



HAL
open science

Purchase Price Allocations: Do they Matter?

P. Astolfi, Luc Paugam, Olivier Ramond

► **To cite this version:**

P. Astolfi, Luc Paugam, Olivier Ramond. Purchase Price Allocations: Do they Matter?. Comptabilités et innovation, May 2012, Grenoble, France. pp.cd-rom. hal-00934973

HAL Id: hal-00934973

<https://hal.science/hal-00934973>

Submitted on 22 Jan 2014

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Purchase Price Allocations: Do they Matter?

Pierre Astolfi

University Paris-Dauphine, pierre.astolfi@dauphine.fr

Luc Paugam

University Paris-Dauphine, luc.paugam@dauphine.fr

Olivier Ramond

University Paris-Dauphine, olivier.ramond@dauphine.fr

This version: March 28, 2012

Acknowledgements. The authors gratefully acknowledge comments by Ryan Davies, participants at the CNAM workshop (Paris, October 2011). The authors are members of *Dauphine Recherche en Management* (DRM), CNRS Unit, UMR 7088. They acknowledge the financial support of the FBF Chair in Corporate Finance.

Purchase Price Allocations: Do They Matter?

Abstract:

Standards setters support that purchase price allocations (PPAs), subsequent to business combinations, enhance financial statement decision-usefulness whereas academics and practitioners challenge this statement. We test the consequences of the quality of PPAs (proxied by the concept of abnormal goodwill) on change in market expectations for 200 major U.S. business combinations. We do not find evidence that PPAs' quality have material impact on change in market expectations, suggesting that market participants fail to fully integrate information content of PPAs. Consistently, we provide evidence that PPAs' quality enables to generate a profitable investment strategy, as cumulated abnormal returns can be systematically generated based on abnormal goodwill recognized in PPAs.

Keywords:

Purchase Price Allocation, Market Expectations, Abnormal Goodwill, Business Combination

Résumé :

Selon les normalisateurs, les PPA (*Purchase Price Allocations*) réalisés suite à un regroupement d'entreprises, renforcent l'utilité des états financiers, alors que la littérature et les praticiens sont réservés. Nous testons les conséquences sur les anticipations de marché de la qualité des PPA (approchée par le concept de goodwill anormal) sur 200 regroupements aux États-Unis. Nous ne mettons pas en évidence que la qualité des PPA a un impact significatif sur les anticipations de marché, suggérant ainsi que les investisseurs échouent à intégrer complètement le contenu informatif des PPA. De même, nous montrons que la qualité des PPA permet de générer une stratégie d'investissement rentable car un goodwill anormal génère systématiquement un rendement anormal cumulé positif.

Mots clés :

Purchase Price Allocation, Anticipations du marché, Goodwill anormal, Regroupements d'entreprises

1. Introduction

The goal of financial reporting is to inform users about the true economic underlying of earnings. Recent evolutions put forward by U.S. and international standard setters resulted in a major change in terms of business combination accounting treatment: the purchase price has to be allocated to identifiable tangible and intangible assets, such as corporate trademark, customer relationship or backlog in order to improve the usefulness of financial statements. The identification and valuation process of acquired tangible and intangible assets, namely purchase price allocation (PPA), implies that goodwill has to be considered only as a residual.

However, there is still a case for competing positions between FASB/IASB and practical implementation of standards provisions relating to PPAs, with regard to earnings management. The FASB/IASB position is not completely supported by academics and practitioners, as they expressed concerns relating to the relevance of favoring separate recognition of intangible assets from goodwill.

These concerns are related to usefulness issues, i.e. the allocation of goodwill may be managed, as well as quality issues, i.e. the information disclosed may be uninformative for investors. In this context, this paper is the first to examine: (1) if analysts really care about information disclosed in the acquirer's purchase price allocation; (2) if the quality of the allocation is fully integrated into stock prices.

Our research question is the following: to what extent is the quality of purchase price allocation, required by standard setters, useful to financial statement users? In other words, do PPAs improve financial statements' usefulness for investors in making economic decisions with regard to capital allocation?

Our analysis is based on a unique hand collected dataset from acquirers' annual reports consisting in 241 major U.S. acquisitions, completed between 2002 and 2008. We focus first on assessing the quality of PPAs and second on testing the consequences of PPAs quality. Our results offer guidance for standard setters as we demonstrate that improving the quality of works undertaken to conduct PPAs, required by standards is not, by itself, sufficient to imply an increase of usefulness for users. As a result, we provide a major contribution to the current debate between academics and standard setters regarding the potential effects of accounting standards on financial markets.

Our research question raises a difficulty because the quality of work undertaken to allocate purchase prices on acquired net assets is not directly observable. Consequently, to address this issue, we implement a two-step approach. First, we estimate a proxy for the quality of the allocation of the purchase price following a business combination. This proxy is based on the notion of abnormal goodwill, initially suggested by Shalev (2009). Abnormal goodwill is defined as the portion of the purchase price allocated to goodwill differing from the expected amount, considering some key underlying economic factors (e.g., sector, performance, growth expectations). Second, we test the effects of PPAs's quality on investors' change in expectations, defined as financial analysts (forecasts' revisions, change in dispersion, change

in accuracy), and market as a whole (cumulated abnormal returns and buy and hold returns). We further provide tests regarding the robustness of our approach to capture PPA's' quality.

Our results suggest that the quality of PPAs has no strong effect on change in market expectations. Analysts, like the market, do not pay much attention to the quality of PPAs disclosed by acquirers. However, we point out evidence that, if a good PPA does not seem to impact market participants' decisions, a profitable investment strategy may be developed based on the portion of abnormal goodwill recognized in PPAs. Indeed, predictable cumulated abnormal returns (hence potential mispricing) can be identified ex ante, on the basis of abnormal goodwill.

The remainder of the paper is organized as follows. Section 2 summarizes the related literature and develops our research question. Section 3 exhibits our methodology. Section 4 presents our data. We show and comment our results in section 5. Concluding remarks are proposed in section 6.

2. Overview of Related Literature

2.1. Business Accounting Treatment: Towards Recognition of Intangible Assets Separately From Goodwill

Business combination accounting treatment has been a very controversial case since the Accounting Principles Board issued APB 16 (AICPA 1970a) and APB 17 (AICPA 1970b), respectively dedicated to business combinations and intangible assets. In 2001, FASB clearly pronounced itself in favor of the recognition of intangible assets separately from goodwill (FASB 2001a). The IASB, issuing IFRS 3 in 2004, converged towards this position (IASB 2004).

One reason for promoting this orientation is clearly expressed by the IASB in 2004. According to IFRS 3.BC 89, "The Board also agreed with the conclusion reached in IAS 22 and by the Canadian and U.S. standard-setters that the usefulness of financial statements would be enhanced if intangible assets acquired in a business combination were distinguished from goodwill."

More recently, and within the project of the convergence process with the FASB, the IASB stated that:¹ "Both the IASB and the FASB decided that they needed to provide explicit criteria for determining whether an acquired intangible asset should be recognized separately from goodwill. The FASB provided such criteria in SFAS 141 and the IASB provided similar, although not identical, criteria in IAS 38.2. One reason for providing such criteria was the boards' conclusion that the decision-usefulness of financial statements would be enhanced if intangible assets acquired in a business combination were distinguished from goodwill."

Yet, academics as well as practitioners expressed some concerns regarding both usefulness and quality of financial statements disclosed by provisions of SFAS 141 and SFAS 141R. These concerns may contradict the objective of usefulness targeted by the FASB.

¹ IFRS 3 R BC 158

2.2. Concerns Expressed

2.2.1. Usefulness of Purchase Price Allocations

Jennings et al. (1996), Kanodia et al. (2004) or Skinner (2008), and some professional investors,² support the idea that information disclosed relating to intangible assets by application of accounting standards are not useful to investors.

Already in 2001, in his report dedicated to strengthening financial markets, Garten (2001, 26) casts doubts on the real impact of accounting for intangible assets for equity valuation. He points out that “The value of a company is driven by its perceived ability to generate profits and cash flow. Intangible assets, by helping companies generate profits and cash flow, are a key indirect driver of value. This does not imply, however, that the value of a company’s intangible assets translates directly into the value of the company as a whole.”

Skinner is also not convinced of the usefulness of disclosures pertaining to intangible assets for equity valuation. Referring to Holthausen and Watts (2001), Maines et al. (2003, 180) underlines that “The fact that voluntary disclosures of intangibles information are not widespread suggests that the net private benefits that accrue to firms from these disclosures are relatively small.”

Similarly, Kanodia et al. (2004) underline that intangible assets, even when they are not identified, may be properly valued by financial market. The model suggested by Kanodia et al. (2004) takes into account concerns of the FASB regarding reliability of the value of intangible assets assuming that measurement of intangible is “necessarily noisy.” Kanodia et al. (2004, 114) point out that “Empirical studies document a positive association between estimated intangible investments and stock prices and returns even when the accounting system does not explicitly measure and report intangibles.” Nonetheless, they add that “These results do not necessarily imply that incorporating such estimates in formal accounting reports would actually provide *new* information to the market, nor do they imply that an outside observer could use these estimates to identify mispriced stocks and earn excess returns in the market.”

Like Kanodia et al. (2004), Skinner (2008) argues that the main explanation of the difference between the book value and the market value is not the value of unrecognized intangible assets: market can value properly intangible assets even when they are not recognized in the balance sheet.

So, the position supported by Kanodia et al. (2004, 91) contrasts with the idea according to which “it may appear that even a crude estimate for intangibles would be better than providing no information on intangibles.” Actually, in some circumstances, a wrong estimate of intangible assets may result in a noise that market will try to undo. This noise may be not only useless, but could preclude correct valuation by investors.

According to Kanodia et al. (2004), “intangibles should be measured only when their relative importance in constituting the firm’s capital stock is high and when they can be measured

² See the IASB/FASB Joint Board Meeting of the CRUF, 22nd April, 2008. The CRUF (Corporate Reporting User's Forum) represents the interests of professional investors and analysts

with sufficiently high precision.” We can underline that this result is consistent with the position of IFRS 3 (IASB 2004) before its revision in 2008: fair value of intangible assets was required to be measured reliably to be accounted for. This position has been reversed with the issue of IFRS 3 R (IASB 2008), according to which there is a presumption that all intangible assets (and not only intangible assets with a finite useful life) are measured reliably.

Basu and Waymire (2008) also argue that “economic intangibles are cumulative, synergistic, and frequently inseparable from other tangible assets and/or economic intangibles not owned by any single entity,” and add that “it is usually futile to estimate a separate accounting value for individual intangibles.” They cast doubt on the ability to provide meaningful estimate of the individual value of economic and cultural intangibles.

2.2.2. Quality Concerns: Purchase Price Allocations and Relations with Earnings Management

In addition to the usefulness concerns highlighted above, accounting for business combinations may favor earnings management behaviors:

- before the issue of SFAS 141 in 2001 (FASB 2001a): earnings management consists in optimizing the choice of the accounting method (purchase method vs. pooling of interest method);
- after the issue of SFAS 141 in 2001: earnings management consists in optimizing measurement of intangible assets in order to minimize the impact of recognition and amortization on subsequent profit and loss statements.

2.2.2.1. Purchase Price Allocations and Earnings Management before 2001

On the one hand, some studies (Browning (1997); McGoldrick (1997); and Hopkins et al. (2000)) tend to show that stock prices for firms using purchase accounting method are penalized as compared with those of companies qualifying combinations for the pooling treatment. This impact would be caused by the effect, in the context of the application of the purchase method, of goodwill amortization on earnings, despite this amortization has absolutely no impact on cash flows generated by the acquirer. As noted by Vincent (1997, 1), “conventional wisdom holds that share prices of purchase firms are penalized due to the reduced earnings resulting from goodwill amortization.”

Some authors (e.g., Lys and Vincent (1995)) even reported that firms which succeeded in qualifying operation for pooling treatment were willing to pay a higher premium to target’s shareholders than firms using purchase accounting method.

Ayers et al. (2000) estimate that 15% of the premium paid in a context of a business combination is attributable to the possibility for the acquirer to secure a pooling accounting treatment.

Hopkins et al. (2000) contribute to this case investigating the extent to which analysts’ valuation judgments are predictably affected by different methods of accounting for business combination. They demonstrate that target prices are negatively impacted by the choice of the

purchase method. Conversely, target prices are higher if the method chosen is the pooling method or the in process R&D method. According to Hopkins et al. (2000), this result can be explained by the potential impact of the purchase method on the net income disclosed by the acquirer.

Still, some studies (e.g., Jennings et al. (1996); Vincent (1997), Jenkins (1999)) document that market is unlikely to be mistaken by such a non-cash accounting treatment. Price to be paid is supposed to be the same however favourable the accounting treatment is in terms of financial presentation, consistently with the efficient market hypothesis. According to these studies, investors adjust earnings so as to make earnings comparable, whatever accounting treatment related to business combinations is chosen by companies.

Jennings et al. (1996) and Vincent (1997) support this assertion. For example, supporting the conventional wisdom described above, research performed by Vincent (1997, 11) provides effectively evidence that “pooling firms enjoy an equity valuation advantage over purchase firms. There is no consistent evidence, however, relating this advantage to the differences in financial reporting.” According to Vincent, “investors value pooling firms more highly, on average, than purchase firms in the years immediately following the business combination for reasons other than accounting.”

In addition, Jenkins (1999)³ points out that amortization of goodwill is a non-cash item and is accounted for over a very long period (most of the time, 40 years), reducing the impact of the amortization of goodwill on investors’ judgment (see Henning and Shaw (2003)).

These studies tend to support the idea that “accounting debates are, in fact, arguments about nothing,” as noted by Jenkins (1999), “in the sense that nothing in the real world changes just because you slap a different label on it.” According to this position, financial accounting options related to business combinations do not provide any useful information to investors.

Similarly, according to Jennings et al. (1996), if goodwill accounted for (by application of purchase method) is effectively positively associated to the stock price of the acquirer, relation between stock price and amortization is very different from a firm to another: actually, analysts pay little attention to the selected accounting treatment.

2.2.2.2. Purchase Price Allocations and Earnings Management after 2001

Standard setters acknowledged, in 2008, date of the issue of IFRS 3 revised (IASB 2008), that previous standards provisions (IFRS 3) had not been properly applied:⁴ “Early in their respective projects on accounting for business combinations, the IASB and the FASB both observed that intangible assets make up an increasing proportion of the assets of many (if not most) entities. The boards also observed that intangible assets acquired in a business combination were often included in the amount recognized as goodwill.” The Boards acknowledge that, until the revision of SFAS 141 and IFRS 3, standards did not meet the objective of reducing the proportion of goodwill accounted for in a context of a business combination, and so impacting the quality of financial statements.

³ Quoted by Hopkins et al. (2000).

⁴IFRS 3 Revised BC 157

From an academic point of view, some authors (see Shalev (2009, 243-245)) recently pointed out that the quality of information disclosed relating to PPAs is actually widely varying from a firm to another. Zhang and Zhang (2007) support the idea that the end of pooling accounting method, which occurred after the adoption of FAS 141 in 2001, did not imply the end of the controversy neither the end of the interest for this issue. In fact, the debate now focuses on the extent to which new standards may exacerbate earnings management, so as to minimize the impact of amortization expenses on reported net income.

This incentive to earnings management is caused by the fact that the end of pooling accounting method (FAS 141, (FASB 2001a)) is associated with the end of goodwill amortization (FAS 142, (FASB 2001b)). This position results in opportunistic behaviours looking to optimize initial purchase price allocation so as to recognize more non-amortizable assets than amortizable assets, hence decrease future systematic impact on earnings.

This behaviour would be reinforced by the idea (see Watts (2003, 215); Ramanna (2008), Ramanna and Watts (2009)) that provisions of FAS 142, relating to impairment of goodwill, cause financial statements relying on unverifiable value estimates and on very subjective appreciations.

Similarly, according to Ball (2006), the quality of the financial statements is largely impacted by the margin for manoeuvre which managers benefit to manipulate their financial statements. Now, IFRS 3/FAS 141R even offer issuers greater latitude in the opportunistic management of operating profits: the characteristics of those assets most concerned by IFRS 3/FAS 141R, i.e. intangible assets, often require fair value to be approached by a model in the absence of a liquid reference market.

This opposite effect is already identified by Ball (2006, 23) according to whom: “mark to model fair value accounting can add volatility to the financial statements in the form of both information (a « good ») and noise arising from inherent estimation error and managerial manipulation (a “bad ») [...] Volatility is an advantage in financial reporting, whenever it reflects timely incorporation of new information in earnings, and hence onto balance sheets (in contrast with “smoothing,” which reduces volatility). However, volatility becomes a disadvantage to investors and other users whenever it reflects estimation noise or, worse, managerial manipulation.”

The specificity and the complexity of intangible assets explain in part the concerns expressed in the literature about the effective usefulness of the information supplied by the financial reports on these assets. More precisely, Zhang and Zhang (2007, 38) “predict and find that managers allocate more purchase price to goodwill relative to amortizable intangibles [post FAS 142] to reduce amortization expenses.” They assert that management’s reporting opportunism is a much more relevant driver to purchase price allocation than the underlying economics. As a result, managers may, on average, choose to allocate as much part of the price as possible to goodwill, considering its non-amortizable accounting treatment.

The effect of FAS 141 on earnings management may result in providing investors with useless information. For instance, Watts (2003, 219) points out that “In moving into unverifiable valuation of the firm and non-separable intangible assets, the FASB is taking

steps down a path that many before them have feared to tread, and with good reason. The likely result will be net asset values and earnings that are subject to more manipulation and, accordingly, are poorer measures of worth and performance.”

These reserves expressed with regard to FAS 141 are closed to those relating to FAS 142. For instance, according to Ramanna and Watts (2009, 14) “Agency theory predicts managers (all else equal) will on average use unverifiability in accounting judgment, such as that in SFAS 142 impairment tests, to opportunistically manage financial reports.” If Ramanna and Watts cannot exclude that the standard is, nevertheless, net beneficial, they highlight “the potential costs of unverifiable fair values in SFAS 142.”

Consequently, issuing standards requiring separate recognition of intangible from residual goodwill, it seems that standard setters only favored the substitution of an old opportunistic behavior in terms of earnings management by a new one.

Some professional users support the same idea. For example, according to the Corporate Reporting Users’ Forum, “The creation of new intangibles on acquisition (customer lists, brands, developed technology, etc.) is a return to goodwill amortisation by the backdoor but (...) it is even more arbitrary (choice of what to capitalise and amortization period is highly subjective).”

2.3. Research Question

To solve the current debate between academics and standards setters, we aim at answering the following research question: to what extent does the quality of purchase price allocations, required by standard setters, make them useful to financial statements users?

We assume that the quality of PPAs is a good proxy for measurement errors. Hence, we answer our research question using a model testing the consequences of measurement errors on decisions of market participants.

3. Methodology

We first explain how we estimate the quality of PPAs (paragraph 3.1), and then our approach to test the association between our proxy for PPAs’ quality and change in forecasts’ revisions, change in dispersion, and change in accuracy (paragraph 3.2). We finally expose our approach to assess the potential association between PPAs quality and security mispricing (paragraph 3.3).

3.1. Determining the Quality of Purchase Price Allocations

The first step of our approach aims at capturing the quality of PPAs by focusing on the amount of abnormal goodwill recognized following a business combination. Consistent with the methodology initially developed by Shalev (2009), high quality purchase price allocations

should generate a level of acquired goodwill consistent with economic fundamentals (e.g., performance of the target, sector characteristics, expected growth, premium paid). We estimate a model explaining the level of recognized goodwill following business combinations with underlying economic factors. As a result, similar to the discretionary accruals literature (e.g., Jones (1991), Dechow and Sloan (1995), Dechow et al. (1996), Subramanyam (1996)), the abnormal portion of recognized goodwill is the residual of the model, i.e. the part that underlying economic factors do not explain. Abnormal goodwill serves as a proxy related inversely with the quality of the purchase price allocation since everything else equal, high quality PPAs should generate less abnormal goodwill. This approach is consistent with the conception of quality set forth by the IASB (IASB 2008) aiming to reduce the proportion of recognized goodwill. Model (1) explains the level of normal goodwill:

$$GW_i = c + b_1 * Materiality_i + b_2 * Growth_i + b_3 * Premium_i + b_4 * Intan_i + b_5 * BIG4_i + b_7 * sector_i + b_8 * Year_i + \varepsilon_i \quad (1)$$

Where for acquirer i :

- GW_i is the amount of goodwill recognized in the PPA expressed as a percentage of the target firm's total assets (from Acquirers' 10-Q/K and Compustat);
- $Materiality_i$ is the purchase price divided by the total assets of the acquiring company at the end of the quarter prior to completion of the acquisition (from Thomson One Banker and Compustat quarterly);
- $Growth_i$ is the target company growth potential measured as the end of the year market-to-book ratio of the target firm (from Compustat annual and CRSP);
- $Premium_i$ is excess purchase price over the market value of equity of the target firm measured at the end of the month prior to the announcement, expressed as a percentage of the market value of equity of the target firm (from One Banker and CRSP monthly);
- $Intan_i$ is the amount of total intangible assets in the balance sheet of the target firm at the end of the year prior to acquisition (from Compustat annual);
- $BIG4_i = 1$ if the auditor of the acquiring company belongs to one of the 4 largest external auditors and 0 otherwise (from acquirer's 10-Q/K);
- $Sector_i$ is a dummy variable controlling sector specific characteristics;
- $Year_i$ is a dummy variable controlling the impact of the year during which the purchase price allocation was disclosed.

ε_i is the error term in model (1) for acquirer i . After estimation of (1) the absolute value of residuals is labeled abnormal goodwill ($AbGW$) in the other models presented hereafter and serves as a proxy for the quality of PPAs.

We expect the following relation with the explaining variables:

- a negative relation between GW and $Materiality$ could be expected, since the relative size and hence visibility of the acquisition could reduce the managers' willingness to recognize a high level of goodwill. However, the relative size of the acquisition could

capture a potential overpayment, and could inflate the amount allocated to goodwill. The expected association is therefore unknown;

- a positive relation is expected with *Growth*, since the growth potential of the target company would justify future profits and hence a high level allocated to goodwill;⁵
- a positive relation is expected between *GW* and *Premium*, as high premium paid to acquire a target firm may indicate an overpayment and increase the amount allocated to goodwill;
- a positive relationship is expected with the amount of intangible assets in the balance sheet of the target company prior to acquisition (*Intan*) as it might be a proxy for the quality of the target company. Everything else equals, firms able to generate and capitalize intangibles may have higher future profitability, justifying higher amounts allocated to goodwill;
- a negative relationship is expected between *BIG4* and *GW* as better audit quality (DeAngelo 1981) could lead to more identified intangibles and therefore a smaller amount recognized as part of goodwill;
- finally, the dummies *Sector* and *Years* serve as controls for respectively the industry and the year. We expect a positive association between *GW* and intangible-intensive sectors, i.e. Healthcare and High Tech sectors. We do not predict a particular direction for the association between *GW* and years, as inertia over the standard or learning effect are potential competing effects.

⁵ Core goodwill equals the present value of abnormal earnings as expressed in the Ohlson (1995) model.

3.2. Testing the Association between Purchase Price Allocations' Quality and Change of Analysts' Expectations

We answer our research question by testing the consequences of the quality of purchase price allocations (i.e. the effect of abnormal goodwill) on dependent variables measuring change of market expectations for the value of stock prices (change in analysts' expectations) and direct consequences on stock prices (changes in security prices). The second step aims at determining the extent to which PPAs are effective and mandatory disclosures required by SFAS 141 are effectively informative and useful for market participants. Using abnormal goodwill, defined as the absolute value of residuals of model (1), as an independent variable, we conduct three sets of tests for analysts' expectations and two sets of tests for the market as a whole, namely computing cumulated abnormal and buy and hold returns.

3.2.1. Association between PPAs' Quality and Revisions of Analysts' Expectations

We examine the impact of the abnormal part of recognized goodwill (proxy for PPA quality) on revisions of analyst expectations (i.e. revision of target prices, earnings forecasts and recommendations) surrounding the disclosure of purchase price allocation.

$$Revision_i = c + b_1 * AbGW_i + b_2 * D10QK + b_3 * Volatility_i + b_4 Size_i + e_i \quad (2)$$

Where:

$Revision_i$ is defined as one the following four variables for acquirer i :

- $Revision_{TP}$ is the change in the consensus (mean) target price following disclosure of the PPA in percentage of the mean target price before disclosure (from I/B/E/S);
- $Revision_{EBIT}$ is the change in the EBIT consensus (mean) forecast following disclosure of the PPA in percentage of the mean EBIT forecast before disclosure (from I/B/E/S);
- $Revision_{EPS}$ is the change of the EPS forecast (mean) consensus after disclosure in percentage of the mean EPS forecast before disclosure (from I/B/E/S);
- $Revision_{RECO}$ is the number of recommendations changed scaled by the total number of recommendations made by analysts following disclosure of the PPA (from I/B/E/S);
- $AbGW$ is the absolute value of residuals from model (1);

We include the following control variables:

- $D10Q/K$ is a dummy variable equal to 1 if the disclosure of the PPA occurred in a form 10-K (from SEC EDGAR);
- $Volatility$ is the annualized daily standard deviation of stock returns measured over the 252 days before disclosure of the PPA (from CRSP);
- $Size$ is the natural logarithm of acquirer total assets at the end of the month before disclosure of the PPA (from COMPUSTAT).

We control for the effect of volatility, size and the information being disclosed in form 10-Ks versus 10-Qs. We expect a positive relation between volatility of stock returns and revisions, a negative relation with acquirer size, and a negative relation between 10-K versus 10-Q as

the information content of 10-Ks is usually already known by market participants. We analyze the effect of PPA's quality on EBIT and EPS as PPA does not impact EBITDA.

3.2.2. Association between PPAs' Quality and Change in Forecasts' Dispersion

We test the association between the quality of the PPAs and change of analysts' forecasts dispersion with model (3):

$$\Delta Dispersion_i = c + b_1 * AbGW_i + b_2 * D10QK + b_3 * Volatility_i + b_4 Size_i + e_i \quad (3)$$

Where $\Delta Dispersion_i$ is defined for acquirer i as the one of the following three variables:

- $\Delta Disp_{EPS_i}$ is the change of EPS range following disclosure of the PPA (from I/B/E/S);
- $\Delta Disp_{EBIT_i}$ is the change of EBIT range following disclosure of the PPA (from I/B/E/S);
- $\Delta Disp_{TP_i}$ is the change of target price range following disclosure of the PPA (from I/B/E/S).

With range is the absolute value of the difference between the most optimistic forecast (or target price) and the most pessimistic forecast, scaled by the mean forecast as detailed in equations below:

$$Range_{EPS} = abs\left(\frac{eps^{high} - eps^{low}}{eps_{mean}}\right)$$

$$Range_{EBIT} = abs\left(\frac{ebit^{high} - ebit^{low}}{ebit_{mean}}\right)$$

$$Range_{TP} = abs\left(\frac{TP^{high} - TP^{low}}{TP_{mean}}\right)$$

Other variables are already described above. We expect the same relation for *Volatility*, *D10QK*, and *Size* with change in dispersion as for analysts' revisions.

3.2.3. Association between PPAs' Quality and Change in Forecasts' Accuracy

We also test if analysts' forecast accuracy improves with the quality of PPAs disclosed. Model (4) is estimated on our sample:

$$\Delta Error_i = c + b_1 * AbGW_i + b_2 * D10QK + b_3 * Volatility_i + b_4 Size_i + e_i \quad (4)$$

Where $\Delta Error_i$ is defined for acquirer i as one of the following two variables:

- $\Delta Error_{EBIT_i}$ is the change after the disclosure of the PPA of the difference between EBIT forecasts and actual EBIT scaled by actual EBIT (from I/B/E/S);
- $\Delta Error_{EPS_i}$ is the change after the disclosure of the PPA of differences between EPS forecasts and actual EPS scaled by actual EPS (from I/B/E/S).

We also test the impact of PPA's quality on target price accuracy as:

$$\%TP_i = c + b_1 * AbGW_i + b_2 * D10QK + b_3 * Volatility_i + b_4 Size_i + e_i \quad (5)$$

Where for acquirer i :

- $\%TP_i$ is the percentage of the target prices hit by the actual security prices over the next 12 month (Asquith et al. (2005)).

Other variables are already described above. We expect the same relation for *Volatility*, *D10QK*, and *Size* with target price accuracy as for change in forecasts' dispersion.

3.3. Association between PPAs' Quality and Cumulated Abnormal Returns

To further investigate the valuation consequences of PPAs' quality, we measured cumulated abnormal returns by running an event study surrounding PPAs disclosures in form 10-Q/Ks for five portfolios containing an equal number of companies, ranked on the basis of the level of abnormal goodwill recognized in the PPA. Portfolio one is composed of companies with the lowest proportion of abnormal goodwill (top 20% PPAs' quality) whereas portfolio five is composed of companies with the highest portion of abnormal goodwill (lowest 20% PPAs' quality). We then compare differences of CARs for the five portfolios.

4. Data and Sample

We obtained our sample from the deals analysis database of Thomson One Banker covering the period 2002-2008 with the following criteria:

- the deal has a value of at least \$100 million;⁶
- both the target and the acquirer are listed U.S. firms;
- the deal has been completed;
- the target macro-industry is high technology, healthcare, energy and power, or industrial.

Acquisitions during the period 2002-2008 were distributed between the different macro-industries as follows: finance (223), high technology (180), healthcare (133), energy and power (61), industrials (56), materials (48), consumer products and services (43), telecommunications (42), real estate (37), media and entertainment (36), consumer staples (30), retail (29), and government and agencies (1). We chose to study the four macro industries with the highest number of deals, excluding the finance sector which has specific disclosure requirements. Therefore we hand collected data for high technology, healthcare, energy and power, and industrial sectors.

According to FAS 141, firms must disclose the purchase price allocation within one year. Rule 425 of the Securities and Exchange Commission does not require that purchase price

⁶ A purchase price in excess of \$100 million increases the likelihood of finding relevant data in the acquirer's 10-K/Q. Significant acquisitions also increase the likelihood of finding material impact of disclosures related to the acquisitions for market participants.

allocation be disclosed in form 8-K. As a result, information disclosed in merger prospectuses (form 8-K) does not contain the purchase price allocation and may only provide very limited and factual information (e.g., form 8-K of LSI Logic filed on April 2, 2007).⁷

From 2002 to 2008, 455 business combinations met the above criteria. Acquirers' 10-Q or 10-K reports (depending on the date of acquisition), available from the SEC EDGAR database, were examined to obtain the purchase price allocations of these business combinations. The purchase price is allocated between current, tangible, and identifiable intangible assets, with the level of detail varying from one firm to another. Due to insufficient and missing disclosures in 10-Q and 10-K reports, the final sample comprises approximately 241 acquisitions with exploitable PPA data.

We then collect data to construct our variables from CRSP, Compustat, and I/B/E/S as described in section 4. Table 1 provides some descriptive statistics of our sample.

[Insert Table 1 About Here]

From Table 1, Panel A, the mean (median) purchase price represents 3.17 (2.24) times total assets of the target companies (*Price* variable). We can also see that a significant part of the purchase price is allocated to goodwill, as the mean (median) recognized goodwill represents 57% (59%) of the purchase price. Our sample is composed of major acquisitions as the mean (median) purchase price represents 33% (23%) of the acquirers' total assets according to the variable *Materiality*. The sample is composed for 51% of acquisitions in the high tech sector, followed by 34% in the healthcare sector, 10% in industrial sector, and 5% of the energy and power sector.

Since variables for some firms are missing our tests are conducted on the largest sample available.

5. Empirical Results

5.1. Determining PPAs' quality

In order to determine PPAs' quality, we estimate model (1) on our sample. Results of this first step are displayed in Table 2 below.

[Insert Table 2 About Here]

From Table 2, materiality of the acquisition increases the amount of the purchase price allocated to goodwill, the growth options of the target, as proxied by the market-to-book ratio, are also positively associated with the amount of recognized goodwill. The amount of separately identified intangibles is positively associated with goodwill. Finally, acquirers in the high tech sector seem to recognize more goodwill as compared to the three other sectors. The adjusted R² of our model appears satisfying, explaining more than 43% of the variance of

⁷ “ On April 2, 2007, LSI Logic Corporation (“LSI”) issued a press release announcing the consummation of the merger of Atlas Acquisition Corp., a wholly owned subsidiary of LSI, with and into Agere Systems Inc. (“Agere”) contemplated by the Agreement and Plan of Merger, dated as of December 3, 2006, by and among LSI, Atlas Acquisition Corp. and Agere. A copy of the press release [...]”

recognized goodwill. This regression aims to capture the amount of normal goodwill, that is to say goodwill that should be recognized considering the underlying economic factors for the acquisition.

Abnormal goodwill, defined as the absolute value⁸ of residuals from model (1), serves as a proxy for PPAs quality.

5.2. Impact of PPAs' Quality on Analysts' Expectations

In order to test whether PPAs' quality is associated with dependent variables capturing change in expectations about firms' values, we use the proportion of abnormal goodwill as an independent variable. We estimate model (2) to (5) to test the impact of the quality of PPAs on analysts' forecasts revisions (model (2)), change in dispersion (model (3)), change in accuracy (model (4)), and accuracy (model (5)).

Table 3 (Panel A to D) presents the results of our second step models.

[Insert Table 3 About Here]

From Table 3, a statistically significant negative association is obtained between abnormal goodwill and target price accuracy after PPA disclosure (Panel D). This would suggest that lower quality (higher abnormal goodwill) would be associated with lower accuracy. However, no association is observed between PPAs' quality and revisions of EPS, EBIT, target price (Panel A), forecasts' dispersion (Panel B), or forecasts' errors (Panel C). These results suggest that PPAs' quality is not related to analysts' forecasts' revisions, dispersion or forecasts' errors. Overall, *Volatility* is associated with larger forecasts' revisions whereas *Size* is negatively associated with forecasts' revisions.

Overall, from the 11 tests we conduct to test the impact of PPAs' quality only two are statistically significant (at the 5% level). It appears that the quality of PPAs is not completely and systematically associated with change in analysts' expectations, whether we define expectations as forecast's revisions, change in dispersions, change in accuracy, or accuracy of analysts. In 9 of our 11 models, PPAs' quality appears to be unrelated to change in analysts' expectations. Analysts do not seem to fully consider the quality of PPAs to update their expectations.

5.3. Measuring PPAs' Quality: Robustness' Checks

The absence of association between forecasts' revisions and PPAs' quality supported by our results presented in Table 3 could be explained by the lack of power of our tests, simply because we would not have a valid proxy for PPAs' quality. To assess whether or not our variable *AbGW* is a valid proxy, we conduct two tests: (1) we test if initial PPAs's low quality

⁸ Unless specified otherwise, we use the absolute value of residuals from model (1) to proxy for PPA's quality. All the tests on change in analysts' expectations have been also performed with the relative value of residuals from model (1). Results are not materially different from those reported in paragraph 5.4.

is associated with subsequent goodwill impairment testing management; (2) we also test if PPAs' quality is correlated with potential earnings management as measured by total accruals.

5.3.1. PPAs' Quality and Subsequent Goodwill Impairment Testing Management

We examine how low quality PPA is associated with subsequent goodwill impairment. Low quality PPA, as measured by a high purchase price allocated of abnormal goodwill, could generate higher impairment risk in the future, i.e. be associated with goodwill write-downs during the following years if performance is low. To test this hypothesis, we use the relative and not the absolute value of abnormal goodwill because the sign of abnormal goodwill matters for subsequent goodwill impairment.

We estimate the following probit model:

$$DIMP_i = c + b_1 * LowPerf_i * AbGW_i + b_2 * AbGW_i + b_3 * AvPerf_i + b_4 * Size_i + e_i \quad (6)$$

Where for acquirer i :

- $DIMP_i$ is a dummy variable equal to 1 if the acquirer writes down goodwill during the three years following the completion of the acquisition (from Compustat Annual);
- $LowPerf_i$ is a dummy variable equal to 1 if the performance measured by the three-year mean ratio $EBITDA/Total Assets$ is below a threshold, i.e. below the median, 15% and 10% of the sample (from Compustat Annual);
- $AbGW_i$ is obtained from model (1) and is expressed in relative value and proxies for risk of future goodwill impairment;
- $AvPerf_i$ is the three-year mean performance of the acquirer measured as $EBITDA/Total Assets$ (from Compustat Annual).

We expect the following associations with $DIMP$:

- A positive relation between $LowPerf_i * AbGW_i$ and $DIMP$ as a bigger proportion allocated to goodwill generate higher impairment risk when performance is low;
- no association between $DIMP$ and $AbGW_i$ as the risk of goodwill impairment only occurs when performance is low enough;
- finally, negative associations with $AvPerf_i$ and $Size_i$.

Table 1, Panel D, presents some descriptive statistics of these variables and shows that goodwill impairments occur 53% of the time during the three years following completion of the acquisition. Furthermore, impairments are large as a proportion of EBITDA.

We should expect that firms with high impairment risk, i.e. high abnormal goodwill in relative value, are those that face the highest write-downs in the future when performance is low. We expect the association is stronger as performance gets lower.

[Insert Table 4 About Here]

As expressed in Table 4, Panel A, the estimated coefficients are consistent with the hypothesis that firms with low performance and high relative abnormal goodwill, i.e. high impairment risk, are associated with higher frequency of goodwill impairment. The relationship is stronger when performance is lower as the value of the coefficient increase when $LowPerf$ is

defined as 50%, 15% and 10% lowest performers. The controls variables are statistically significant and show the expected signs.

5.3.2. *PPAs' Quality and Total Accruals*

We also test if the amount of abnormal goodwill is positively correlated with total accruals. The underlying assumption is that firms managing earnings through accruals in their day to day financial reporting are also likely to manage earnings through purchase price allocations when a business combination occurs. This assumption is expressed in model (7) below:

$$AbGW_i = c + b_1 * Accruals_i + e_i \quad (7)$$

Where for acquirer i :

- $AbGW_i$ is the absolute value of residuals from model (1) and proxies for PPA's quality;
- The variable $Accruals_i$ is the ratio of the absolute value of total accruals to the absolute value of cash flow from operations. Total accruals are calculated as follows: $(\Delta \text{ total current assets} - \Delta \text{ Cash}) - (\Delta \text{ total current liabilities} - \Delta \text{ short term debt}) - \text{depreciation expense}$. Cash flow from operation is equal to operating income minus total accruals (Burgstahler et al. 2006).

Table 4, Panel B, presents the results of model (7).

As total accruals are positively associated with abnormal goodwill, it confirms the validity of our proxy for PPAs' quality. It also constitutes evidence that firms managing earnings through the use of accruals are also more likely to manage PPAs.

5.4. **Impact of PPAs' Quality on Security Prices**

To further investigate the impact of the quality of PPAs on market expectations, we run an event study centered on the disclosure of the PPA in the acquirer 10-Q/K. If investors do not use information contained in PPAs, although they are informative, then it should be possible to use PPAs' quality to form a profitable trading strategy. Indeed, PPAs quality could proxy for the quality of the acquisition.

We divide the initial total sample is into five portfolios based on a ranking of the level of abnormal goodwill recognized in the PPAs: portfolio one includes companies that provide the top 20% of PPAs' quality, portfolio two is composed of firms providing the following 20% of best PPAs, etc. Portfolio five is contains firms providing the 20% worst PPAs, i.e. 20% of the initial sample with the highest level of abnormal goodwill.

We compute the benchmark returns using the Fama and French (1992) three factors model calibrated on the S&P500 on 200 days ending 32 days prior to the event window. The cumulated abnormal returns are then computed during 50 trading days starting two days after the disclosure of the purchase price allocation in acquirers' 10-Q/K reports.

[Insert Table 5 About Here]

From Table 5, Panel A, we can see that firms exhibiting the lowest portion of abnormal goodwill (portfolio one) present positive cumulated abnormal returns (+ 2.1% during 50 days, representing 10.60% annualized⁹), whereas the two portfolios including acquirers with the highest portion of abnormal goodwill (portfolio four and five) exhibit negative cumulated abnormal returns (respectively -2.83% and -4.36% on 50 days, i.e. resp. -14.15% and -21.80% annualized). Additionally, the ranking of CARs for the five portfolios reflects exactly the ranking of PPAs' quality. Figure 1 shows the CAR' time series after disclosure of PPAs in acquirers' 10-Q/K.

[Insert Figure 1 About Here]

These results are consistent with the hypothesis that market participants do not impound the information content of PPAs and therefore fail to correctly assess the value of securities following the disclosure of PPAs. A profitable trading strategy, consisting in shorting acquirers recognizing the highest level of abnormal goodwill and going long on acquirers recognizing the lowest level of abnormal goodwill appears to generate alpha (at least before taking transaction costs into account).

We also computed buy and hold returns over the 50 days following disclosure of PPAs for the same five portfolio. As Table 5, Panel B exhibits, acquirers disclosing low quality PPAs lead to lower stock returns than acquirers disclosing high quality PPAs.

6. Conclusion, Limitations, Discussion for Further Research

Purchase price allocations (PPAs) following business combinations, mandated by accounting standards (FAS 141 in the U.S., and IFRS 3 in an international setting) require a large recognition of intangible assets separately from residual goodwill. Yet, this position is challenged by some academics (e.g., Garten (2001); Kanodia et al. (2004); Skinner (2008); Basu and Waymire (2008)) and by some practitioners (e.g., CRUF (2008)). Indeed, concerns are expressed relating to usefulness issues of this requirement, and to quality issues. Earnings management behaviors are likely to be exacerbated in the context of a separate recognition of intangible assets.

This paper is the first to investigate the extent to which quality of PPAs, required by standard setters, improves financial statements' usefulness for investors (proxied by analysts or share returns) in making economic decisions with regard to capital allocation.

In order to address this question, and because the quality of work undertaken to conduct PPAs is not directly observable, we implemented a two steps approach on a unique hand collected data set, consisting of: first, computing a proxy of the quality of works undertaken by a firm in the context of PPAs, and second, testing the effects of PPAs' quality on usefulness of financial statements for users (analysts and other market participants).

⁹ 10.60% = 2.12% * 5, assuming approximately 250 trading days a year.

We provide evidence that analysts, like the market as a whole, do not fully integrate information disclosed in PPAs. However, we find that PPAs' quality has an informative content, as high quality PPAs are predictably related to stock over performance, whereas lower quality's PPAs are related to future stock underperformance.

We contribute to the literature in several ways. Our study is the first to test the effects of PPAs' quality for market participants. Hence, we contribute to standard setters' works, providing insights regarding the usefulness of standards issued and implemented, and regarding the extent to which a quite commonly understandable objective – improving information thanks to a more comprehensive recognition of intangible assets from goodwill¹⁰ – is likely to be met. As a result, this paper enters within the scope of the present context much more in favor of studies focusing on potential impacts of accounting standards.

However, our study may suffer from a number of limitations. It may be limited by the sample we used. Indeed, we focused on U.S. firms, from 2002 to 2008. The results may not be generalized to other areas, following international standards for instance. Besides, our proxy for PPA's quality, although robust to some tests, may result in additional limitations: omitted variables may be associated to normal goodwill and distort our conclusions relating to abnormal goodwill, defined as the residual of our first step approach.

We suggest to further investigate the extent to which analysts and market as a whole pay attention to the informational content of PPAs. Studies could be conducted under an IFRS environment, and focus on the evolution over time of the quality of PPAs.

¹⁰ See IFRS 3.89 and IFRS 3 R BC 158

References

- AICPA. (1970a). *Accounting principles board (APB) no. 16: Business combinations*. American Institute of Certified Public Accountants.
- AICPA. (1970b). *Accounting principles board (APB) no. 17: Intangible assets*. American Institute of Certified Public Accountants.
- Asquith, P., M. B. Mikhail, and A. S. Au. (2005). Information content of equity analyst reports. *Journal of Financial Economics* 75 (2): 245-282.
- Ayers, B. C., C. E. Lefanowicz, and J. R. Robinson. (2000). The financial statement effects of eliminating the pooling-of-interests method of acquisition accounting. *Accounting Horizons* 14 (1): 1-19.
- Ball, R. (2006). International financial reporting standards (IFRS): Pros and cons for investors. *Accounting & Business Research* 36: 5-27.
- Basu, S., and G. Waymire. (2008). Has the importance of intangibles really grown? And if so, why? *Accounting & Business Research* 38 (3): 171-190.
- Browning, B. (1997). Maximizing r&d write-offs to reduce goodwill. *Mergers and Acquisitions* 32 (2): 29-32.
- Burgstahler, D., L. Hail, and C. Leuz. (2006). The importance of reporting incentives: Earnings management in european private and public firms. *The Accounting Review* 81 (5): 1-45.
- CRUF (2008) In *April 22, 2008 FASB/IASB Joint Board Meeting*.
- DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of Accounting & Economics* 3 (3): 183-199.
- Dechow, P. M., and R. G. Sloan. (1995). Detecting earnings management. *Accounting Review* 70 (2): 193-225.
- Dechow, P. M., R. G. Sloan, and A. P. Sweeney. (1996). Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the sec. *Contemporary Accounting Research* 13 (1): 1-36.
- Fama, E. F., and K. R. French. (1992). The cross-section of expected stock returns. *Journal of Finance* 47 (2): 427-465.
- FASB. (2001a). *Statement of financial accounting standards (SFAS) no. 141: Business combinations*. Norwalk, CT: Financial Accounting Standards Board.
- FASB. (2001b). *Statement of financial accounting standards (SFAS) no. 142: Goodwill and other intangible assets*. Norwalk, CT: Financial Accounting Standards Board.
- Garten, J. E. (2001). Strengthening financial markets: Do investors have the information they need? *Report of an SEC-Inspired Task Force* (May).
- Henning, S. L., and W. H. Shaw. (2003). Is the selection of the amortization period for goodwill a strategic choice? *Review of Quantitative Finance & Accounting* 20 (4): 315.
- Holthausen, R. W., and R. L. Watts. (2001). The relevance of the value-relevance literature for financial accounting standard setting. *Journal of Accounting & Economics* 31 (1-3): 3-75.
- Hopkins, P. E., R. W. Houston, and M. F. Peters. (2000). Purchase, pooling, and equity analysts' valuation judgments. *Accounting Review* 75 (3): 257.
- IASB. (2004). *International reporting financial standard (IFRS) no. 3: Business combinations*. London: IASC Foundation Publications Department.
- IASB. (2008). *International reporting financial standard (IFRS) no. 3: Business combinations – revised*. London: IASC Foundation Publications Department.
- Jenkins, H. W. J. (1999). Business world: Mean old FASB: Forcing us to think. *The Wall Street Journal* 2nd June.

- Jennings, R., J. Robinson, R. B. Thompson II, and L. Duvall. (1996). The relation between accounting goodwill numbers and equity values. *Journal of Business Finance & Accounting* 23 (4): 513-533.
- Jones, J. J. (1991). Earnings management during import relief investigations. *Journal of Accounting Research* 29 (2): 193-228.
- Kanodia, C., H. Sapra, and R. Venugopalan. (2004). Should intangibles be measured: What are the economic trade-offs? *Journal of Accounting Research* 42 (1): 89-120.
- Li, K. K., and R. G. Sloan. (2011). Has goodwill accounting gone bad? *Canadian Academic Accounting Association Annual Meeting, Toronto*.
- Lys, T., and L. Vincent. (1995). An analysis of value destruction in at&t's acquisition of ncr. *Journal of Financial Economics* 39 (2/3): 353-378.
- Maines, L. A., E. Bartov, P. M. Fairfield, D. E. Hirst, T. A. Iannacconi, R. Mallett, C. M. Schrand, D. J. Skinner, and L. Vincent. (2003). Implications of accounting research for the fasb's initiatives on disclosure of information about intangible assets. *Accounting Horizons* 17 (2): 175-185.
- McGoldrick, B. (1997). Goodwill games. *Institutional Investor* 31 (3): 145-149.
- Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research* 11 (2): 661-687.
- Ramanna, K. (2008). The implications of unverifiable fair-value accounting: Evidence from the political economy of goodwill accounting. *Journal of Accounting and Economics* 45: 253-281.
- Ramanna, K., and R. L. Watts. (2009). Evidence from goodwill non-impairments on the effects of using unverifiable estimates in financial reporting. *Working Papers -- Harvard Business School Division of Research*: 1-41.
- Shalev, R. (2009). The information content of business combination disclosure level. *The Accounting Review* 84 (1): 239-270.
- Skinner, D. J. (2008). Accounting for intangibles - a critical review of policy recommendations. *Accounting & Business Research* 38 (3): 191-204.
- Subramanyam, K. R. (1996). The pricing of discretionary accruals. *Journal of Accounting & Economics* 22 (1-3): 249-281.
- Vincent, L. (1997). Equity valuation implications of purchase versus pooling accounting. *Journal of Financial Statement Analysis* 2 (4): 5.
- Watts, R. L. (2003). Conservatism in accounting part i: Explanations and implications. *Accounting Horizons* 17 (3): 207-221.
- Zhang, I., and Y. Zhang. (2007). Accounting discretion and purchase price allocation after acquisitions. Hong Kong University of Science and Technology.

Table 1 – Descriptive Statistics of the SamplePanel A – 1st Step Variables

	N	Mean	St-dev.	1st Q	Med	3rd Q
<i>Price</i>	265	3.173	2.819	1.429	2.235	3.540
<i>GW</i>	260	1.813	1.852	0.713	1.193	2.210
<i>%GW</i>	276	0.572	0.284	0.422	0.589	0.734
<i>Materiality</i>	278	0.332	0.340	0.093	0.230	0.496
<i>Intan</i>	265	0.768	1.011	0.205	0.481	0.887
<i>Growth</i>	250	4.026	6.151	1.751	2.765	4.277
<i>Premium</i>	251	0.743	2.556	0.238	0.413	0.650
<i>Accruals</i>	272	-0.003	0.094	-0.033	0.006	0.041
<i>BIG4</i>	279	0.950				
<i>Health</i>	281	0.338				
<i>Industry</i>	281	0.096				
<i>HighTech</i>	281	0.505				
<i>Nrj</i>	281	0.060				

Price is the purchase price scaled by the total assets of the target firm (from Thomson One Banker and Compustat). *GW* is the amount of the purchase price allocated to goodwill scaled by the total assets of the target company (from acquirers' 10-Q/K and Compustat). *%GW* is the percentage of the purchase price allocated to goodwill (from acquirers' 10-Q/K A and Thomson One Banker). *Materiality* is the purchase price scaled by the total assets of the acquiring firm (from Thomson One Banker and Compustat). *Intan* is the amount of recognized intangible assets of the target firm scaled by the target firm total assets (from Compustat). *Growth* is the target company growth potential measured as the end of the year book-to-market ratio of the target (from Compustat annual and CRSP). *Premium* is excess purchase price over the market value of equity of the target company measured at the end of the month prior to the announcement expressed as a percentage of the market value of equity of the target company (from One Banker and CRSP monthly). *Accruals* is the acquiring firm total accruals measured as indicated in section 5.2. (from Compustat). *BIG4* = 1 if the auditor of the acquiring company belongs to one of the 4 largest external auditor (from firm 10-Q/K). *Health* is a dummy variable equaling 1 if the acquiring firm macro industry is Healthcare (from Thomson One Banker). *Industry* is a dummy variable equaling 1 if the acquiring firm macro industry is Industrials (from Thomson One Banker). *HighTech* is a dummy variable equaling 1 if the acquiring firm macro industry is High Technology (from Thomson One Banker). *Nrj* is a dummy variable equaling 1 if the acquiring firm macro industry is Energy and Power (from Thomson One Banker).

Panel B – 2nd Step Variables (Forecasts' Revisions, Forecasts' Accuracy and Controls)

	N	Mean	St-dev.	1st Q	Med	3rd Q
<i>Revision</i> _{EPS}	241	0.117	0.256	0.003	0.031	0.098
<i>Revision</i> _{EBIT}	191	0.259	0.716	0.002	0.036	0.192
<i>Revision</i> _{TP}	238	0.118	0.251	0.008	0.032	0.076
<i>Revision</i> _{RECO}	245	0.043	0.063	0.000	0.018	0.057
<i>%TP (mean)</i>	233	0.524				
<i>%TP (median)</i>	231	0.519				
<i>Volatility</i>	263	0.442	0.234	0.149	0.282	0.362
<i>Size</i>	258	8.447	1.740	4.815	7.104	8.290
<i>D10QK</i>	266	0.282	0.451			

*Revision*_{EPS} is the change in the consensus (mean) EPS following disclosure of the PPA (from I/B/E/S); *Revision*_{EBIT} is the change in the consensus (mean) EBIT following disclosure of the PPA (from I/B/E/S); *Revision*_{TP} is the change in the consensus (mean) target price following disclosure of the PPA (from I/B/E/S); *Revision*_{RECO} the number of recommendations changed scaled by the total number of recommendations made by analysts following disclosure of the PPA (from I/B/E/S); *%TP (mean)* is the percentage of the first mean consensus target price after disclosure of the PPA hit by actual security prices over the next 12 month (from I/B/E/S and CRSP); *%TP (median)* is the percentage of the first median consensus target price after disclosure of the PPA hit by actual security prices over the next 12 month (from I/B/E/S and CRSP). *Volatility* is the annualized daily standard deviation of stock returns measured over the 252 days before disclosure of the PPA (from CRSP). *Size* is the natural logarithm of acquirer total assets at the end of the month before disclosure of the PPA (from COMPUSTAT). *D10QK* is a dummy variable equal to 1 if the disclosure of the PPA occurred in a form 10-K (from SEC EDGAR).

Panel C – 2nd Step Variables (Dispersion and Forecasts' Errors)

	N	Mean	St-dev.	1st Q	Med	3rd Q
$\Delta Disp$ _{EPS}	241	-0.012	0.588	-0.040	0.000	0.019
$\Delta Disp$ _{EBIT}	191	-0.043	0.670	0.000	0.000	0.018
$\Delta Disp$ _{TP}	222	0.007	0.179	-0.063	0.000	0.037
$\Delta Error$ _{EPS}	228	-0.020	0.322	-0.039	0.000	0.008
$\Delta Error$ _{EBIT}	162	-0.123	1.008	-0.053	0.000	0.013

$\Delta Disp$ _{EPS} is the change in EPS range after disclosure of the PPA (from I/B/E/S); $\Delta Disp$ _{EBIT} is the change in EBIT range after disclosure of the PPA (from I/B/E/S); $\Delta Disp$ _{TP} is the change in target price range after disclosure of the PPA (from I/B/E/S); $\Delta Error$ _{EPS} is the change after the disclosure of the PPA in the difference between EPS forecasts and actual EPS scaled by actual EPS (from I/B/E/S); $\Delta Error$ _{EBIT} is the change after the disclosure of the PPA in the difference between EBIT forecasts and actual EBIT scaled by actual EBIT (from I/B/E/S).

Panel D – PPA and Subsequent Goodwill Impairments

	N	Mean	St-dev.	1st Q	Med	3rd Q
<i>DIMP</i>	266	0.538				
<i>AbGW*</i>	229	0.316	1.360	-0.497	0.083	0.732
<i>AvPerf</i>	191	0.117	0.058	0.081	0.116	0.156
<i>Imp (% EBITDA)</i>	193	0.302	1.002	0.000	0.000	0.059

DIMP is a dummy variable equal to 1 if the acquirer writes down goodwill during the three years following the completion of the acquisition. **AbGW* is the abnormal goodwill estimated from model (1) measuring future impairment risk in relative value (not absolute). *AvPerf* is the three-year mean performance of the acquirer measured as return on assets (EBITDA/Total Assets). *Imp (% EBITDA)* is the cumulated goodwill impairment during the years following completion of the acquisition (with a maximum of three years after completion) expressed as a percentage of three-year cumulated EBITDA.

Panel E – Correlation Matrix between 1st Stage Variables (P-Value are indicated in parenthesis)

	<i>Pricetat</i>	<i>GWtat</i>	<i>GWpc</i>	<i>Materiality</i>	<i>Intant</i>	<i>Growth</i>	<i>Premium</i>	<i>Accruals</i>	<i>BIG4</i>	<i>Health</i>	<i>Industry</i>	<i>HighTech</i>	<i>Nrj</i>
<i>Pricetat</i>	1.000												
<i>GWtat</i>	0.835 (0.000)	1.000											
<i>GWpc</i>	-0.042 (0.495)	0.330 (0.000)	1.000										
<i>Materiality</i>	0.078 (0.205)	0.020 (0.747)	-0.152 (0.011)	1.000									
<i>Intant</i>	0.699 (0.000)	0.581 (0.000)	-0.101 (0.103)	-0.098 (0.110)	1.000								
<i>Growth</i>	0.382 (0.000)	0.395 (0.000)	0.074 (0.246)	-0.066 (0.295)	0.229 (0.000)	1.000							
<i>Premium</i>	0.113 (0.073)	0.118 (0.064)	-0.076 (0.229)	-0.022 (0.724)	0.162 (0.010)	-0.039 (0.538)	1.000						
<i>Accruals</i>	0.014 (0.817)	0.058 (0.359)	-0.001 (0.985)	0.120 (0.046)	0.022 (0.726)	0.041 (0.525)	0.011 (0.861)	1.000					
<i>BIG4</i>	-0.019 (0.758)	-0.065 (0.293)	-0.023 (0.702)	0.072 (0.232)	-0.051 (0.410)	0.007 (0.910)	0.012 (0.849)	-0.021 (0.729)	1.000				
<i>Health</i>	0.208 (0.000)	0.023 (0.704)	-0.215 (0.000)	0.138 (0.021)	0.250 (0.000)	0.054 (0.387)	0.020 (0.745)	0.054 (0.367)	-0.077 (0.197)	1.000			
<i>Industry</i>	-0.126 (0.040)	-0.090 (0.146)	0.110 (0.067)	0.055 (0.354)	-0.094 (0.125)	0.058 (0.356)	-0.032 (0.605)	0.067 (0.267)	0.075 (0.210)	-0.233 (0.000)	1.000		
<i>HighTech</i>	-0.060 (0.323)	0.099 (0.109)	0.200 (0.001)	-0.191 (0.001)	-0.110 (0.072)	-0.053 (0.402)	0.023 (0.713)	-0.165 (0.006)	0.000 (0.989)	-0.722 (0.000)	-0.329 (0.000)	1.000	
<i>Nrj</i>	-0.113 (0.064)	-0.137 (0.026)	-0.125 (0.037)	0.059 (0.324)	-0.132 (0.031)	-0.065 (0.302)	-0.050 (0.429)	0.154 (0.010)	0.058 (0.329)	-0.181 (0.002)	-0.082 (0.166)	-0.256 (0.000)	1.000

Table 2 – Explanation of Normal Goodwill

Dep Var:	<i>GW/TA</i>			
	Exp. Sign	Coeff.	t-stat	P.Value
<i>Materiality</i>	(+/-)	0.793**	2.182	0.030
<i>Growth</i>	(+)	0.089**	2.607	0.010
<i>Premium</i>	(+)	0.035	1.044	0.297
<i>Intan</i>	(+)	0.957***	5.657	0.000
<i>BIG4</i>	(-)	-0.135	-0.277	0.782
<i>Industry</i>	(+/-)	-0.010	-0.036	0.971
<i>Nrj</i>	(+/-)	-0.015	-0.047	0.963
<i>HighTech</i>	(+/-)	0.759***	3.476	0.001
<i>Two</i>	(+/-)	0.484	0.829	0.408
<i>Three</i>	(+/-)	0.024	0.078	0.938
<i>Four</i>	(+/-)	0.358	1.019	0.309
<i>Five</i>	(+/-)	0.542*	1.774	0.077
<i>Six</i>	(+/-)	0.225	0.783	0.434
<i>Seven</i>	(+/-)	0.299	1.064	0.288
<i>Eight</i>	(+/-)	0.689**	2.166	0.031
<i>_cons</i>	(+/-)	-0.1646	-0.2617	0.794
R²		0.471		
Adj. R²		0.436		
F		8.163***		
p(F)		0.000		
N		241		

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Table 3 – Association between PPAs' Quality and Analysts' Expectations

Panel A – Association with Analysts' Revisions

Dep Var:	<i>Revision_{EPS}</i>			<i>Revision_{EBIT}</i>			<i>Revision_{TP}</i>			<i>Revision_{RECO}</i>		
	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value
<i>abGW</i>	-0.016	-1.045	0.297	-0.056	-1.010	0.314	-0.023	-1.420	0.157	0.001	0.225	0.822
<i>A10QK</i>	0.026	0.763	0.446	0.017	0.130	0.897	-0.025	-0.678	0.498	-0.015	-1.550	0.123
<i>Volatility</i>	0.159**	2.175	0.031	0.529	1.872*	0.063	0.139*	1.823	0.070	0.003	0.132	0.895
<i>Size</i>	-0.028***	-2.791	0.006	-0.114	-2.864***	0.005	0.003	0.253	0.800	-0.007**	-2.599	0.010
<i>_cons</i>	0.283***	2.724	0.007	1.129	2.741***	0.007	0.049	0.453	0.651	0.106***	3.786	0.000
R²	0.107			0.111			0.031			0.057		
Adj. R²	0.088			0.087			0.010			0.038		
F	5.634***			4.709***			1.491			2.922**		
p(F)	0.000			0.001			0.206			0.022		
N	194			156			194			197		

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Panel B – Association of PPA’s Quality with Change of Forecasts’ Dispersion

Dep Var	<i>ΔDisp_{EPS}</i>			<i>ΔDisp_{EBIT}</i>			<i>ΔDisp_{TP}</i>		
	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value
<i>abGWI</i>	0.014	0.524	0.601	-0.014	-1.210	0.228	0.004	0.386	0.700
<i>A10QK</i>	0.088	1.511	0.133	-0.008	-0.299	0.765	-0.030	-1.260	0.209
<i>Volatility</i>	-0.089	-0.726	0.468	-0.070	-1.199	0.233	-0.017	-0.352	0.725
<i>Size</i>	0.002	0.114	0.910	0.002	0.260	0.796	-0.008	-1.164	0.246
<i>_cons</i>	-0.053	-0.300	0.764	0.014	0.160	0.873	0.088	1.259	0.210
R²		0.017			0.025			0.019	
Adj. R²		-0.004			-0.000			-0.003	
p(F)		0.516			0.420			0.487	
N		194			156			183	

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Panel C – Association with Change in Forecasts' Accuracy

Dep Var:	$\Delta Error_{EPS}$			$\Delta Error_{EBIT}$		
	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value
<i>abGWI</i>	0.000	0.028	0.978	0.022	0.297	0.767
<i>A10QK</i>	0.088***	3.027	0.003	0.022	0.118	0.906
<i>Volatility</i>	-0.056	-0.956	0.341	-1.110***	-2.987	0.003
<i>Size</i>	0.002	0.270	0.787	0.076	1.392	0.166
<i>_cons</i>	-0.028	-0.325	0.746	-0.381	-0.674	0.502
R²		0.055			0.109	
Adj. R²		0.034			0.081	
F		2.582**			3.942***	
p(F)		0.039			0.005	
N		183			134	

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Panel D – Association with Target Prices' Accuracy after Disclosure

Dep Var	%TP(mean)			%TP(median)		
	Coeff.	t-stat	P.Value	Coeff.	t-stat	P.Value
<i>abGW1</i>	-0.206**	-2.235	0.025	-0.199**	-2.162	0.031
<i>A10QK</i>	0.264	1.302	0.193	0.116	0.568	0.570
<i>Volatility</i>	0.211	0.507	0.612	0.434	1.035	0.301
<i>Size</i>	0.075	1.288	0.198	0.100*	1.717	0.086
<i>_cons</i>	-0.536	-0.906	0.365	-0.824	-1.388	0.165
Pseudo R²		8.803			8.145	
chi2		0.033*			0.031*	
p(chi2)		0.066			0.086	
N		191			189	

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Table 4 – Proxy for PPAs Quality: Robustness’ Checks

Panel A – Association between PPAs’Quality and Subsequent Goodwill Impairments

Dep. Var:	<i>DIMP</i>								
	Low Perf = 50%			Low Perf = 15 %			LowPerf = 10 %		
	Coeff	t-stat	P.Value	Coeff	t-stat	P.Value	Coeff.	t-stat	P.Value
<i>LowPerf*abGW</i>	0.258*	1.689	0.091	0.299*	1.686	0.092	0.673*	1.902	0.057
<i>AbGW</i>	-0.179	-1.498	0.134	-0.094	-1.090	0.276	-0.053	-0.707	0.479
<i>AvPerf</i>	-3.876*	-1.890	0.059	-3.934*	-1.956	0.050	-4.389**	-2.152	0.031
<i>Size</i>	-0.121*	-1.748	0.080	-0.132*	-1.907	0.057	-0.150**	-2.128	0.033
<i>_cons</i>	1.104**	1.966	0.049	1.214**	2.202	0.028	1.442***	2.600	0.009
chi2	18.098***			17.857***			18.786***		
P(chi2)	0.001			0.001			0.001		
Pseudo-R²	0.075			0.076			0.078		
N	172			172			172		

Panel B – Association between PPAs Quality and Total Accruals

Dep. Var:	<i>AbGW</i>		
	Coeff.	t-stat	P.Value
<i>Accruals</i>	1.518**	2.469	0.014
<i>_cons</i>	0.965	15.11	0.000
R²	0.019		
Adj. R²	0.015		
F	6.10**		
p(F)	0.014		
N	236		

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Table 5 – Returns Following Disclosure based on Ranking of PPAs’ Quality

Panel A – Cumulated Abnormal Returns (CAR) based on Quintile of PPA’s Quality (days +2 to +50 after Disclosure)

Portfolio	N	Mean CAR (+2, +50)	Portfolio Time- Series (CDA) t	p-Value
Top 20% of PPAs Quality	46	2.12%	0.869	0.1942
Top 20% to 40% of PPAs Quality	50	0.38%	0.151	0.4401
Top 40% to 60% of PPAs Quality	43	-0.41%	-0.156	0.4379
Top 60% to 80% of PPAs Quality	42	-2.83%	-1.148	0.1255
Bottom 20% of PPAs Quality	47	-4.36%**	-1.875	0.0304

*p<.1 (two-sided tests); **p<.05(two-sided tests); ***p<.01 (two-sided tests)

Panel B – Buy and Hold Returns based on Quintile of PPA’s Quality (days +2 to +50 after Disclosure)

Portfolio	N	Mean Buy and Hold return	Median Buy and Hold return
Top 20% of PPAs Quality	46	3.10%	5.94%
Top 20% to 40% of PPAs Quality	50	6.32%	3.42%
Top 40% to 60% of PPAs Quality	43	3.63%	2.80%
Top 60% to 80% of PPAs Quality	42	-0.02%	0.26%
Bottom 20% of PPAs Quality	47	-1.08%	0.62%

Figure 1 – Time Series of CARs for the 5 Portfolios after PPAs Disclosure (+2, +50 days)

