

# Silicon Economics, Inc.

July 3, 2008

Ms. Florence Harmon  
Acting Federal Advisory Committee Management Officer  
Securities and Exchange Commission  
100 F Street, NE  
Washington, DC 20549-1090

Via: [rule-comments@sec.gov](mailto:rule-comments@sec.gov)

Re: File No. 265-24 (Advisory Committee on Improvements to Financial Reporting)

Dear Ms. Harmon:

In the engineering fields – software engineering, electrical engineering, etc., – there is an idea of a “silver bullet.” A silver bullet is an insight to solve a long-lasting difficult problem simply and quickly. Is there a silver bullet to yield both easier-to-understand and simpler-to-prepare financial statements? I believe the answer is yes. I believe that this silver bullet can end the reigning confusion regarding income and income determination—specifically, the confusion between the “Asset and Liability” versus the “Revenue and Expense” income views.<sup>1</sup>

I am an economist, and my career has focused on developing computerized mathematical models. I have developed models for valuation, for probabilistic costing of electrical power generation, for optimizing bank mergers and acquisitions, for modeling consumer-product market demand, for simulating strategic-weapon-system performance, and for scheduling construction projects. As a Peace Corps volunteer in the Fiji Islands, I headed the trade section of the Bureau of Statistics, oversaw eight clerical workers, and designed a database system to store import and export data and to generate periodic reports. I’ve written over a half-a-million lines of software code and founded a software company that was acquired. My interest in financial reporting goes back forty years, when I first started to read financial statements and first became troubled with “income smoothing.”

Winston Churchill once said: “the further back you look, the further forward you can see”. Accordingly, I will briefly explain the history regarding both user needs for income measurement and the confusion regarding income. Afterwards, I will suggest a silver bullet that is based upon a mathematical insight and that I believe to be straight-forward to implement.

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<sup>1</sup> Anthony (1987) writes that the debate between “Asset and Liability” versus “Revenue and Expense” is the fundamental issue in financial reporting.

Beforehand, however, three definitions are required to contextualize the subsequent discussion<sup>1</sup>:

- Economic income: net asset change over the course of a period, i.e., ending-period net-asset value minus beginning-period net-asset value – exclusive of equity transactions.
- Permanent income: the value that can be perpetually and constantly consumed on a periodic basis.
- Windfall: an unexpected capital gain or loss.

Economic income is synonymous with the comprehensive income of the FASB/IASB (Financial Accounting Standards Board/International Accounting Standards Board) conceptual framework. Permanent income is the academic term for what is frequently termed “recurring income.” The annual payment of an annuity, for example, is permanent income. As a comparative example, consider a company that always pays its income as dividends. In any period, it has a per-share economic income of either \$5.00 or \$15.00, with equal probability. The per-share permanent income is \$10.00, that is the average of \$5.00 and \$15.00.

To see why investors want permanent income is readily apparent from the example and the contingency table shown below. Suppose that both a buyer and seller can know only one income number – either the most recent economic-income number or the permanent income number. Which of the two income numbers would investors prefer? Suppose, for the moment, that the most recent economic-income number is \$5.00 and that this number is the basis for a trade between a buyer and a seller. If the subsequent economic-income number proves to be \$5.00, then expectations for both buyer and seller are met, as indicated by the “=” sign in the table. If, however, the subsequent economic-income number proves to be \$15.00, then both buyer and seller will perceive that buyer has gained at the sellers’ expense, as indicated by the “+” and “-” in the table. Similarly, suppose, for the moment, that the most recent economic-income number is \$15.00 and that this number is the basis for a trade between a buyer and a seller. If the subsequent economic-income number proves to be \$15.00, then expectations for both buyer and seller are met, as indicated by the “=” sign in the table. If, however, the subsequent economic-income number proves to be \$5.00, then both buyer and seller will perceive that seller has gained at the buyer’s expense, as indicated by the “+” and “-” in the table. In all variations – whether economic income is \$5.00 or \$15.00 – both the buyer and seller risk whether the economic-income number is repeatable. With permanent income, there is no income-number risk. Consequently, investors naturally prefer the permanent-income number.

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<sup>1</sup> These terms are more precisely defined and demonstrated in the attached paper: “The Third-way – A Financial Reporting Synthesis.”

	Buyer		Seller	
	Subsequent		Subsequent	
	<u>Economic Income</u>		<u>Economic Income</u>	
	\$5.00	\$15.00	\$5.00	\$15.00
<b>Most Recent</b>				
<b>Economic Income</b>				
\$5.00	=	+	=	-
\$15.00	-	=	+	=

The conclusion of the history that follows is that history also demonstrates that financial-statement users want and need a permanent-income measurement.

Two special historic pivot points will be highlighted— the inability of the 20<sup>th</sup> century reporting paradigm to handle asset-and-liability-value trends and fluctuations and the misinterpretation of Nobel laureate economist J.R. Hicks. It is these two special historic pivot points that have led to present day confusion regarding income, and in turn the acrimonious conflict regarding financial accounting. The suggested silver bullet addresses this problem, while building upon the FASB/IASB Fair-value move towards economic income.

As of the middle of the 19<sup>th</sup> century in both the U.S. and the U.K., the balance sheet was the primary financial statement (Previts and Merino 1998: p. 86-89). Income was economic income, i.e., the difference in net asset values over the course of a period.

In the early 20<sup>th</sup> century, investors wanted a permanent income measurement. According to Previts and Merino who cite William Paton:

Shareholders wanted an income number that would serve as (1) a measure of managerial effectiveness in the use of assets entrusted to them and (2) an indicator of expected future earnings [permanent income]. (Previts and Merino 1998: p. 261)

According to George O. May, who was the Price-Waterhouse partner instrumental in the initial formation of the SEC:

To my mind, few points are of more importance in connection with the problem of presenting illuminating reports to investors than that of taking some steps which will tend to prevent investors from including capital gains [windfalls] with current income in one sum, from which they will compute capital value by a single multiplication. (May 1936: p. 99)

According to Benjamin Graham and David Dodd, authors of the classic 1934 investment book *Security Analysis*:

For what the investor chiefly wants to learn from an annual report is the *indicated earning power* under the given set of conditions, *i.e.*, what the company might be expected to earn year after year [i.e., permanent income] if the business conditions prevailing during the period were to continue unchanged. (Graham and Dodd 1934: p.354)

As a result of investor needs for a permanent income estimate, Paton and others developed the revenue-and-expense paradigm (R&E-Paradigm), which became the basis for 20<sup>th</sup> century financial reporting. The fundamental deficiency, however, with the R&E-Paradigm is its inability to directly handle asset-and-liability-value trends and fluctuations. As Previts and Merino write:

By the end of the decade [1919?], academic theorists appeared to agree on how to measure operating profits; the key question, still unresolved [today, i.e., 1998, 2008], was how, given the constraints of double entry, could the accountant accurately report both an increase in corporate wealth [economic income] and earned income [permanent income]. (Previts and Merino 1998: p. 262)

This deficiency on the part of the R&E-Paradigm is the first, of the two, historical pivot points. Because of the deficiency, two things occurred. First, assets were kept on the books at historic cost. Second, “income smoothing” was applied to spread significant asset-value changes across several reporting periods.

Starting perhaps in the 1950s, both practices – keeping assets on the books at historic cost and employing income smoothing – were railed by many people, including specifically academics. Endless debate ensued, with many concluding that resolution was impossible. This conclusion was congruent with the then decades’ old belief that resolution was impossible:

Implicit in the early debate [circa 1920] was the enduring belief that accountants must view either the income statement or the balance sheet as fundamental, and the other residual. (Previts and Merino 1998: p. 213)

Circa 1960 is the second historical pivot point. At this time, many leading accounting academics became enchanted with Nobel laureate economist J.R. Hicks’ *Value and Capital*, published in 1946. They interpreted his statements:

...it would seem that we ought to define a man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning (Hicks 1946: p. 172)

...*ex post* is not a subjective affair, like other kinds of income; it is almost completely objective. The capital value of the individual's property at the beginning of the week is an assessable figure; so is the capital value of his property at the end of the week; thus, if we assume that we can measure his consumption, his income *ex post* can be directly calculated (Hicks 1946: p. 179)

as an advocacy for, and approval of, economic income. Academics convinced themselves of the merit of economic income, and the demerit of net income measurement yielded by the R&E Paradigm. In 1961, David Solomons published his now famous article predicting the demise of the income statement within 25 years. Accounting theorists such as Chambers (1966), Sterling (1970), and Edwards and Bell (1970) published books delineating accounting theory and methods that were focused on economic income, without any consideration of permanent income. It is from this intellectual setting that much of today's financial accounting leadership and intelligentsia grew and developed.

There are three problems, with the so-called "Hicksian" approach to financial accounting. First, investors' historical need for need a permanent income measurement as described above is not served. Second, this Hicksian approach is not Hicksian, and is misnamed, since Hicks actually prescribed permanent income, not economic income, for decision making. Third, many Nobel laureate caliber thinkers argue for the primacy of permanent income over other measurements, in particular economic income.

Hicks actually advocated for a permanent income measurement. In his chapter on income, he compares and contrasts economic versus permanent income, but in the final analysis rejects economic income for decision making and advocates permanent income:

The income *ex post* of any particular week cannot be calculated until the end of the week, and then it involves a comparison between present values and values which belong wholly to the past. On the general principle of 'bygones are bygones', it [ex-post income] can have no relevance to present decisions. The income which is relevant to conduct must always exclude windfall gains; if they occur, they have to be thought of as raising income for future weeks (by the interest on them) rather than as entering into any effective sort of income for the current week. Theoretical confusion between income *ex post* and *ex ante* corresponds to practical confusion between income and capital. (Hicks 1946: p. 179).

He must take his objective magnitude, the Social Income *ex post* [i.e., ex-post income], and proceed to adjust it, in some way that seems plausible or reasonable, for those changes in capital values which look as if they have had the character of windfalls. (Hicks 1946: p. 179)

Bromwich, Macve, and Sunder (2005) and Fukui (2006) also argue that J.R. Hicks advocated for a permanent income.

Besides Hicks, other Nobel laureate economists and Nobel laureate caliber economists have advocated for the primacy of permanent income, in both accounting and non-accounting contexts:

Fischer Black, co-developer of the famous Black-Scholes option-valuation formula wrote<sup>2</sup>:

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<sup>2</sup> In 1993, Black reaffirmed his assessment. See Black (1993).

Users of financial statements—analysts, stockholders, creditors, managers, tax authorities and even economists—really want an earnings figure that measures value [i.e., permanent income], not the change in value [economic income]. Analysts, for example, want an earnings number they can multiply by a standard price-earnings ratio to arrive at an estimate of the firm's value. (Black 1980: p. 22)

Nobel laureate economist Milton Friedman wrote:

[rather than to characterize a set of assets in terms of individual market prices]...there is an alternative, less general way that is more satisfactory.

The alternative way is to convert all patterns of intertemporal payments into constant, permanent income streams. This method was adopted by Frank Knight, and also by John Maynard Keynes, in defining his concept of marginal efficiency of investment. It is also the method that is used in the financial pages of newspapers in reporting the “yield to maturity” of fixed income securities. (Friedman 1976: p. 288).

Nobel laureate economist Hayek wrote:

Whether the particular unforeseen change is favorable or unfavorable to him, this will mean that as soon as he learns about its occurrence or imminence, he will have to change his rate of consumption to the level at which it can now be permanently kept. If, for instance, his receipts increase in consequence of the change by £210, the rate of return which he can obtain on reinvestment is 5 percent, he must consume only £10, and must reinvest the remaining £200, which at 5 percent will give him the same return in every future year. Such *windfall profits* are, therefore, not income in the sense that their consumption is compatible with ‘maintaining capital intact’. Nor need consumption be reduced by the amount of corresponding *windfall losses*. In both cases, only the current interest on the (positive or negative) capital gains ought to be counted as income. (Hayek 2007: p. 286-87.)

In summary, historically investors have wanted and needed a permanent income measurement. That investors would want and need a permanent income measurement is affirmed by leading economists and other thinkers. Financial accounting theory and practice historically fulfilled investor needs via developing and using the R&E-Paradigm. The R&E-Paradigm, however, was deficient because it was unable to handle asset-and-liability-value trends and fluctuations. This was confounded by the misinterpretation of J.R. Hicks and the current accounting board shifting towards only economic income. The shift has triggered significant opposition.

Clearly, what needs to be done is to address the asset-and-liability-value trends and fluctuations deficiency of the R&E-Paradigm. But how?

The silver bullet is to apply stochastic calculus to estimate instantaneous asset and liability incomes. Stochastic calculus is same silver bullet that Fischer Black and Myron Scholes used to develop the Black-Scholes option valuation formula. Prior to their breakthrough, option valuation had been a long-time unresolved problem. Today, stochastic calculus is the mathematical underpinning of option-valuation theory and practice.

As described in the paper, “The Third-way – A Financial Reporting Synthesis”, included with this comment letter, applying stochastic calculus is simplified to a formula that is directly related to the present value formula. This simple formula is called the *Ex-Ante Equation*.<sup>3</sup> The instantaneous asset and liability incomes, along with operating income, yield permanent income. Ideally, all assets and liabilities are mark-to-market or mark-to-model, with all non-equity postings passing through the income statement. There is no income smoothing; there is a clean surplus. As a side benefit of the credit and debit mathematics, an asset-and-liability stewardship metric results and is naturally part of the income statement.

I believe implementation of the Third-way to be straight-forward. No additional data is needed beyond that required of Fair Value accounting. Rather than posting to homogenous revenue and expense accounts, mark-to-market and mark-to-model postings are made to a new type of income statement account, termed windfall accounts. Application of the *Ex-Ante Equation* can be automatically performed just before income statement generation.

At this time, financial accounting is on the cusp of coalescing into a global standard. The standard that is set in the next few years will likely remain for decades to come. The question thus arises: what do we want to bequest to subsequent generations? Will it be the paradigm of the 19<sup>th</sup> century that yields only economic income, or will it be a paradigm that yields both economic and permanent income and that fixes the fundamental flaw of 20<sup>th</sup> century financial reporting by handling asset-and-liability-value trends and fluctuations?

I would be glad to meet with the Committee at its convenience.

Best regards,

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President

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# The Third-way – A Financial Reporting Synthesis

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July 3, 2008

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**Abstract:** A Synthesis of the “asset and liability” and the “revenue and expense” income views is presented. The synthesis results in complementing the fair-value market-based balance sheet with an equally fair-value market-based income statement. This is accomplished by employing stochastic calculus, via the Ex-Ante Equation, to estimate instantaneous asset-and-liability incomes. These incomes, coupled with operating income, yield permanent income. Asset-and-liability windfalls are calculated based upon the instantaneous incomes and market-value changes. Permanent income plus windfalls yields fair-value economic income on a clean-surplus income statement. No data beyond fair-value requirements is needed for implementation.

## Introduction

What is the fundamental issue in financial reporting? I submit that it is the decades’ old debate between the “asset and liability” and the “revenue and expense” income views.<sup>1</sup> And that undergirding the debate is the limiting belief that either the balance sheet or the income statement can be valid, and the other residual.

What is gained by a synthesis of both sides of the debate? Such a synthesis can yield a balance sheet based upon current-market values AND an income statement based upon current-market values AND a permanent income estimate.

Who gains from such a synthesis? Likely most everyone gains. Financial-statement users gain better financial data for analysis and decision making. Practitioners, academics, and standard setters gain a simpler, more useful theory and practice methodology.

As will be shown, the key to synthesis is the application of stochastic calculus to calculate instantaneous asset and liability incomes that appear on the income statement. Stochastic calculus is the basis of the Black-Scholes option valuation formula and today is the mathematical underpinning of option-valuation theory and practice. As will be shown, this income calculation is an implementation of Nobel laureate economist J.R. Hicks’ prescription contained in his book, *Value and Capital*. The implementation yields a permanent-income estimate.

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<sup>1</sup> Robert Anthony (1987) makes the same point.

The paper proceeds as follows. Definitions of key conceptual terms are initially presented non-mathematically, and then demonstrated mathematically using an option-valuation lattice model. The option-valuation lattice model is then used to motivate derivation of the *Ex-Ante Equation*. The definitions and *Ex-Ante Equation* are then applied to a hypothetical company, demonstrating posting credits and debits, and performing period-close procedures.

What is presented here is termed the “Third-way” because it is a conceptual synthesis of both the “asset and liability” and the “revenue and expense” income views. In both the hard sciences and in the engineering fields, any real advancement in theory is inclusive of prior theory and practice. Perhaps the best example of this is the relationship between Newton’s universe and Einstein’s universe: if very low velocities and small masses are applicable, then Einstein’s universe becomes identical to Newton’s. As discussed in Appendix A, the Third-way includes the functionality of both “asset and liability” and the “revenue and expense” income paradigms.

A few guideposts might be helpful to some readers. First, stochastic calculus is only behind the concept of the *Ex-Ante Equation* and is not directly used. The *Ex-Ante Equation*, in fact, is very similar to, and derivable from, the present value equation. Second, an option-valuation lattice model is used here, not because options are necessarily foundational, but because it nicely demonstrates key concepts and definitions. Those readers unfamiliar with lattice models are advised to accept the option valuations and probabilities at face value. Third, though *prima facie* it might appear that “income smoothing” is performed, no income smoothing is done. Instead, instantaneous income and windfalls are determined and posted to the income accounts, yielding a clean-surplus income statement.

### Key Definitions

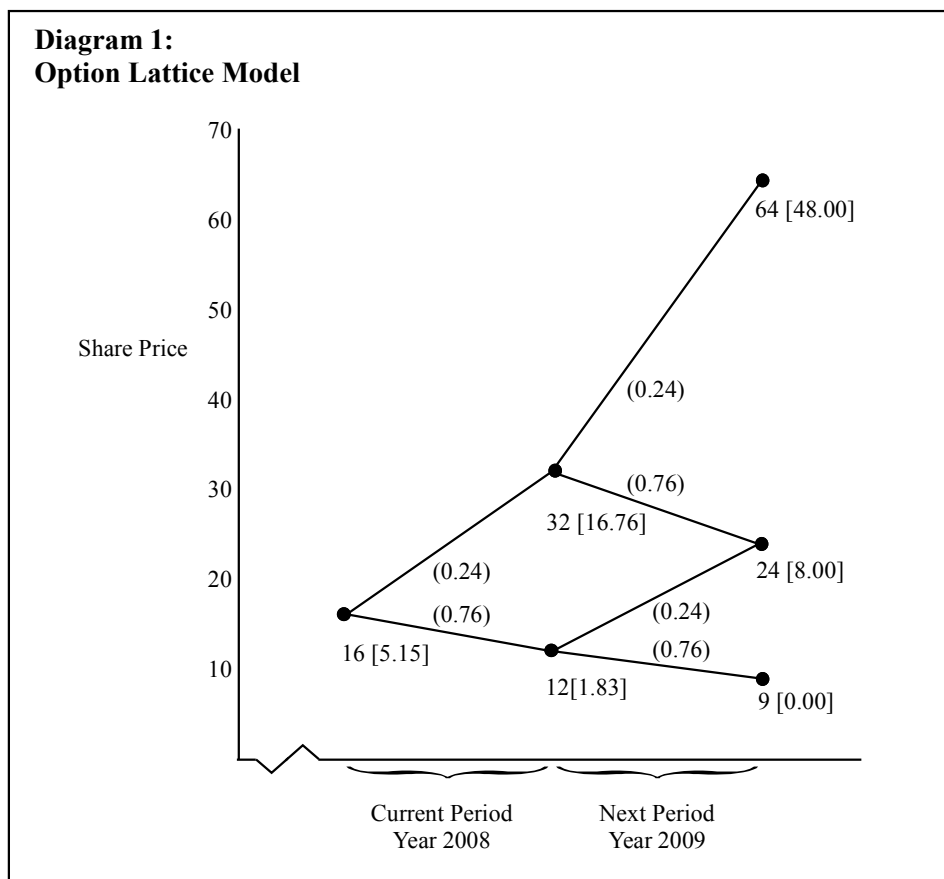
- Economic income: net capital-value change (net asset change) – the difference between ending-period capital value minus beginning-period capital value – exclusive of equity-transactions.
- Ex-ante income: the mathematically-expected value that can be perpetually and constantly consumed, beginning at the time of measurement, on a periodic basis.
- Ex-post income: income measured at the end of a period as the difference between ending capital value and beginning capital value.
- Permanent income: the mathematically-expected value that can be perpetually and constantly consumed, beginning at the time of measurement, on a periodic basis.
- Windfall: the difference between ex-post income and the mathematically-expected ex-post income estimated at the start of the period.

Ex-ante income is tantamount to permanent income and ex-post income is tantamount to economic income. Both ex-ante and ex-post are used here when referring to an individual asset and liability or when attempting to make an explicit tie with J.R. Hicks, who both defined and used these two Latin terms. Both economic income and permanent income are used to refer to a reporting entity as a whole or when attempting to make a tie with general writings, thought, and practice.

Economic income is synonymous with the comprehensive income of the FASB/IASB (Financial Accounting Standards Board/International Accounting Standards Board) conceptual framework. Permanent income is an academic term for what is, frequently in practice, termed “re-occurring income.”

**Lattice Model**

A two-period common-share European call option<sup>2</sup> will now be used to demonstrate the above key terms.



<sup>2</sup> This is the most basic type of option and allows the option holder exercise rights only at the time of expiration.

Diagram 1 shows a simple option lattice model. The strike price equals the current share price of \$16.00. Over the course of the current period, the share price either increases 100% or decreases 25%. Share prices are shown in the diagram beneath the nodes. Over the course of the next period (2009), regardless of what occurs in 2008, the share price either increases 100% or decreases 25%. Assuming a risk-free interest rate of 5% and applying standard option-valuation methodology yields option values, as shown in brackets to the right of the share prices. For each arc or branch, risk-neutral probabilities<sup>3</sup> are enclosed in parentheses: throughout, the probability of a price increase is 24% and the probability of a price decrease is 76%. All that is shown in Diagram 1 is standard practice.

### Nature of Option Discounting and Value Appreciation

Though perhaps not generally known, under standard option theory and practice, until expiration, the mathematically-expected appreciation of a European option equals the risk-free interest rate. So in the case of the option of Diagram 1, mathematically-expected option value at the end of the current period is:

$$5.15 \times 1.05 = 0.24 \times 16.76 + 0.76 \times 1.83 = 5.41$$

At the end of the current period, the mathematically-expected appreciation over the next period (2009) remains at 5%, regardless of whether the stock price is \$32.00 or \$12.00. So assuming the price proves to be \$32.00, the mathematically-expected option value at the end of the next period 2009 is:

$$16.76 \times 1.05 = 0.24 \times 48 + 0.76 \times 8 = 17.60$$

Similarly, assuming the price proves to be \$12.00 at the end of the current period, the mathematically-expected option value at the end of the next period is:

$$1.83 \times 1.05 = 0.24 \times 8 + 0.76 \times 0 = 1.92$$

### Option Ex-Post Income Calculation

Assuming that the share price at the end of the current period proves to be \$32.00, then the current-period ex-post income for the option is the difference between ending and starting values:

$$\text{option ex-post income} = 16.76 - 5.15 = 11.61$$

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<sup>3</sup> “Actual”, rather than risk-neutral, probabilities could be used if deemed appropriate.

And similarly, assuming that the share price at the end of the current period proves to be \$16.00, then the current-period ex-post income for the option is the difference between ending and starting values <sup>4</sup>:

$$\text{option ex-post income} = 1.83 - 5.15 = -3.33$$

### Option Ex-Ante Income Calculation

Assuming that the share price at the end of the current period proves to be \$32.00, the mathematically-expected ex-post income for the next period equals \$0.84 since:

$$0.84 = 16.76 \times 0.05$$

The ex-ante income for the option is the present value of that ex-post income, i.e., \$0.80 ( $0.84/1.05$ ). To see that \$0.80 is “the mathematically-expected value that can be perpetually and constantly consumed, beginning at the time of measurement, on a periodic basis”, consider that the option holder sells a small portion of the option ( $0.80/16.76$ ) for \$0.80 and consumes the sale proceeds. The sale leaves the holder with a fractional stake ( $(16.76-0.80)/16.76$ ), which is worth \$15.96 ( $16.76-0.80$ ). But given that the option is mathematically expected to appreciate by 5% over the next period, 2009, the value of the option proportion is mathematically expected to return to the \$16.76 ( $15.96 \times 1.05$ ) value.

The \$0.80 ex-ante income is a permanent income. This is because the option holder is positioned to immediately consume \$0.80, with the mathematical expectation of being able to consume \$0.80 in each future period – assuming capital reinvestment that earns a 5% ex-post return.

### *Ex-Ante Equation*

*Ex-Ante Equation* is a formulation of the above principles and procedure:

$$\text{ex-ante income} = r \times \text{capital value} / (1+r)$$

where:

$$r = \text{expected appreciation or discount rate}$$

The intuition and logic is simple:  $r$  times capital value yields mathematically-expected ex-post income, which is discounted to the present to yield ex-ante income.

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<sup>4</sup> Values do not sum exactly because of rounding.

### Windfall Equation

The Windfall Equation is defined as:

$$\text{windfall} = \text{ex-post income} - \text{ex-ante income}$$

So for the option, assuming that the share price at the end of the current period proves to be \$32.00, the windfall is:

$$\text{windfall} = 11.61 - 0.80 = 10.81$$

A useful mathematical property of the windfall calculation is that if a capital-value performs as suggested by the used  $r$  value, then the windfall value is zero. So, for instance, if the option was worth its expected value of \$5.41 at then end of the current period, ex-post income would be \$0.26 (5.41-5.15); and the ex-ante income would also be \$0.26 (  $0.05 \times 5.41/1.05$ ), yielding a zero windfall value.

### Special Considerations

Before presenting the demonstration, some special consideration regarding the above definitions and mathematics are needed.

The *Ex-Ante Equation* is equally applicable to both assets and liabilities, where end-of-period account balances are used as the capital-value parameter. In practice,  $r$  should be the same  $r$  used in present value calculation, be equal to the risk-free interest rate for publicly traded assets and liabilities (because of the No Arbitrage Theorem), or be based upon existing asset depreciation schedules, in which case it is negative. For appreciating assets, ex-ante income is positive; for depreciating assets and for liabilities, ex-ante income is negative.

The *Ex-Ante Equation* yields a mathematically-expected instantaneous income, scaled to span the upcoming period. Implicitly, it is assumed that the capital-value parameter follows a stochastic process, in the same way that modern financial valuation theory and practice, specifically option valuation theory and practice, assumes that the financial instrument values follow a stochastic process. The capital-value stochastic process has a mean appreciation rate (  $r$  ), which is used to calculate ex-ante income. Assuming unbiased capital and  $r$  values, the yielded ex-ante income is also unbiased, i.e., on average correct.

The yielded income of the *Ex-Ante Equation* is based only on the capital-value, and not any history of that value. Whether the capital-value has been increasing or decreasing prior to application of the *Ex-Ante Equation* is not considered and does not impact the calculation of ex-ante income. So, for example, whether the value of the option discussed above had appreciated or depreciated to \$16.76, ex-ante income would be \$0.80 in either case.

The advantage with the *Ex-Ante Equation*'s not considering any history is that it yields a true indication of "the mathematically-expected value that can be perpetually and constantly consumed, beginning at the time of measurement, on a periodic basis."

Not considering history is a fundamental concept in human development, probability theory, and economic theory. In human development, there is the adage: "Don't cry over spilt milk"; in probability theory, "The roulette wheel has no memory"; in economic theory "ignore sunken costs" or, as expressed by J.R. Hicks, "that bygones be bygones."<sup>5</sup> Fischer Black<sup>6</sup>, co-developer of the famous Black-Scholes options valuation formula, was troubled that accounting could yield a negative income, even though an entity obviously had some positive, unknown, permanent income. Application of the *Ex-Ante Equation* mitigates Black's identified problem, because it calculates income by not considering any history, in particular negative windfall history.

As will be shown, the *Ex-Ante Equation* and the Windfall Equation yield several desirable properties in the context of a credit and debit framework to produce useful financial reports. Practitioners can focus on calculating ex-post income, and just before the income statement is generated, apply the *Ex-Ante Equation* to both calculate permanent income and windfalls. The financial statement user obtains an income statement with permanent income – arguably the most important financial statement number – windfalls, and economic income.

### Option-holder Company Demonstration

The object of the above concepts and definitions is an income statement as delineated in Diagram 2. Major subtotals include operating income and asset-and-liability ex-ante income, which when combined yield permanent income (net income). Asset-and-liability windfalls is another major subtotal, which when combined with permanent income yields economic income (comprehensive income).

<b>Diagram 2:</b>			
<b>Income Statement -- Dec 31, 2008</b>			
Permanent Income			
Operating Income			
Total Revenues	0.00		
Total Expenses	0.00		
Total Operating Income		0.00	
Total A&L Ex-Ante Income		0.80	
Permanent Income (Net Income)			0.80
Operating Income Shift			0.00
Total A&L Windfalls			10.81
Economic Income (Comprehensive Income)			11.61

<sup>5</sup> Hicks, *Value and Capital*, p. 179.

The data in Diagram 2 shows the income statement for a company whose only asset is the option discussed above. Permanent income totals \$0.80, i.e., the ex-ante income previously obtained; windfalls total the previously obtained \$10.81; economic income totals the previously obtained ex-post income of \$11.61. Essentially, this income statement reflects application of Hicks' prescription:

He must take his objective magnitude, the Social Income ex-post [i.e., ex-post income], and proceed to adjust it, in some way that seems plausible or reasonable, for those changes in capital values which look as if they have had the character of windfalls. (Hicks, 1946, p. 179)

Though here, windfalls are the residual after determining income rather than, as per Hicks, income is the residual after determining windfalls.

### **Account-type Structure and Definitions**

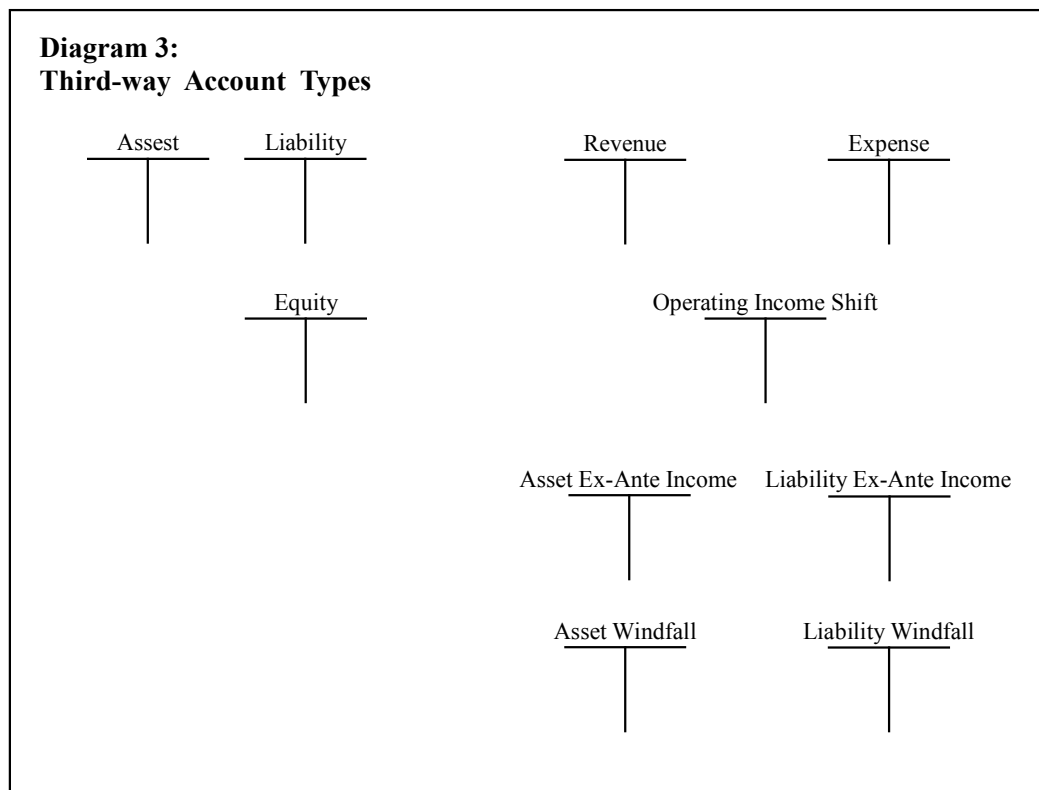
Diagram 3 displays the ten Third-way account types. As shown to the left, the balance sheet accounts consists of asset, liability, and equity accounts. Ideally, all the accounts balances are based on Fair-market values and are updated continuously. To the right of the diagram are seven income statement accounts. The display is sequenced to follow the vertical flow of the income statement of Diagram 2. The revenue and expense accounts are for operations only; asset-and-liability-value updates pass through the asset and liability windfall accounts. The asset-and-liability ex-ante income accounts report the results of the *Ex-Ante Equation*. Ideally, each asset and each liability has an associated windfall and ex-ante income account.<sup>7</sup> The operating-income-shift account contains present-value time-shift adjustments.

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<sup>6</sup> Black (1993), p. 6.

<sup>7</sup> This includes the cash-on-hand account, which could earn interest and have an associated  $r$ -value. For simplicity, cash here is assumed to earn no interest.





Assuming computerized operation, accounting personnel and auditors rarely, if ever, directly use the ex-ante income or the operating-income-shift accounts.

Conceptually, the entity is split into operations and asset-and-liability holding bisections. Ideally, operations and asset-and-liability holdings transact on an arms-length market-price basis. Assets and liabilities are assumed held in an A&L Warehouse, with a strict gatekeeper. An expense occurs whenever management withdraws an asset from the A&L Warehouse or whenever management deposits a liability with the A&L Warehouse. A revenue occurs whenever when management deposits an asset with the A&L Warehouse or whenever management withdraws a liability.

When asset and liability accounts are updated – i.e., marking-to-market or marking-to-model – the offsetting accounts are the windfall accounts.

### Hypothetical Company Demonstration

How the above concepts and definitions are applied on a credit and debit transactional, mark-to-market, and a day-to-day basis will be demonstrated next via considering a hypothetical company over the course of a single accounting period. The company could be a hedge fund, a professional services company such as a product-design or a law firm, or a manufacturer. Pensions, a bond, and the above option will be brought into the demonstration in due course.

On January 1, 2008, the company has a balance sheet as shown in Diagram 4. The balance sheet lists a recently-purchased five-year bond that has an annual coupon rate of 6%. Bond interest is paid at the end of 2008, 2009, 2010, 2011, 2012; the principal is paid at the end of 2012. The bond is publicly traded, and the market implicitly uses the cash-flow table shown in Diagram 5 to set the spot-market bond price, which is shown on the balance sheet. The balance sheet also lists a legacy-pension (Pension-legacy) obligation. The basis for that present-value entry is the cash-flow table shown in Diagram 6. A discount rate of 10% is used, because it reflects the company's cost of capital<sup>8</sup>.

**Diagram 4:**  
**Balance Sheet -- Jan 1, 2008**

Account	Assets	Liabilities
Cash	1,148.37	
Bond	100.00	
Pension-Legacy		248.37
Shareholder Equity		1,000.00
Total	1,248.37	1,248.37

**Diagram 5:**  
**Bond Cash-flow Table -- Jan 1, 2008**

[A]	$1.06^{([A]-2007)}$ [B]	[C]	$[C]/[B]$ [D]
Date	Discount Factor	Future Receipt	Present Value
2008	1.06	6.00	5.66
2009	1.12	6.00	5.34
2010	1.19	6.00	5.04
2011	1.26	6.00	4.75
2012	1.34	106.00	79.21
2013	1.42	0.00	0.00
Total			100.00

<sup>8</sup> Other rates, and rate basis, could be used instead if deemed appropriate.

**Diagram 6:**  
**Pension-Legacy Cash-flow Table -- Jan 1, 2008**

[A]	$1.10^{([A]-2007)}$ [B]	[C]	$[C]/[B]$ [D]
Date	Discount Factor	Future Obligation	Present Value
2008	1.10		
2009	1.21		
2010	1.33		
2011	1.46		
2012	1.61	(400.00)	(248.37)
2013	1.77		
Total			(248.37)

**Diagram 7:**  
**Bond Cash-flow Table -- Jan 1, 2008 (5%)**

[A]	$1.05^{([A]-2007)}$ [B]	[C]	$[C]/[B]$ [D]
Date	Discount Factor	Future Receipt	Present Value
2008	1.05	6.00	5.71
2009	1.10	6.00	5.44
2010	1.16	6.00	5.18
2011	1.22	6.00	4.94
2012	1.28	106.00	83.05
2013	1.34		
Total			104.33

Suppose that immediately at the start of the period two independent events occur. The first event is that the interest rate on the bond falls to 5%, and that as a consequence, the bond value raises to \$104.33, as shown by the cash-flow table of Diagram 7. Marking-to-market entails debiting the bond asset account, and crediting the bond windfalls account with the \$4.33 difference. As the second event, the company purchases the option discussed above: A debit to an option asset account and a credit to cash are made for the \$5.15 price.

**Diagram 8:**  
**Bond Asset Account**

	Comment	Amount	Balance
	Starting Period Value		100.00
	Debit -- interest rate decline	4.33	104.33
	Credit -- interest payment	6.00	98.33

Suppose, now, that the end of the period, i.e., December 31, 2008, has been reached.

For the bond, the annual \$6.00 interest payment is received. Given that this payment is essentially a return of capital – as defined by the present value as represented in the bond asset account – the bond asset account is credited \$6.00 and cash is debited \$6.00. This brings the bond asset account balance to \$98.33 as shown in Diagram 8. Assuming that the interest rate remains at 5%, the bond market value at the end of current period is \$103.55, as shown in the cash-flow table of Diagram 9. Marking-to-market entails debiting the bond asset account, and crediting the bond windfall account the \$5.22 difference. Thus far, the bond has been treated simply as an asset in a manner tantamount to economic-income accounting treatment, without any consideration of “income.” As will be shown, permanent income is determined when the *Ex-Ante Equation* is applied to the \$103.55 balance value.

**Diagram 9:  
Bond Cash-flow Table -- Dec 31, 2008**

[A]	$1.05^{([A]-2008)}$ [B]	[C]	$[C]/[B]$ [D]
Date	Discount Factor	Future Receipt	Present Value
2008	1.00	0.00	0.00
2009	1.05	6.00	5.71
2010	1.10	6.00	5.44
2011	1.16	6.00	5.18
2012	1.22	106.00	87.21
2013	1.28	0.00	0.00
Total			103.55

Assuming that the underlying stock of the option has appreciated to \$32.00, the option value is then \$16.76. Marking-to-market entails debiting the option asset account, and crediting the bond windfalls account for the ex-post \$11.61 income. Thus far, the option has been treated simply as an asset in a manner tantamount to economic-income accounting treatment, without any consideration of “income.” As will be shown, permanent income is determined when the *Ex-Ante Equation* is applied to the \$16.76 balance value.

The legacy-pension liability account needs to be updated also. Suppose the year 2012 obligation has been revised upwards by \$80.00, bringing the total to \$480.00. As shown in the cash-flow table in Diagram 10, the present value is now \$327.85, triggering a mark-to-model posting, i.e., crediting the legacy-pension liability account and debiting

the legacy-pension liability windfalls account with the ex-post loss \$79.48.<sup>9</sup> Thus far, the legacy-pension has been treated simply as a liability in a manner tantamount to economic-income accounting treatment, without any consideration of “income.” As will be shown, permanent income is determined when the *Ex-Ante Equation* is applied to the \$327.85 balance.

**Diagram 10:**  
**Pension-Legacy Cash-flow Table -- Dec 31, 2008**

[A]	$1.10^{([A]-2008)}$ [B]	[C]	$[C]/[B]$ [D]
Date	Discount Factor	Future Obligation	Present Value
2008	1.00		
2009	1.10		
2010	1.21		
2011	1.33		
2012	1.46	(480.00)	(327.85)
2013	1.61		
Total			(327.85)

In terms of operations, management withdraws \$100.00 in cash from the A&L Warehouse to pay employees. This triggers a debit to an employee salary account, and a credit to the cash account. Management also gives employees a new pension to pay \$50.00 in 2013. Per the cash-flow table of Diagram 11, the present value of this obligation is \$31.05, which is posted as a debit to a pension-2008 expense account and as a credit to a pension-2008 liability account. Assuming a cash receipt of \$200.00 for the employee work-product, a revenue account is credited \$200.00, and the cash account debited \$200.00.<sup>10</sup>

<sup>9</sup> The \$400 obligation is closer by one period, resulting in a present value increase of \$24.84. The present value of the \$80 is \$54.64. Adding the two present values (24.84+56.64) yields the posting value of \$79.48.

<sup>10</sup> Alternatively, if credit were extended to customers, an asset accounts receivables would be established. The asset debt and the revenue credit would be the present value of the receivables. The receivables account would then be handled as shown with the bond.

**Diagram 11:  
Pension-2008 Cash-flow Table -- Dec 31, 2008**

[A]	$1.10^{([A]-2008)}$ [B]	[C]	$[C]/[B]$ [D]
Date	Discount Factor	Future Obligation	Present Value
2008	1.00		
2009	1.10		
2010	1.21		
2011	1.33		
2012	1.46		
2013	1.61	(50.00)	(31.05)
Total			(31.05)

**Diagram 12:  
Asset and Liability r-Values**

Account	r-Value
Cash	0.00
Bond	0.05
Option	0.05
Pension-Legacy	0.10
Pension-2008	0.10

At this point, all operational, mark-to-market, and mark-to-model postings are complete, and a computer system can automatically perform what follows.

Now suppose that all along, an asset-and-liability *r*-value table, as shown in Diagram 12, has been maintained. Balance sheet account balances can be obtained, along with *r*-Values, and the *Ex-Ante Equation* used to calculate an ex-ante income for each asset and liability. Credits and debits can be generated to shift ex-ante income from the asset-and-liability windfall accounts to the asset-and-liability ex-ante income accounts. So, for instance, given the ex-ante income for the option as \$0.80, a debit is posted to the option’s windfall account and a credit to the option’s ex-ante income account – shifting value above the permanent income line. Similarly, the *Ex-Ante Equation* is applied to the other asset and liability accounts to calculate additional ex-ante incomes which, via credits and debits, are moved from windfall to ex-ante income accounts.

If the income statement were generated at this point, the operating section would be as shown in Diagram 13. The problem that needs to be addressed now is that to consider the

\$68.95 as permanent income would be to confuse income and capital: at the end of the period, the \$68.95 is already part of the A&L Warehouse, generating asset-and-liability ex-ante income. The solution is to recognize that operations is separate from the A&L Warehouse and to estimate permanent ex-ante income that it can independently generate. Seeing operations as an entity by itself suggests that operations might borrow money that it pays to shareholders as a dividend and that operations might then, through its efforts over the course of the next period, generate the proceeds to pay the loan. So this suggests discounting the \$68.95, or its components, to convert it into start-of-period terms.

**Diagram 13:**  
**Provisional Operating Income Statement -- Dec 31, 2008**

Operating Income		
Total Revenues		200.00
Expenses		
Salaries	(100.00)	
Pension-2008	(31.05)	
Total Expenses		(131.05)
Total Operating Income		68.95

Since a primary object here is to obtain an overall permanent income estimate, the procedure is to discount all revenue and expense posting values into start-of-period-values. The offset account is the operating-income-shift account, which is displayed on the income statement below the permanent income line. So, since the \$200.00 revenue was received at the end of the period, it is discounted by the 10% cost of capital, yielding a value of \$181.82. The difference (\$18.18) is posted as a debit to the revenue account, and as a credit to the operating-income-shift account. Similarly, since the salaries were paid at the end-of-the-period, they are discounted to yield a difference of \$9.09, which is posted as a credit to the expense account and as a debit to the operating-income-shift account.

Using the income account balances, the income statement can now be assembled to yield the income statement as shown in Diagram 14, and the income account balances swept into the equity account to yield the balance sheet as shown in Diagram 15. All posted credits and debits are shown in Diagram 16 in Appendix B.

**Diagram 14:  
Income Statement -- Dec 31, 2008**

Permanent Income			
Operating Income			
Total Revenues		181.82	
Expenses			
Salaries	(90.91)		
Pension-2008	(28.22)		
Total Expenses		(119.13)	
Total Operating Income			62.69
A&L Ex-Ante Income			
Bond	4.93		
Option	0.80		
Pension-Legacy	(29.80)		
Pension-2008	(2.82)		
Total A&L Ex-Ante Income			(26.90)
Permanent Income (Net Income)			35.79
Operating Income Shift			6.27
A&L Windfalls			
Bond	4.62		
Option	10.81		
Pension-Legacy	(49.67)		
Pension-2008	2.82		
Total A&L Windfalls			(31.43)
Economic Income (Comprehensive Income)			10.63

**Diagram 15:  
Balance Sheet -- Dec 31, 2008**

Account	Assets	Liabilities
Cash	1,249.21	
Bond	103.55	
Option	16.76	
Pension-Legacy		327.85
Pension-2008		31.05
Shareholder Equity		1,010.63
Total	1,369.52	1,369.52



## Synthesis Results

The balance sheet of Diagram 15 is based upon current-market values. The bond, the option, and the pension liabilities entries are all individually based upon end-of-period market values. The bond and option are based upon actual market values; while the pension liabilities are based upon model-estimated market values.

The income statement is based upon current-market values. This is because operating revenues and expenses ideally are based upon current-market values. It is also because ex-ante income is ideally calculated using current-market values for assets, liabilities, and  $r$ -values.

The income statement of Diagram 14 yields a permanent income estimate. The components of permanent income themselves represent permanent income measurements for operations and individual assets and liabilities held by the A&L Warehouse. Operating income shows how management is currently performing in an open market context; assuming that management continues to do what it has done in the just-completed reporting period, operating income satisfies the charter of permanent income. The *Ex-Ante Equation* yields individual asset and individual liability permanent incomes. Aggregating component permanent incomes yields an overall company permanent income.

Asset and liability stewardship metrics are shown as on the income statement as windfalls. If an asset or liability exceeds expectations as represented by the  $r$ -value, the windfall is positive; if expectations are exactly met, windfall is zero; if expectations are not met, the windfall is negative.

Probably everyone gains with the synthesis. Financial-statement users gain better financial data for analysis and decision making. Practitioners, academics, and standard setters gain a simpler, more useful theory and practice methodology.

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**Appendix A: Synthesis of the “Asset and Liability” and “Revenue and Expense” Paradigms.**

Both the Third-way and the “Asset and Liability” paradigm handle asset-and-liability value trends and fluctuations by updating the balance sheet with current-market values and using income-statement accounts as offsets. Conceptually, both generate the same balance sheet and economic income. While the “asset and liability” paradigm has revenues and expenses, the Third-way has additional income statement accounts to distinguish between, and report, operating income, asset-and-liability holding income (ex ante income), and asset-and-liability holding windfalls.

Both the Third-way and the “revenue and expense” paradigm handle transactions and depreciation to conceptually generate the same operating income. While the “revenue and expense” paradigm has revenues and expenses, the Third-way has additional income statement accounts to distinguish between, and report, asset-and-liability holding income (ex ante income), and asset-and-liability holding windfalls.

**Append B: Debit/Credit Log****Diagram 16:  
Debit/Credit Log**

<b>Debit</b>	<b>Credit</b>	<b>Amount</b>
Option (Asset)	Cash (Asset)	5.15
Bond (Asset)	Bond (Windfall)	4.33
Cash (Asset)	Bond (Asset)	6.00
Cash (Asset)	Revenue (Revenue)	200.00
Salary (Expense)	Cash (Asset)	100.00
Pension-2008 (Expense)	Pension-2008 (Liability)	31.05
Pension-Legacy (Windfall)	Pension-Legacy (Liability)	54.64
Bond (Asset)	Bond (Windfall)	5.22
Option (Asset)	Option (Windfall)	11.61
Pension-Legacy (Windfall)	Pension-Legacy (Liability)	24.84
Bond (Windfall)	Bond (Ex Ante Income)	4.93
Pension-Legacy (Ex Ante Income)	Pension-Legacy (Windfall)	29.80
Option (Windfall)	Option (Ex Ante Income)	0.80
Pension-2008 (Ex Ante Income)	Pension-2008 (Windfall)	2.82
Revenue (Revenue)	Operating Income Shift	18.18
Operating Income Shift	Salary (Expense)	9.09
Operating Income Shift	Pension-2008 (Expense)	2.82