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**POLICY PAPER**

**“Marking to Market versus Taking to Market”**

**Executive Summary**

**Guillaume Plantin (Sciences Po) and Jean Tirole (TSE and IAST)**



# “Marking to Market versus Taking to Market”

## Executive Summary

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### Abstract

The debate on the opportunity of adopting accounting standards based on “fair values” has been raging for years. In Plantin and Tirole (2015), we offer a framework for the study of accounting measures that builds on the primitive ingredients of information economics (informational asymmetries). The goal of this executive summary is to describe the main ingredients and insights of this economics paper in a non-technical fashion. Plantin and Tirole (2015) study in particular the mutual feedback between individually optimal use of market data by firms and equilibrium liquidity in the markets for their assets. This equilibrium approach reveals a socially excessive use of market-based measures that dries up market liquidity and reduces the informativeness of the price signals that firms use for their governance. Inducing firms to rely less on market data than they would find privately optimal benefits them as it reduces their cost of capital. In practice, accounting standards that rely on market data only for the most liquid items (as opposed to using it as much as possible) would go in this direction.

## 1 Introduction

### Accounting measures and information economics

A global debate on the opportunity of fair-value accounting has been raging for years. The International Accounting Standard Board (IASB) defines fair value as “the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.”<sup>1</sup> This contrasts with amortized-cost accounting whereby, broadly, items remain recorded at their entry value instead of reflecting all relevant data accruing from markets for similar items. Advocates of fair-value accounting (such as the IASB) argue that marking to market provides a more accurate picture of the balance sheet, and prevents distortions such as gains trading (the selling of winners and keeping of losers under amortized-cost accounting). By contrast, opponents of fair-value accounting point at the volatility of market values, mispricing and the destabilization of balance sheets; they further worry about macroeconomic implications, such as the occurrence of fire sales by entities pressed to sell already-depreciated assets.

While economists and accountants paint a sharp contrast between amortized-cost and fair-value accounting, the distinction between the two is more a matter of degree: amortized-cost accounting embodies some fair-value accounting. First, gains trading, the practice of selling winners, implies that more successful investments are more likely to be recorded at market value before their maturity. Second, some impairment rules may take sufficiently negative information, including market signals, into account under amortized cost accounting.

Presumably, the extent to which the information that firms convey to their stakeholders relies on market data should have a far-reaching impact on both corporate governance and capital markets. Yet, economists have devoted surprisingly little research to this question. The goal of our “technical” paper is to step back from the policy debate in a first go and to apply information economics to the study of accounting measures. Information economics is the subfield of economics that studies how informational asymmetries affect economic performance. Informational asymmetries broadly correspond to situations in which the various parties involved in an economic activity do not share a common information set. Some parties may be privately informed about some key parameters of the economy. For example, the top managers of a firm have inside information about the prospects of the firm’s current R&D projects that is difficult to credibly communicate (or that they do not want to disclose) to retail shareholders. An alternative form of informational asymmetry pertains to situations in which actions taken by one party cannot be observed by the other parties. For example, the top management of a bank cannot fully monitor the due-diligence efforts of its loan officers. It observes these efforts only imperfectly and retrospectively through subsequent loans performance. Information economics aims at designing institutional arrangements, contracts, governance, and more generally mechanisms that mitigate the adverse economic consequences from such informational asymmetries.

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<sup>1</sup> See International Financial Reporting Standards 13.

Accounting measures are the primary source of certified information that firms convey to their stakeholders (suppliers of capital, employees, public authorities, customers,...). Because there are pervasive informational asymmetries among these stakeholders, information economics seems to be a well suited tool to determine the optimal design and use of accounting information by corporations. The goal of our “technical” paper is to develop an environment that is sufficiently rich to capture the important trade-offs at stake, and yet sufficiently simple to lend itself to a rigorous analysis that delivers clear answers.

### Why measure future cash flows ?

The public debate on accounting standards has mainly focused on *how* to measure items in firms’ balance sheets (e.g., amortized cost versus marking to market), often leaving implicit *why* accounting measures matter in the first place. By contrast, it is difficult to develop a rigorous economic analysis of *how* to measure firms’ future cash flows without taking a precise and explicit stand on *why* such measures matter. Accordingly, to shed light on the debate on accounting rules, any framework must jointly address these questions of *why* and *how*.

There are several practical reasons why accounting measures are an important determinant of corporate decisions. First, measurement and consolidation rules shape firms’ interactions with public authorities, as fiscal and regulatory constraints are mainly based on accounting measures of firms’ activity. Second, as professional and academic accountants have long emphasized, accounting conventions come to life when they are actually employed for corporate governance, either prospectively (e.g., to assess an entity’s solvency, or the management’s capability at running an entity), or retrospectively to reward performance. Our focus is on this latter use of accounting measures as measures of economic performance. We study an environment in which accounting measures serve as inputs for performance-based governance mechanisms that align the interests of firms’ various stakeholders. This way, we are consistent with modern corporate finance theory, which views such conflicts of interest between firms’ stakeholders as the primary issue that firms’ capital structure, governance, and compensation policies seek to address.

### Roadmap

The remainder of this executive summary is comprised of two sections. Section 2 first offers a bird’s eye view of the main ingredients of our formal model. Section 3 then spells out the main results generated by this model, their practical interpretations, and their policy implications.

## 2 Sketch of the model

### Incentive-compatible corporate governance

Our starting point is a standard agency model of corporate finance in which a firm is described as an interaction between two stakeholders, deemed a “principal” and an “agent” in the standard economics terminology. The principal stands for outsiders, or constituencies that have a financial stake in the firm but do not operate its assets, such as retail shareholders or bondholders. The agent stands for insiders—the stakeholders who run the firm or closely oversee its operations, such as top managers, directors, and blockholders.

Insiders are in charge of figuring out the strategy that maximizes the total value of the firm to all stakeholders. Depending on the context, such strategic decisions encompass asset allocation, market entry or exit, risk-management decisions, etc... We model this task as a simple forecasting effort, whereby the agent acquires private information about the future cash flows resulting from the firm’s various strategic options. This forecasting effort comes to the agent at a private cost that increases with effort intensity. This cost can be interpreted in a variety of ways. Literally, it can stand for any time and resources devoted by insiders to figuring out the strategy that generates the highest firm value instead of devoting them to tasks that they find more rewarding (e.g., enjoying a more leisurely managerial occupation or running “pet projects”). Alternatively, it may stand for the costs in terms of private benefits or career concerns that the manager incurs by choosing the course of action that best fits the firm.

Crucially, we posit an informational asymmetry between firms’ insiders and outsiders: The principal cannot observe the intensity of the forecasting effort exerted by the agent. The imperative of aligning the agent’s incentives with the principal’s interests implies that the benefits that the agent derives from participating in the firm must be made contingent on the outcome of the strategy that he has chosen. Suppose otherwise that the agent is, for example, a manager compensated with a fixed salary. In this case he may have insufficient incentives to exert any forecasting effort, which would be detrimental to total firm value and in general inefficient. By contrast, rewarding insiders after the strategy that they have chosen turns out to deliver a sufficiently good outcome and punishing them following bad performance elicits a higher forecasting effort from them because they then internalize the consequences of this effort on total firm value. This of course requires a proper measurement of “performance”.

The “reward” and “punishment” can take many forms in practice. It may simply consist in a contingent pecuniary transfer from the principal to the agent, as is the case with performance-based managerial compensation. It may alternatively consist in letting insiders derive rents from carrying out growth projects, large investments or acquisitions as opposed to restructuring the firm and scaling down its activity. A debt covenant that restricts capital expenditures, payouts, or additional borrowing if the solvency and liquidity of the borrowing firm have deteriorated corresponds for example to such an incentive-compatible scheme for insiders. Incentives then stem from (possibly ex-post inefficient) courses of actions that are contingent on the firm’s measured performance.

In sum, we use a simple environment in which an optimal corporate governance provides the insiders of a firm with incentives to work sufficiently hard on identifying a value-maximizing strategy.

### Measures-based corporate governance

Ideally, such an incentive-compatible corporate governance should be based on the observation of the entire sequence of cash flows generated by the strategy initially chosen by the insiders. This entire sequence is the most accurate signal that outsiders can receive about the intensity of insiders' initial effort<sup>2</sup>. Waiting for the entire project to unfold can be prohibitively costly in practice, however.

Projects in the energy or infrastructure industries, long-term loans or insurance portfolios, or R&D projects mature at long horizons at which it is typically not feasible in practice to postpone insiders' rewards or punishments. For example, a top manager would have to spend her/his entire career within the same firm in order to reap the benefits from her/his efforts on long-term projects absent any reward based on early performance measures. Such extreme commitment seems undesirable both from the perspective of the manager and that of the firm. Similarly, in case of liquidity needs or faced with new project opportunities, a shareholder holding a controlling stake would value the ability to trade her/his shares at a price that reflects the future value that she/he has contributed to create but that is not reflected yet in the current cash flows. Finally, it can be that shareholders cannot wait to decide whether to keep the top management or allow it to invest in new undertakings. In such instances, it may be preferable to base corporate governance on measures of performance that are less precise than the entire sequence of realized cash flows associated with a strategy, but that accrue at a shorter horizon. What are such measures of the value of future cash flows in practice? We posit that they can be of two broad types.

First, a given firm can seek to observe the valuation of an item in its balance sheet by an informed third party, such as insiders in the same industry or in a sufficiently closely related one. In this case, the only way this third party sends a credible signal about its views is by "putting its money where its mouth is." In our simple model, this amounts to selling the item to be measured to this third party. There is in practice a vast array of arrangements other than outright sales that can ensure that a third party delivers a credible valuation of a firms' assets or liabilities, including partial sales (e.g., joint-ventures), risk-sharing arrangements (e.g., reinsurance treaties), or refinancing (e.g., repos). We abstract from these distractions for simplicity and deem this first way of producing an early measure of future cash flows *taking to market* (TTM henceforth). The cost of TTM depends on how competitive the potential informed buyers of such assets are.

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<sup>2</sup> This signal is still never perfectly informative as corporate performance is always affected by many factors that are impossible to perfectly foresee.

Second, instead of taking its own item to the market, a given firm can simply observe transactions between other firms selling sufficiently similar items and third parties. We deem this approach *marking to market* (MTM henceforth). An obvious advantage of MTM over TTM is that this comes for free since the firm “free rides” on the information generated by market transactions by other firms<sup>3</sup>. However, this information is presumably less precise than that generated by TTM because the assets that are put on the market by other firms may differ from that owned by the firm seeking to use this data, and because transaction prices are not perfectly observed in many markets.

### Summary of the setup

Before deriving our main results, it is worthwhile summarizing the main ingredients of our model:

1. We posit that the measured performance of firms is a key governance tool. Rewarding insiders following a good outcome (with bonuses, continuing tenure, promotions, or expansion projects) and punishing them following bad ones (with demotions, firing, restructurings, takeovers,...) induces insiders to exert their best effort at selecting value-maximizing strategies ex-ante.
2. Ideally, performance is best measured after full resolution of the uncertainty surrounding strategic decisions. In practice, this implies basing governance on the observation of the cash flows implied by a given strategy.
3. For strategic decisions whose consequences are too remote relative to the horizon of the insiders that affect them, it may be preferable to rely on early measures of cash flow must be based on some form of market transaction—either a transaction involving the cash flow to be measured or that of another future cash flow with sufficiently similar characteristics<sup>4</sup>. We deem TTM a measurement based on the (possibly partial) sale of the items to be measured. We deem MTM a measurement based on the observation of comparable transactions by other firms.

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<sup>3</sup> In practice, external pricing services or assessment of fair values may create a cost of obtaining this signal. We ignore it in our model as this does not fundamentally affect the analysis.

<sup>4</sup> Note that even when the measure of an item for which there is no market is based on a sophisticated model, the data used to calibrate the model (discount factors, risk premia, expected growth,...) still stem from observed market transactions. The only difference between “marking to market” and “marking to model” is that there is a more distant relation between the items that trade and the one to be measured in the latter case, hence the need to make assumptions and use a theoretical model. This is a practical distinction rather than a conceptual one.

In this environment, we derive the optimal governance mechanism. An optimal mechanism is a system of rewards and punishments that uses firms' realized cash flows and the measures of future ones generated by TTM and MTM in order to induce insiders to select a value-maximizing strategy at the lowest cost for outsiders. In other words, we solve for a governance system that minimizes the cost of outside funds for firms.

### 3 Main results and policy implications

The optimal governance mechanism that we derive has three interesting practical implications for optimal accounting measures that we describe in turn.

#### Optimal degree of marking to market

First, we find that it is in general not optimal for a firm to use exclusively market data in order to measure performance and implement governance.

The intuition is the following. Recall that governance can rely on three performance measures: accruing cash flows, market-consistent valuation of future cash flows (MTM), or gains or losses realized when trading these future cash flows (TTM). These three measures come at different costs and benefits. Waiting for the accrual of cash flows delivers the most accurate signals but comes at the cost of delaying decisions. TTM comes at the cost of leaving trading profits to the buyers of the items to be sold if they are not perfectly competitive. MTM comes at the cost of "rewarding insiders for luck." The imperfect observation of transactions of items that are related to (but not perfectly similar to) the ones to be measured may lead to reward or punish insiders for factors that they are not able nor supposed to forecast in the first place since these would not affect the value created by their strategies. This does not provide appropriate incentives.

Very broadly speaking, these three performance measures must each contribute to the provision of incentives depending on how informative they are relative to each other, and, in the case of long-term cash flows, on the cost of delaying rewards and strategic decisions. *In particular, this implies that market-based measures of future cash flows should be used for governance only to the extent that they are informative about the value generated by the firm at a sufficiently high confidence level.* At one extreme, for items that trade in very informationally inefficient markets, it is preferable to ignore market data altogether and measure performance either through accrued cash flows or the realization of latent capital gains. This would amount to measuring performance under pure historical-cost accounting. Conversely, if an entity's balance sheet features only items for which an informative market price is readily available—e.g., a mutual fund trading only large listed stocks—then an exclusive reliance on market-based performance measures can be optimal. This amounts to measuring corporate performance using marked-to-market accounting data.

In other words, we capture historical-cost accounting (with gains trading) and full fair value as two extreme cases. In the general case, we introduce the "degree of marking to market" of a governance system as the extent to which it should depend on market-based measures. This

degree is 0 under historical-cost accounting and 1 under pure marking to market. In general, we show how this degree depends on the characteristics of the market for the items of a firm's balance sheet.

It is interesting to revisit the debate on the unintended consequences of accounting measures on firms' real decisions in light of our theory. Historical-cost accounting has been accused of inducing costly and unnecessary realizations of latent capital gains ("gains trading") and equally costly concealment of latent losses. Marking to market has been accused, among other things, of adding irrelevant market volatility in firms' balance sheets. Interestingly, our setup in which accounting measures and the real decisions that they govern are jointly and optimally designed captures both gains trading and reward of insiders for luck as part of an optimal mechanism.

### **Business model and performance measure**

Our analysis also offers a natural link between the degree of marking to market that an entity should optimally use and its business model. We find that, as the horizon of a firm's projects gets shorter and thereby more in line with that of its insiders, then other things being equal:

- The firm should trade assets less frequently and wait for their cash flows to accrue instead;
- The governance system should have a lower degree of marking to market.

The intuition is simply that as future cash flows become less remote, then the relative cost of waiting for them to accrue becomes smaller relative to both the costs of TTM and that of MTM.

This bears interesting relationship to the accounting standard IFRS 9 issued in 2014. In this standard, the business model used by an entity for managing an asset affects the measurement of this asset. The "hold and collect" business model, whereby firms acquire assets to collect their cash flows until maturity, is the one that corresponds to the lowest degree of marking to market. In line with this, we predict that firms that rely more on the "hold to collect" model should optimally use a lower degree of marking to market. Thus we rationalize this connection between "business model" and measurement regime.

### **General equilibrium, endogenous item levels, and excessive marking to market**

All the insights described so far rely on what economists deem a "partial-equilibrium" analysis. That is, (a) corporate governance is optimal from the point of view of the firm, and not necessarily so from that of society, and (b) the firm's environment is taken as exogenously given. Recall that the two key features of the environment that shape a firm's optimal governance are its respective costs of MTM and TTM. The cost of TTM is the expected difference between the value of an asset if the firm held on to it and the price paid by the informed buyer who purchases it.

The cost of MTM is the expected value of the rewards that are paid to insiders only because they are “lucky,” which occurs when they benefit from very positive market data for the type of assets that they have selected even though it does not correspond to an actual high performance of their own assets.

In the final section of the paper, we conduct a “general-equilibrium analysis” in which we no longer take these two costs as given. Instead, we study how they result from the aggregation of each firm’s individual behavior. We explicitly model the demand for the assets that firms put up for sale for certification purposes. In equilibrium, the demand for these assets responds to the expected supply by firms, which is driven by the extent to which firms’ governance mechanisms rely on TTM. In turn, each firm designs its mechanism based on its beliefs about the liquidity of the market of its assets—the ease with which assets trade and the informativeness of the trading prices. More precisely, the costs of TTM and MTM are determined in equilibrium as follows.

First, the cost of TTM depends on the liquidity of the market for the firm’s assets defined as the ease of selling them. This is driven in turn by the depth of the pool of agents who are sufficiently sophisticated to make informative bids for the assets that firms decide to put up for sale. A deeper pool means more competition among bidders, more aggressive bids, and thus a lower cost of TTM.

Second, the cost of MTM depends on the liquidity of the market for firms’ assets defined as the informational efficiency of the price. This is also driven by the depth of the pool of potential informed buyers. More competitive buyers bid more aggressively for assets so that the price differential between high-value and low-value assets is larger and more informative. As a result, from observing the prices of transactions by other firms, a given firm is less likely to reward insiders for luck.

We determine the depth of the pool of informed buyers as follows. We posit that the potential buyers of firms’ assets incur a cost to acquire information about the value of these assets. How many of these potential buyers decide to pay such a cost and become informed depends on the expected subsequent gains from bidding for firms’ assets. As the number of informed bidders grows, the demand side of the market for firms’ assets becomes more competitive. Bidders bid more aggressively, which reduces each bidder’s expected profit, and reduces both the costs of TTM and MTM.

**Excessive marking to market.** Our main general-equilibrium result is that *laissez-faire*, whereby each firm is free to adopt whichever governance system it finds optimal given its environment, leads to an excessive degree of marking to market by firms. Each individual firm’s governance relies excessively on market signals generated by other firms’ sales. This generates an inefficiently low supply of assets up for sale, thereby inducing inefficiently low levels of information acquisition by potential buyers, and in turn inefficiently high costs of TTM and MTM. Because each firm “free rides” on the liquidity created by the sales of other firms, the market for firms’ assets is inefficiently illiquid. In other words, firms fail to *internalize* the effect of their measurement systems on the liquidity of the items that they seek to measure.

Under *laissez-faire*, firms contract too much on transactions by other firms. They sell their own assets too rarely, and at deep discounts when they do so. A regulation that limits the extent to which they mark their assets to market would reduce their cost of capital by spurring informed buyers' entry. Taking to market would be more efficient because asset resales would occur at higher prices. So would be marking to market because resale prices would be more informative.

**Inefficient marking to market and full fair-value standards.** This inefficiency result suggests that public interventions aimed at reducing the reliance on market data by firms may be desirable. *We believe that the extent to which an accounting standard relies on fair values can act as such a device to control the degree of marking to market used by firms in practice.* To be sure, firms are always free to use whichever information they see fit when contracting, regardless of the prevailing accounting standard. Still, we believe that accounting standards that make a more or less intensive use of fair value can partially affect the degree to which corporate governance relies on market data. This is because commonly used accounting measures are easier to grasp than bespoke variables for private contracting between heterogeneously informed agents in practice (e.g., in bond covenants) because they are familiar, available at no cost, certified, and easier to verify by courts.

#### 4 Conclusion

Our paper augments a standard agency-based model of optimal corporate governance with a measurement friction. It offers a theory of privately and socially optimal accounting measures in an environment in which both contractual relations between firms' stakeholders and liquidity in the market for firms' assets are the endogenous outcome of optimizing behaviors.

Gains trading (taking to market) arises naturally as a substitute for relying on market data (marking to market). Their respective contributions to the provision of incentives depend in an intuitive way on the informativeness of market data and on the expected discount when the assets are taken to the market.

Our main result is that *laissez-faire* generically leads to a socially excessive degree of marking to market. When firms are free to set the degree of marking to market of their governance system, the equilibrium exhibits an excessive form of bootstrapping. It is inefficient because firms fail to internalize the negative liquidity externalities that they create for each other by contracting too much on transactions by other firms and too little on their own transactions. A lower degree of marking to market would enable firms to trade their assets at a lower cost, and would enhance the quality of market data.