employment growth, even for firms that do not appear to have managed their earnings too much.

The effects are quantitatively large. The mean of $\bar{A}_{I(i),t}$ is 1.6%, the standard deviation is 2%, and, on average across industries, $\bar{A}_{I(i),t}$ went from 0% in 1996 to 5% in 2001. At this point however, we cannot say that the increase in fraud detections decreased the growth rate of employment by 9%, for two reasons. First, we have not established causality, we have simply shown that announcements predict slower growth. Second, the identification applies across industries, so it does not capture the general equilibrium effects.

The main identification issue is omitted variable bias: the increase in restatements and the subsequent decline in growth could both be caused by some negative shock. The fact that sales per employee increase, while hiring and investment decline, is not consistent with the usual TFP shock interpretation⁹, but we cannot rule out other, more sophisticated, explanations.

3.4 Predicting Accounting Fraud: The Role of Governance

We have shown that all the predictions of the model find strong support in the data, and that the dynamics of restating firms break the link between labor productivity and labor demand. Our final effort is to understand the ex-ante factors that make fraudulent accounting more or less likely. We run predictive logit regressions in the cross-section of firms present in our

⁹We have used sales per employee, not TFP, because comparisons of the value of book assets across firms is subject to large measurement errors.

sample in 2002

$$P(\text{fraud}_{i,02}) = F(\gamma' X_{i,97} + \alpha_{I(i)}) ,$$

where fraud_{02} is a dummy variable for any restatement between 1998 and 2002, $F(\cdot)$ is the logistic function, $\alpha_{I(i)}$ is a set of 22 industry dummies, and $X_{i,97}$ includes age, assets and Tobin's Q in 1997, as well as governance variables. The governance variables come from the Institutional Investor Research Center (IRRC). IRRC follows 24 governance provisions that appear beneficial to management, and which may be harmful to shareholders. Gompers, Ishii, and Metrick (2003) have used all 24 provisions to construct an index of bad governance, and have shown that the index is negatively correlated with Tobin's Q. Recently, Bebchuk, Cohen, and Ferrell (2004) have argued that staggered boards, limits to shareholder bylaw amendments, super-majority requirements, poison pills and golden parachutes account for most of the correlation.

In our data set, 1146 firms have IRRC data available in 1997. **Table 4** shows that firms with bad governance in 1997 were more likely to restate between 1998 and 2002 than comparable firms in the same industry. Among the individual provisions, we find that classified boards, poison pills and limits to amend the corporate charter are significant.

4 Conclusion

Earnings management distorts the allocation of resources because it allows bad managers to hire and invest too much in order to mimic good managers. When they are caught and forced to restate, their firms shrink rapidly, and labor productivity increases, while labor and capital demands fall. Thus, waves of earnings management are followed by periods of jobless growth and low investment. We have also shown that governance provisions that favor shareholders' interests significantly reduce the likelihood of earnings management.

The analysis can be extended in several ways. First of all, we know now that earnings management is linked to CEO compensation. Yet, we do not know how optimal compensation should look like in a world where earnings can be manipulated. Second, we have provided some evidence consistent with the idea that honest firms can be affected by the behavior of dishonest managers, but we need more empirical work and better theories to be able to establish causality, and understand the underlying mechanisms. Finally, we will

need a general equilibrium model to fully understand the macroeconomic implications of earnings management.¹⁰

¹⁰See Clementi and Philippon (2004) for a dynamic partial equilibrium model. Philippon (2003) studies imperfect governance in a standard real business cycle model, calibrated for the US economy.

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A A Brief Review of the Literature on Earnings Management

In this section, we discuss previous research on earnings management, following Dechow, Kothari, and Watts (1998). Economists write models about cash flows. In practice, investors look at earnings. Why? Because earnings forecast future cash flows. Consider a firm and assume that sales follow a random walk

$$s_t = s_{t-1} + \varepsilon_t .$$

Earnings (assuming a constant profit rate π) are

$$e_t = \pi s_t ,$$

and we assume that accounts receivable (rec_t) and payable (pay_t) are constant fractions of sales and total costs

$$rec_t = \alpha s_t , \text{ and } pay_t = \beta (1 - \pi) s_t .$$

In this simplified setup, cash flows are simply given by

$$\begin{aligned} c_t &\equiv e_t + \Delta pay_t - \Delta rec_t \\ &= \pi s_t + [\beta (1 - \pi) - \alpha] \varepsilon_t , \end{aligned}$$

so we see that

$$E_t [c_{t+1}] = \pi s_t = e_t .$$

To forecast future cash flows, and therefore to compute the value of the firm, earnings are the place to start. The value of the firm at the end of period t is

$$V_t = \frac{e_t}{r} ,$$

where r is the risk adjusted discount rate. Dechow, Kothari, and Watts (1998) expand this model to take into account other important features of accruals, such as depreciation, and show that, empirically, accruals are indeed the better predictors of future cash flows.

What we would like the reader to take away from this brief discussion is that earnings forecast cash flows, and that, to a first order, investors are right to focus on earnings when assessing the value of a firm. The problem, however, is that earnings can be manipulated. For instance, accruals, defined in our example as $\Delta rec_t - \Delta pay_t$, cannot be verified. Investors need to trust a manager who claims high earnings coming from large future receivables. Unfortunately, there are documented cases of earnings management.

1. Firms avoid negative numbers. There is a higher than expected frequency of firms with slightly positive earnings changes. Burgstahler and Dichev (1997), and see Guttman, Kadan, and Kandel (2004) for a model.

2. Who manipulates earnings? Bergstresser and Philippon (2002) and Burns and Kedia (2004) show that managers with a lot of stock options are more likely to engage in earnings management.
3. Accruals are mispriced. Sloan (1996) documents the presence of negative excess returns after large positive accruals. In fact, excess returns follow high accruals *that coincide with insider selling the stock*, as shown by Beneish and Vargus (2002)

B Extension of Model to Endogenous Trading Decision

In this section, we briefly show how the model extends to the case where trading is an endogenous decisions for (at least some) managers. A fraction δ of the managers are hit by liquidity shocks and have to trade. The remaining $1 - \delta$ decides to trade or not, based on their private information. Managers who are not hit by a liquidity shock consume at the end of period 2.

Claim: Good managers do not trade unless they have to, and bad managers who have manipulated always trade.

The proof is straightforward. Good managers are better off waiting since they would have to sell below the market price. Bad managers who manipulated their earnings at $t = 1$ are better off trading since their manipulation will be found out at time $t = 2$.

$$\begin{aligned} V_H(\hat{\lambda}, trade) &= p \frac{\hat{\lambda}(x_L - a) + \delta x_H}{\hat{\lambda} + \delta}, \\ V_H(notrade) &= px_H, \end{aligned}$$

The equilibrium condition becomes

$$\frac{\delta + \hat{\lambda}}{\delta - \hat{\lambda}} = \frac{\alpha p}{\gamma} (x_H - x_L) .$$

Under condition 1, the fraction of bad firms that inflate earnings is strictly between 0 and 1, and is increasing in $\frac{\alpha p}{\gamma} (x_H - x_L)$ and in δ

Table 1. Descriptive Statistics

Sample		COMPUSTAT					EXECUCOMP				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	
Non Restating Firms	Year	46526	1998.07	2.50	1994	2002	8179	1997.90	2.36	1994	2002
	Market Value (growth rate)	45174	0.03	0.52	-4.53	5.81	8141	0.10	0.39	-3.01	2.90
	Book Assets (growth rate)	46526	0.09	0.41	-5.18	4.39	8179	0.13	0.28	-2.30	3.26
	Number of Employees (growth rate)	46526	0.05	0.42	-8.01	7.73	8179	0.07	0.27	-4.95	2.94
	Sales (growth rate)	46526	0.10	0.51	-9.32	9.09	8179	0.11	0.30	-6.09	4.11
	Log(Book Assets) in 1994	46526	0.33	2.35	-9.33	9.09	8179	2.39	1.89	-2.91	7.93
	Log(Age) in 1994	46526	1.93	1.06	0.69	3.87	8179	2.58	1.07	0.69	3.83
	Relative Value of Exercised Options	.	.	.	.	.	8179	0.21	0.31	0.00	1.00
Restating Firms	Year	3873	1998.16	2.48	1994	2002	1028	1997.90	2.34	1994	2002
	Market Value (growth rate)	3809	0.04	0.59	-3.72	5.35	1024	0.12	0.44	-1.90	2.84
	Book Assets (growth rate)	3873	0.10	0.44	-2.95	3.48	1028	0.14	0.32	-1.41	2.72
	Number of Employees (growth rate)	3873	0.06	0.41	-4.89	3.68	1028	0.08	0.34	-4.66	1.95
	Sales (growth rate)	3873	0.11	0.51	-6.59	4.68	1028	0.11	0.32	-3.42	2.18
	Log(Book Assets) in 1994	3873	0.55	2.19	-3.96	8.54	1028	2.57	1.75	-1.80	6.91
	Log(Age) in 1994	3873	1.93	1.12	0.69	3.78	1028	2.78	1.04	0.69	3.78
	Relative Value of Exercised Options	.	.	.	.	.	1028	0.23	0.32	0.00	1.00
	Reported Length of Restated Period (quarter)	459	4.83	3.82	1	20	118	5.01	3.62	1	17
	Delay between End of Restated Period and Announcement	459	2.24	2.24	0	22	118	2.08	2.10	0	16
	Distribution of Announcements by Year	year	Freq.	Percent			year	Freq.	Percent		
		1997	50	10.31			1997	11	9.02		
		1998	57	11.75			1998	9	7.38		
1999		94	19.38			1999	24	19.67			
2000		111	22.89			2000	26	21.31			
2001		120	24.74			2001	48	39.34			
2002		53	10.93			2002	4	3.28			
Total	485	100			Total	122	100				

Note: Relative Value of Exercised Options is (Value Realized from Options Exercised) / (Value Realized from Options Exercised + Black-Scholes Value of Exercisable Options)

Table 2: Dynamics of Restating Firms

Sample	EXECUCOMP						COMPUSTAT				
	Relative Value of Exercised Options	Market Value (growth rate)	Book Assets (growth rate)	Number of Employees (growth rate)	Sales (growth rate)	Sales per Employee (growth rate)	Market Value (growth rate)	Book Assets (growth rate)	Number of Employees (growth rate)	Sales (growth rate)	Sales per Employee (growth rate)
During Restated Period (pre)	0.046 2.42	0.049 3.25	0.04 3.27	0.036 3.1	0.023 1.92	-0.013 -1.76	0.057 5.59	0.071 7.64	0.047 5.41	0.05 4.76	0.003 0.42
After Restated Period (post)	-0.04 -1.61	-0.054 -1.95	-0.07 -2.74	-0.05 -2.16	-0.04 -1.49	0.01 0.71	-0.078 -4.94	-0.089 -6.28	-0.058 -4.47	-0.068 -3.96	-0.01 -0.76
<i>p-value of test for equality of pre and post</i>	<i>0.0019</i>	<i>0.0017</i>	<i>0.0001</i>	<i>0.0012</i>	<i>0.0427</i>	<i>0.1891</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0.4075</i>
log(Age) in 1994	0.004 1.23	-0.008 -2.52	-0.015 -5.4	-0.011 -4.43	-0.013 -5.13	-0.003 -1.52	0.005 4.68	0.007 6.46	0.005 4.74	0.003 2.11	-0.002 -2.3
log(Assets) in 1994	0.011 2.09	-0.024 -5.16	-0.038 -8.79	-0.042 -9.6	-0.041 -9.27	0 0.1	0.007 3.52	-0.029 -14.56	-0.036 -18.51	-0.047 -21.09	-0.011 -6.64
Year*Industry Dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R2	0.06	0.139	0.114	0.095	0.121	0.045	0.101	0.056	0.036	0.037	0.011
N	9207	9165	9207	9207	9207	9207	48983	50399	50399	50399	50399

Source: GAO and Compustat, sample period 1994-2002. **Coefficients** in bold, t-statistics below coefficients. Standard errors are robust and corrected for firm level clustering. We use 22 industries, so there are 198 Year*Industry Dummies. Excluded industries are Real Estate, Health, Education and Entertainment. Relative Value of Exercised Options is (Value Realized from Options Exercised) / (Value Realized from Options Exercised + Black-Scholes Value of Exercisable Options)

Table 3: Dynamics of Non-Restating Firms

Dependent Variable	Market Value (growth rate)	Book Assets (growth rate)	Number of Employees (growth rate)	Sales (growth rate)	Sales per Employee (growth rate)
Average Number of Restatements in Industry in Previous Year	-1.709 -4.76	-1.233 -4.03	-1.793 -5.81	-0.7 -2	1.092 3.75
log(Assets) in 1994	0.004 3.92	0.006 6	0.004 4.37	0.002 1.62	-0.002 -2.53
log(Age) in 1994	0.01 4.4	-0.028 -13.34	-0.035 -17.38	-0.046 -19.95	-0.011 -6.62
Year Dummies	yes	yes	yes	yes	yes
Industry Dummies	yes	yes	yes	yes	yes
N	45174	46526	46526	46526	46526
r2	0.053	0.032	0.024	0.027	0.004

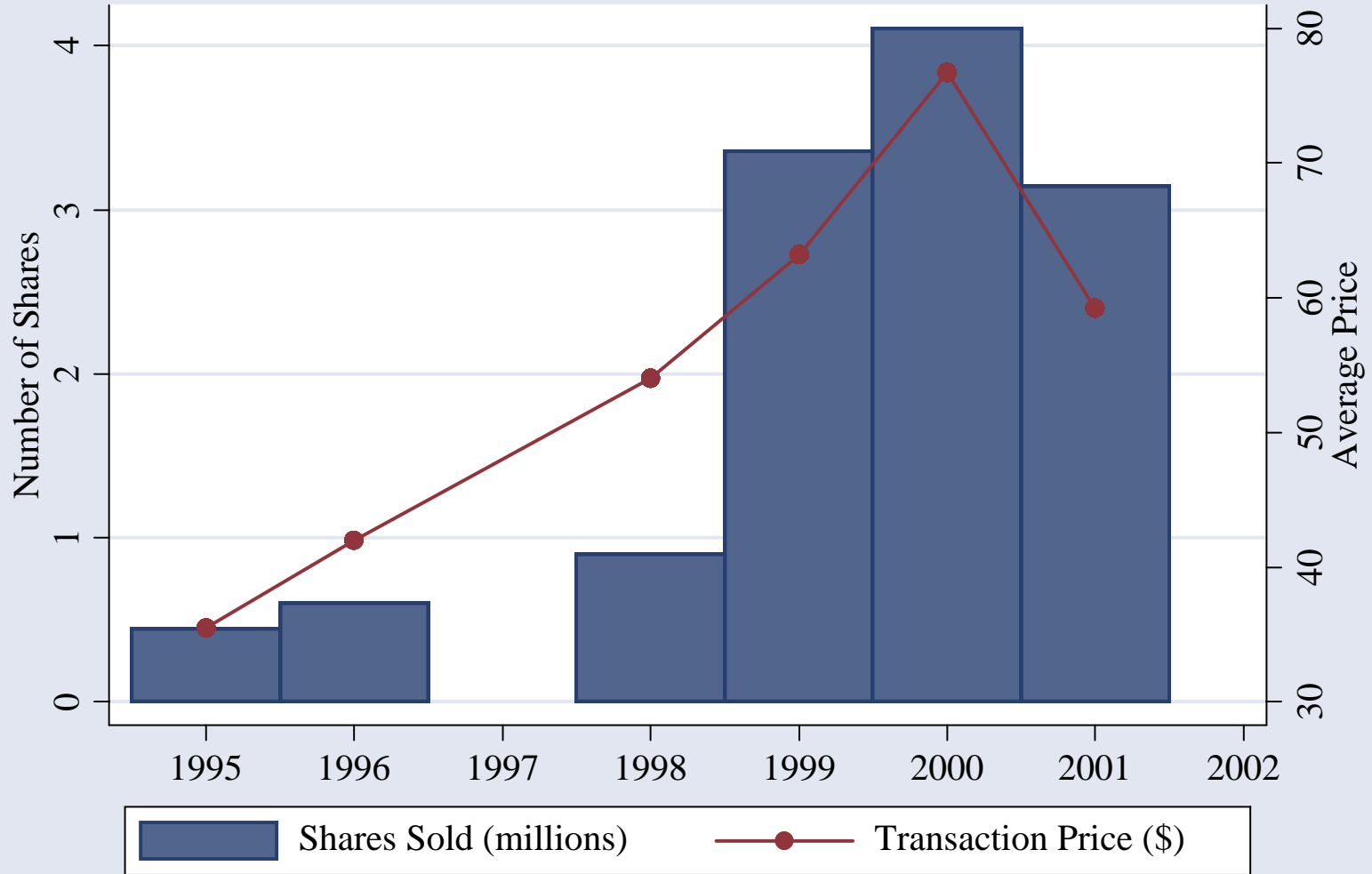
Source: GAO and Compustat, sample period 1994-2002. Coefficients in bold, t-statistics below coefficients. Standard errors are robust and corrected for firm level clustering. We use 22 industries. Excluded industries are Real Estate, Health, Education and Entertainment.

Table 4: Predicting Restatement by 2002 using Corporate Governance in 1998.

Dependent Variable is Dummy for Restatement between 1998 and 2002.						
Independent Variables, all measured in 1998	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Bebchuck et al. index	0.203 2.83					
Gompers et al. index		0.095 2.68				
Classified Board			0.451 2.19			
Poison Pills				0.399 2		
Limits to Amend Corporate Charter					1.073 2.19	
Golden Parachute						0.345 1.74
Log Tobin's Q	0.366 1.69	0.312 1.46	0.294 1.4	0.302 1.43	0.278 1.34	0.309 1.48
Log Age	0.055 0.8	0.027 0.39	0.063 0.91	0.048 0.71	0.056 0.83	0.059 0.85
Log Assets	0.86 1.92	0.923 2.01	0.867 1.92	0.899 2.02	0.941 2.08	0.873 1.93
Industry Dummies	yes	yes	yes	yes	yes	yes
N	1146	1146	1146	1146	1146	1146

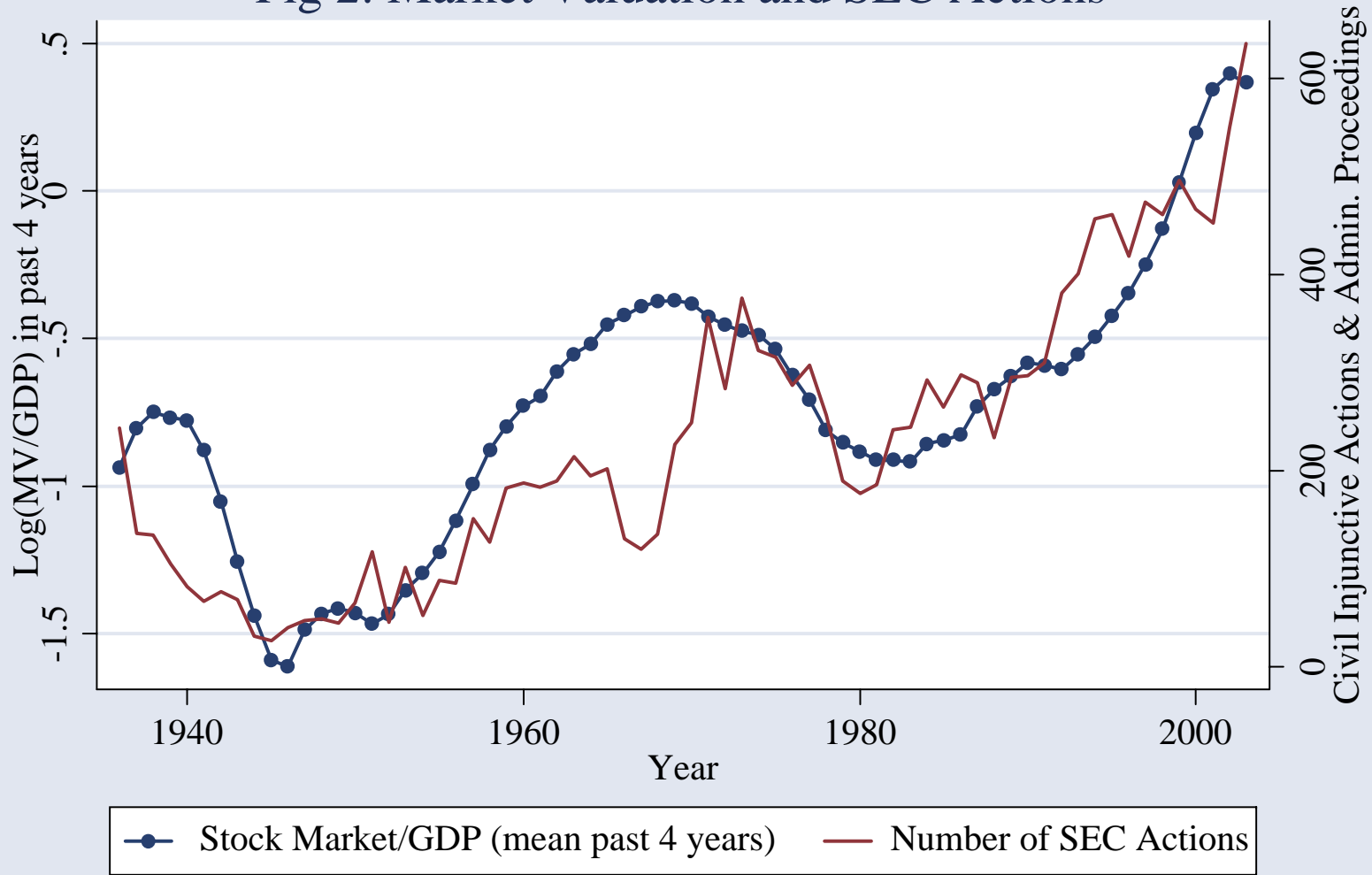
Source: GAO and Compustat, sample period 1997-2002. **Coefficients** in bold, t-statistics below coefficients. Logit Models estimated in cross section in 2002 by Pseudo Maximum Likelihood, with Robust Standard Errors.

Fig 1: Sales of ENRON's stock by Kenneth Lay



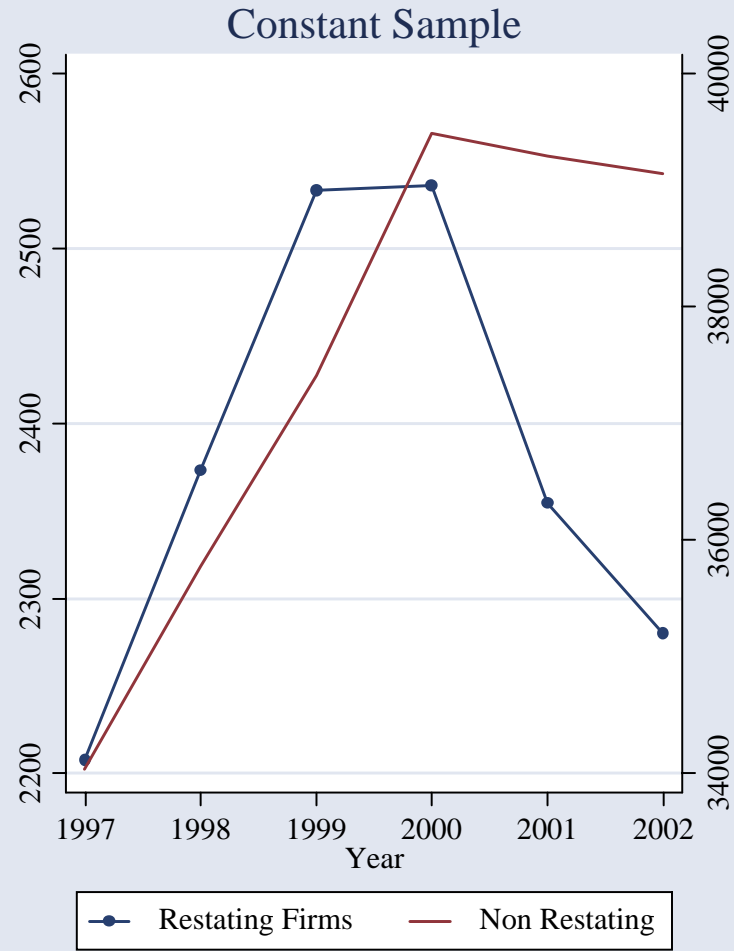
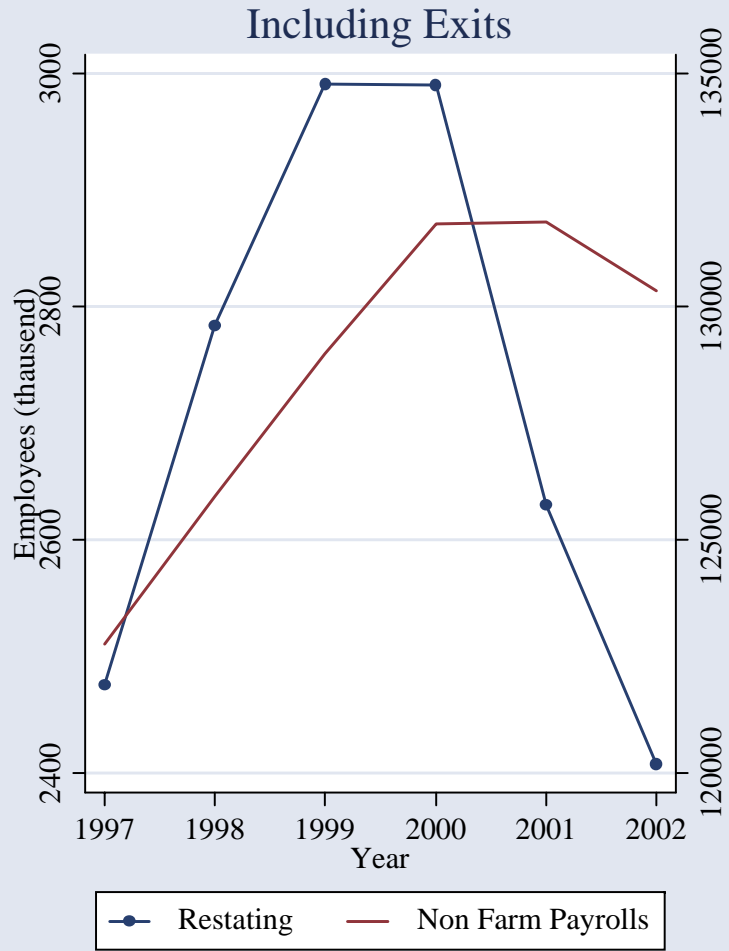
Source: Thomson Financial Insider Filing Data

Fig 2: Market Valuation and SEC Actions



Source: SEC annual reports, CRSP and NIPA

Fig 3: Employment of Firms Announcing Restatements in 2000-2001



Source: GAO, BLS and COMPUSTAT

Fig 4: Dynamics of Firms Announcing Restatements in 2000-2001



Source: GAO, BLS and COMPUSTAT