

Project Summary: **Infinite Spreadsheet: Methodology for Full Disclosure in Rational Decision-Making; Its Application to Legislation HR 4173: Dodd-Frank Wall Street Reform and Consumer Protection Act**

This proposal deals with the methodology of full disclosure for decision-making, valuation, and planning. The inputs and outputs are fully disclosed in the Infinite Spreadsheet, which extends to infinity in time and space. The methodology has been used in solving the problem of value posed by Kenneth Arrow and Gerard Debreu in the book **Theory of Value** by Debreu. The goal of this proposal is to apply the concept of full disclosure to the recently passed **Dodd-Frank Wall Street Reform and Consumer Protection Act (The Act)**, whose essence is financial accountability. Instead of partial accountability, full disclosure should lead to full accountability.

The Infinite Spreadsheet is a deterministic valuation system, which is operational, and is based on just one equation, which simulates the realistic accounting of future cash flows:

**Cash Return = Sum of Cash Flows + Cash from Resale**

The methodology of the Infinite Spreadsheet involves mainly (1) Calculating the price in a time-reversed fashion covering a semi-infinite time space and (2) Instead of comparing the price directly, the inputs are expressed as approximate time-invariant quantities and, thus, can be obtained from comparison to past data. Mathematically, the time-reversed methodology of the Infinite Spreadsheet can be expressed as:

**P<sub>0</sub> = P<sub>0</sub> (P<sub>1</sub> (P<sub>2</sub> (P<sub>3</sub> (P<sub>4</sub> (P<sub>5</sub> (P<sub>6</sub>... (P<sub>n</sub> (P<sub>n+1</sub> ... (P<sub>infinity</sub>) ... ) ) ... ) ) ) ) ) ) ) ) ) ) ) )**

which simply says that the price **P<sub>j-1</sub>** depends on **P<sub>j</sub>**, and **P<sub>j-2</sub>** depends on **P<sub>j-1</sub>**, so on and so forth back to **P<sub>0</sub>**. The Infinite Spreadsheet has publicly predicted the S&L Crisis and the Subprime Woe by detecting over-valuation brought about by the market comparison method, which keeps the price rigid, even after the economic condition has changed.

Discounted Cash Flow Method assumes a resale price or a capitalization rate to determine the price. Also, a difference discount rate is needed for each year. The Infinite Spreadsheet does not need to assume a resale price, for all the resale prices are treated the same way as the price. The **Rate of Return** is the monetary return and reflects inversely the non-monetary return, such as risk and stochastic volatility in OR. The potential long-term impacts of the proposal are:

- (1) The qualitative concept of utility can be replaced by the quantitative price or **Rate of Return**.
- (2) Taylor Rule for setting the fed funds rate can be replaced by the relationship: **Rate of Return > Interest Rate > Inflation**, where the **Rate of Return** is calculated by the Infinite Spreadsheet.
- (3) A Two-Valuation Reform is proposed based on the equation: **Bubble (Over-valuation) = Market Price – Intrinsic Value**, where Market Price is obtained from market comparison to the past sales data, and Intrinsic Value is calculated based solely on the future expected cash flows.
- (4) Over and under-production and resource allocation must be balanced by the solution of value.

**Intellectual Merit:** The Infinite Spreadsheet could provide a rigorous solution of value and a rational foundation for decision-making in operations research. It provides full disclosure and unifies traditional real estate appraisal concepts by obtaining all inputs from market comparison and calculating the price using the income approach. Since infinity never arrives, its acceptance has to rely on the rigor of mathematics, not on empirical verification, the rigor of science.

**Broad Impact:** This proposal will open up a new direction in the education of social science, using the methodology in operations research, which subscribes to mathematical rigor. The financial crisis creates an historic opportunity for the potential transformation of our society from one regulated by man-made laws, such as **the Act** and **FIRREA of 1989**, to one regulated solely by non-violable mathematical laws of nature in social science, such as the Infinite Spreadsheet.