The Impact Of Combination Of Accounting And Non-Accounting Information On Valuation

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ABSTRACT

The information content perspective stresses that accounting uses the language and algebra of valuation to convey information. So the information sources that cause partition and initiate systematic review of informative structure probabilities are effective in valuation and evaluation of performance (information modeling). It is possible that an information source do not contain signal per se and cannot enact distinction (lack of information content) but upon mixing with another information source might create a new information structure and affect mathematical speculation and valuation. In the present research, the combination of accounting & non-accounting sources is discussed by relying on simulation concept.

Key words: Signaling, combination of information sources, valuation, information content, simulation.

Introduction

It is simple to offer a definition for information. Conceptually, information is a class of basic states expressed in a moment of time. Perfect information, i.e. which state really happens. On the other end of the spectrum, there is lack of info and we do not know about any states. The median is some information on occurrence of various states but the information is not all that there is to it[2], for example suppose there are four events: \( S = \{s_1, s_2, s_3, s_4\} \) also, suppose an information source reveals info on these states. Particularly, the information source reveals one of the two probable reports below: It is a member of the set \( \delta_1 = \{s_1, s_2\} \) or the set \( \delta_2 = \{s_3, s_4\} \).Thus, the report would be either \( \delta_1 \) or \( \delta_2 \). The details including the probability \( S \) are shown in table 1.

Now, if we know that information source has reported \( \delta_1 \), we know the correct state is \( S_1 \) or \( S_2 \), i.e. correct state is a member of \( \delta_1 = \{s_1, s_2\} \).So \( s_3 \) and \( s_4 \) will not be one of the correct states. Certainly, the probability of the latter 2 states –given that the report is \( \delta_1 \) would be zero.

We write this in the form of a conditional probability \( \text{Prob}(s_1 | \delta_1) = \text{Prob}(s_2 | \delta_1) = 0 \). We calculate the probability of the other 2 states as such:

\[
\text{Prob}(s_3 | \delta_1) = \frac{\pi_3}{\pi_1 + \pi_3} = \frac{0/2}{(0/1 + 0/2)} = \frac{2/3}
\]

Observing news about \( \delta_1 \) or \( \delta_2 \) informs us about possible states. Regularly, this may cause a systematic review of the probability [2].

Partition:

One of the extra parts of previous example that is noteworthy is the fact that each of the possible news is a subset of the set of probable states of \( S \). Also, two possible subsets \( \delta_1 \) & \( \delta_2 \) have no intersection (\( \delta_1 \cap \delta_2 = \emptyset \)) and their union creates a sample space of \( S \). This is a consequent of state description and includes all uncertainties and also all info that we might receive. The set of partitions created by information sources are called information structure and it starts with lack of info level (partition zero) towards secondary partitions to full awareness (perfect partition)[2,11]. A sample of information structure with 4 possible states is:
Table 1: Details of probability of receiving info

<table>
<thead>
<tr>
<th></th>
<th>S₁</th>
<th>S₂</th>
<th>S₃</th>
<th>S₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob(s₁)</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Prob(s₂)</td>
<td>1/3</td>
<td>2/3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Prob(s₃)</td>
<td>0</td>
<td>0</td>
<td>3/7</td>
<td>4/7</td>
</tr>
</tbody>
</table>

T = 0: null  Lack of information (Partition zero)
T = 1: {{s₁, s₂}, {s₃, s₄}}
T = 2: {{s₁, s₂}, {s₃, s₄}}
T = 3: {{s₁}, {s₂}, {s₃}, {s₄}}

Perfect partition

Information content:

Accounting is an information source and we are its client because we face uncertainty and need info to reduce it (more partitions) for decision making. Info can tell the decision-maker things that he does not know. Info simply affects probability systematically. Individual’s choice depends on signal received by him. In fact, this is what we call information content. Information content is useful if it affects individual choice through info [2, 7].

The information content school stresses info transfer by accounting system. The information content outlook stresses informative role of accounting. Info provision means possibility of better awareness (more partitions) and learning things unbeknownst to us (zero partition). Thus, capability of getting better info means there was little knowledge at the beginning when there was uncertainty [2].

Valuation:

Suppose the market knows about all info and observations’ history. Now, suppose E(CFₜ|hₜ) points to expected value of cash flow CFₜ subject to our knowledge of time hₜ. Also, suppose E points to expected value of current continuous value at time t subject to history hₜ. Using an interest rate of r, we have:

\[ E[PV_t / h_t] = \sum_{j=1}^{T} E[CF_j / h_j](1 + r)^{-j} \]

Now the important hypothesis is offered. We suppose claim on cash flow is traded in a perfect market, and history hₜ is available to all partners in market, interest rate r is fixed, and price of traded claims is set by above equation.

Suppose price at time t is a function of knowledge at time t, thus our pricing hypothesis is simply:

\[ P_t(h_t) = E[PV_t / h_t] \]

Thus, obviously, the information sources that cause partitioning and initiate systematic review of information structure probability, affect mathematical speculation (cash flow) and ultimately the valuation.

Multiple information sources:

Every so often, there is more than one information source. Perhaps an information source lacks a signal per se and cannot partition (lack of information content) but in combination with another information source might cause systematic review of information structure probability and affect valuation [2,7]. Suppose two information sources are available in tandem and determined by Δ and Δ̂ partitions on their own. Union of two partitions creates one partition in sample space roughly similar to each Δ and Δ̂, the 2nd source can allegedly improve only in the shadow of the 1st one. To put it simply, suppose S = {s₁, s₂, s₃, s₄}. Also suppose Δ = {{s₁,s₂},{s₃,s₄}} and Δ̂ = {{s₁,s₃},{s₂,s₄}}. The combination of two partitions creates one partition like which means availability of perfect information[2].

Combination of Accounting & Non-Accounting Information:

An example of this can be searched in the difference between accounting size (book value) and market size (market price). Past studies and review of companies’ financial statements show there is a big difference between book value and market value. The reason can be summarized as:

1- Accounting is conservative,
2- There is information in the market that cannot be distinguished by accounting reports.

Suppose a company lifetime is divided into 3 eras and the initial investment CF₀ and cash flow in uncertainty situation is:

\[ CF_0 = C_0 + \epsilon_0 + \epsilon_1 \]
\[ CF_1 = C_1 + \theta \epsilon + \epsilon_2 \]
\[ CF_2 = C_2 + \gamma \epsilon + \epsilon_3 \]

Changes in each period are independent and ε has a persistence effect that affects cash flow in each period. θ And γ are fully positive. Cₙ unlike ε has a temporary effect limited to the periods, for example ε₁ affects cash flow in the 1st year and is not related to cash flow change of the 2nd year.

In market sector, there are two information sources: accounting report and an extra source that reports the passing shock of 1st year (ε₁). The accounting source (cash flow) determines ε₁+ ε and market information determines ε₁. On the other
hand, market value calculation makes use of perfect acknowledgment of persistence effect ($\epsilon$). Thus, calculation and determination of $\epsilon$ is possible only through combining accounting source (cash flow) and non-accounting source. Since, otherwise it is not feasible to distinguish $\epsilon_1$ from $\epsilon$ and this is proof for 2nd reason that there is a difference between accounting size and market price (existence of an extra source in the market).

Since now, we supposed $\epsilon$ is positive. Now if it was negative (bad news) the accounting system registers an appropriate restructuring change. This is the same conservative inclination inherent in accounting system that delays reporting good news and registers bad news immediately.

**A Closer Look At Combination Of Accounting & Non-Accounting Information:**

For better understanding, the combination was studied from a valuation viewpoint through an example. Imagine a company with a cash flow of 0 & 1. So, $D \in \{0, 1\}$ and the probability of each is 50% ($\pi(D=1)=\pi(D=0)=50\%$). Also suppose interest rate is zero. Thus the expected value of cash flow $D$ would be:

$$E[D]= 1 \times \pi(D=1) + 0 \times \pi(D=0) = \pi(D=1) = 0.50$$

Also, in every period there are reports as non-accounting information that might impart a good news ($y=g$) or bad news ($y=b$) based on structure below:

$$\pi(y=g|D=1)=\pi(y=b|D=0)=\beta$$

As we said, the expected value of cash flow in a simple situation when there is only the accounting source is 50%. On the other side, obviously there are two information sources that are accounting and non-accounting. Now we are going to depict the combination of accounting and non-accounting information and we want to know whether this combination leads to change in expected value of cash flow?

In Table 2, the shared probability of two information sources $\pi(y,D)$ for the 3rd year is shown. In the 3rd year, the historical information $h_t$ is $h_3=(y_1,y_2,y_3)$. Suppose $\beta = 0.9$.

As indicated in the table, there are 8 possibilities of historical information ($h_t$) combinations. According to probability structure described above, probability of $D=1$, subject to good news in the report ($y=g$), follows the probability below:

$$E[D|h_t=\text{good}] = \sum_{y \in \{g,b\}} \pi(y,D) \pi(y=g|D=1)$$

Based on discussion in the valuation section, the expected value of $D$ regarding $h_t$ is:

$$P(h_t) = E[D|h_t] = 1 \times \pi(D=1|h_t) + 0 \times \pi(D=0|h_t) = \pi(D=1|h_t)$$

To calculate expected value of $D$ that shown in Table 3, we use Bayes theorem and data from Table 2. For example, to calculate expected value $D$ in 2nd year based on reporting good news in 1st & 2nd year ($h_2=(g,g)$) will be calculated as this:

$$E[D|h_2=(g,g)] = \pi(D=1|h_2=(g,g)) = \frac{0.3645 \times 0.9000 + 0.0045 \times 0.0014}{0.3645 + 0.0045} = 0.9878$$

Now we can answer to this question that whether combination of accounting & non-accounting

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**Table 2: Shared probability of two information sources**

<table>
<thead>
<tr>
<th>$h_t=(y_1,y_2,y_3)$</th>
<th>$D=1$</th>
<th>$D=0$</th>
<th>$\pi(h_t)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(g,g,g)</td>
<td>0.3645</td>
<td>0.0045</td>
<td>0.3645</td>
</tr>
<tr>
<td>(g,g,b)</td>
<td>0.0405</td>
<td>0.5000</td>
<td>0.0405</td>
</tr>
<tr>
<td>(g,b,g)</td>
<td>0.0405</td>
<td>0.5000</td>
<td>0.0405</td>
</tr>
<tr>
<td>(g,b,b)</td>
<td>0.0045</td>
<td>0.5000</td>
<td>0.0045</td>
</tr>
<tr>
<td>(b,g,g)</td>
<td>0.0045</td>
<td>0.5000</td>
<td>0.0045</td>
</tr>
<tr>
<td>(b,g,b)</td>
<td>0.0045</td>
<td>0.5000</td>
<td>0.0045</td>
</tr>
<tr>
<td>(b,b,g)</td>
<td>0.0045</td>
<td>0.5000</td>
<td>0.0045</td>
</tr>
<tr>
<td>(b,b,b)</td>
<td>0.0045</td>
<td>0.5000</td>
<td>0.0045</td>
</tr>
</tbody>
</table>

**Table 3: Expected value of D**

<table>
<thead>
<tr>
<th>$h_t=(y_1,y_2,y_3)$</th>
<th>$t=1$</th>
<th>$t=2$</th>
<th>$t=3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(g,g,g)</td>
<td>0.9000</td>
<td>0.9878</td>
<td>0.9986</td>
</tr>
<tr>
<td>(g,g,b)</td>
<td>0.9000</td>
<td>0.9878</td>
<td>0.9000</td>
</tr>
<tr>
<td>(g,b,g)</td>
<td>0.9000</td>
<td>0.5000</td>
<td>0.9000</td>
</tr>
<tr>
<td>(g,b,b)</td>
<td>0.9000</td>
<td>0.5000</td>
<td>1.0000</td>
</tr>
<tr>
<td>(b,g,g)</td>
<td>0.1000</td>
<td>0.5000</td>
<td>0.9000</td>
</tr>
<tr>
<td>(b,g,b)</td>
<td>0.1000</td>
<td>0.5000</td>
<td>0.1000</td>
</tr>
<tr>
<td>(b,b,g)</td>
<td>0.1000</td>
<td>0.0122</td>
<td>0.1000</td>
</tr>
<tr>
<td>(b,b,b)</td>
<td>0.1000</td>
<td>0.0122</td>
<td>0.0014</td>
</tr>
</tbody>
</table>
information affects the expected value of cash flow. Based on table 3 the answer is yes. In previous sections we said that the expected value of cash flow in simple terms is 50% but table 3 shows a different valuation.

On Combination of accounting & non-accounting information we may refer to research by Chin-Bun Test (2005)[3]. He studied British stock market companies and based on dividends policy (consistent policy, fixed percentage of dividend on each stock, fixed growth rate, irregular pattern, no dividend payment) classified them into two groups: companies that use dividend as a signal and companies that don’t. Then he used multivariate regression to test former group and found that secret info held by stockholders (non-accounting information source) and book value of company assets (accounting information source) significantly affect signaling of dividends distributed to market and investors [3,4,6,7].

Simulation In Accounting:

Simulation is checking a subject in various circumstances to determine it[1]. Accounting literature shows various simulation applications. The main use of simulation in accounting is in management accounting, governmental accounting, etc [1, 8 and 9]. Simulation is also used in determination of information stricture and combining information sources and their problems, e.g. by noting various information on historical record (h_t) and various environments (risky/no-risk) the subject is explained. The present research is another example of simulation in accounting.

Discussion And Conclusion:

Today, the almost perfect competitive market necessitates correct decision-making and optimum resource allocation. Also, another condition for sound decision making is availability of relevant and effective information that can cast a light on the decision making path by signaling thereto. But relying on accounting information sources published by companies’ reporting system can not suffice in itself since full knowledge required by the decision-maker would become more Feasible by inclusion of non-accounting information sources as a complement to accounting information source based on discussion offered on combination of the two.

Reference