

# Pricing with time-technology and timescapes

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Wisdom, knowledge, and information are required to survive in the 21<sup>st</sup> century. Is there a way to provide these without having to spend years in schools, colleges, and universities? It would seem humanity is on the verge of making such a transformation. This article discusses some of the issues and their potential in a very novel way.

The economics of pricing<sup>1</sup> is a complex subject and includes many fields of human knowledge and endeavors. The principle of scarcity has been the basis of economic models. Scarcity<sup>2</sup> is a function of time. Hence, speed [Mansfeld (2004)] is valued, advocated, and sought to bring about financial transformations of economic systems. Time and its measurement have thus become central to modern economies and their studies. Economists have computed their time series<sup>3</sup> of economic data based on the geographical time (solar clocks and solar calendar); both micro and macro studies of economic variables are computed using this geographical time parameter. In international trade world wide pricing has acquired a unique complexity due to its influence on the profits, taxes, and regulations pertaining to its implications on domestic market structures [Wild et al. (2003)]. In the pricing of the financial products such as options, futures, and bonds time durations help measure the risks [McDonald (2004)]. The durations included in these computations also are traditionally a function of the solar clock times as well. Price differentials, both in the products and factors markets, cause economic agents to either speculate or conduct time and/or market arbitrages. Here again, the solar clock time plays the central role. An outcome of either a profitable or unprofitable speculation is essentially a solar clock dependent phenomenon. Determinants of economic profits are functions of costs and costs are measured using the geographic time units. When it comes to the costing of information we include the value of time spent to acquire it, since 'time is money.' But, here again we are consistent in the use of solar clocks and solar calendar time to help value this scarce economic resource.

According to Paul Gregory, writing in American Economic

Review, the 1974 Nobel Laureate in Economics, Frederick Hayek (1945) admired the 'efficiency with which the market processes the pricing information and sparingly allocates the scarce resource in a multiplicity of its use throughout the economy.' So, pricing has become central to our economic processes and hence perhaps even for the wellbeing of human kind.

In an Internet culture, a functioning knowledge society has come to rely on the pricing mechanism to provide the appropriate signals necessary to adjust allocations of not only all resources, but also to impart value to actions in many contexts. Through differential pricing [Clemons et al. (2002)] it is believed, disintermediation could be avoided in the presence of customer heterogeneity. This paper examines the implications of this conventional wisdom and proposes an alternative to the complete dependence on the geographical time scale in order to solve societal conflicts. This proposed framework might foster true egalitarianism and pragmatism [James (2000)] which might provide true and complete freedom from any and all societal strife which has been the declared goal of modern governments [Davies (1996)].

The flow of time in addition to being geographical (i.e., based on the location of our planet in the solar system and the longitude and latitude on the globe, or what is denoted as 'spatial') is a function of societal relationships. When it comes to pricing or establishing a value of exchange the latter measure of time and its duration has a greater significance than understood by the economists and scientists of the industrial era who were preoccupied with our physical universe and the human relationship with that universe. When we eliminate an important step or an intermediary layer of societal-time<sup>4</sup> that has a vital role on the outcome, we risk losing valuable information necessary for its measurement and inclusion in our valuations. Before we include the spatial time in our computations we need to account for the time and the durations inherent in societal relationships and processes. If we do not account for these variations and the resulting costs associated with that phenomenon of time then the outcomes of our

1 A money price is a price expressed in monetary units, a relative price is a price expressed in terms of other commodities, while a price system is the entire set of relative prices.

2 Scarcity exists when the amount of the good or resource offered is less than what users would want if it were given away free.

3 A time series is a measurement of one or more variables over a designated period of time, such as months, years, or quarters.

4 Societal-time is a new phrase coined by this author to denote the unique combination of the relationships of individuals to one another and to their societal institutions, processes, and methods that govern the outcome of such relationships.

decision-making processes become unpredictable. In the parable of the householder (King James Version of Bible, Matthew ch. 20) the Kingdom of Heaven prices the services of a laborer equally at the first hour and the eleventh hour and attributes this inequity to the goodness of that householder. In the 21<sup>st</sup> century how can we account for our business cycles and pricing inequities beyond statistical and data input errors? The most effective way to include and measure the goodness of the heavenly householder and its present day equivalent societal values is to measure the phenomena of societal-time, using timescapes [Subramanian (2003b)] and by the development of time-technologies akin to our present day space-technologies that could further our knowledge about our valuations and perhaps improve the dismal status of our economic sciences.

The flow of the geographical-time is a summary of many a societal-times akin to the white light from the sun's rays we see which is a summary of many other colors of differing frequencies in the visible spectrum of lights. If our economic data series fail to differentiate the many shades and color values of time and the durations associated with those units of measures, then the interpretation of those series become questionable at best and meaningless and incorrect for useful economic analysis and its application at its very least.

Time-technology is the science of decoding the mystery of geographical time and its relationship to human existence. The geographical time produces seasons and weather conditions that affect the lives of many kingdoms (plant, animal, and many other organisms). The bio-clocks in these kingdoms govern the flow of events necessary for their survival and their interdependence. In like manner the economic-clock that governs the value creation processes of the universe balance our ecosystems. Our present day monetary, pricing, trading, and exchanging mechanisms seems to have been created without regard to this truism. Could this anomaly be the reason that produces our social and family strife? If so, what could be done to improve this? How can we create and use the many economic-clocks that could provide the correct rhythms for the

value creation cycles of individuals and communities that create and sustain the wealth of nations?

Many authors [Hayami (1997)] and economists have correctly identified the interdisciplinary nature of this wealth building task but have failed to recognize that one of the main reasons for this complexity is the misunderstanding and perhaps even misuse of our geographical time as a substitute for the societal time. In my view the measurement and streamlining of the societal processes using individual and appropriate clocks could lead to the successful integration of global economies much more easily. Even if we could successfully integrate regional economies using common markets and could modify our human behaviors to a single and uniform set of standards, which may take many years and many a political battles, liberating the human capital and obtaining the liquidity [Shojai et al. (2001)] would be impossible using our geographic-clocks and that measure of durations alone because of the variations inherent in the creativity, health, individuality, and thought processes of humans.

Data mining experts in finance [Kovalerchuk and Vityaev (2004)] have concluded that matching tasks with methods is a very complex endeavor leaving one to conclude, it is more an art than a science. The noise described with those time series could perhaps be due to the failure to associate data with a societal-time framework prior to their conversion to the geographical-time used in these computations.

With the introduction of the Internet and the benefits of e-commerce [Litan and Rivlin (2001)] the geographical time unit has entered a new phase of obscurity for economic data. According to Prof. Samuelson (2004), 'there is no valid reason to think that if we were only a little more knowledgeable and a little more energetic, we could converge on highly accurate macro forecasts. Mass behaviors answer to no simple discoverable set of rules.' The best way to discover rules of behavior is by mapping events and their durations on a virtual timescape independent of any geographical limitations. The U.S. asset management industry as well as the global investors

whose equity market capitalization amounted to U.S.\$36 trillion in 1999 [Shojai and Preece (2001)], lack a uniform measure of time to value their interests. The future no longer is merely represented by the calendar year millennia but resides in the thought processes of the future generations [Feiger and Shojai (2003)]. Any data collection and its use for meaningful analysis should begin by associating that data with the individual entities that cause an event to occur in their respective time horizons and yet be amenable to integration. The creation of trust and a sustainable point of differentiation for financial relationships have to begin with the use of timescapes that show changes over many generations and many societal cultures. Brands conceived in the transactions era may have to be evaluated in the relationship era [Boone and Kurtz (2003)] using cultural and social contexts of greater depth to show product performance. The predicted disintermediation [Shojai and Wang (2003)] of financial intermediaries might not happen even after 'the dust settles over the internet landscape' as those authors argue due to the fact that 'improving the efficiency of the world we live in' is likely to remain invisible in solar timescape. I tend to agree with Myron Scholes (2004) that complex securities are hard to value especially when using solar time alone. Using societal timescapes that measure the efficiency of markets in meaningful ways to an individual investor or a group of investors of uniform demography might bring about the much needed transparency in that industry for its survival.

If we look at the evolution of currency [Turk (2004)] and try to provide all of the properties of money to money substitutes using new technologies as suggested by that author then, to guarantee the purchasing power to money substitutes we need to develop timescapes and time-technologies [Subramanian (2003)].

If we want to extract the business value of IT by increasing its usage [Marchand (2004)], we should be able to link every user to that technology in meaningful ways using each user's societal time and societal roles by providing the timescapes to software agents that can help that individual enhance his/her

productivity by being in multiple locations concurrently to safeguard their interests in all relevant virtual meeting places. Collaborative networks, be they financial trading (CTN) [Shojai (2001)] or of any other kind, should be capable of detecting nuances to data not only according to the Enterprise Integration (EAI) principles of Extract, Transform and Load (ETL) [Dilkes (2004)] or Extract, Load and Transform (ELT) but also relate the many contexts affected by its societal relationships contained in timescapes [Subramanian (2004)].

The complexity of wealth management in the 21st century [Feiger and Shojai (2001)] may not be addressed fully without a sophisticated link to the social contexts of the individual economies and the global citizenry. Trust [Zak (2003)] and risk [Bryan (2002)] are all related to social contexts and societal processes that may not be summarized in solar timescape measurements alone. If the laboratory experiments belie the predicted outcome of Nash equilibrium we could attribute this deviation to the lack of data mapping of societal processes and their significance for understanding human behavior. Fear of the unknown is the natural outcome of giving greater importance to the landscapes and the real estates than to the timescapes and the human societal values. The perceived law of motion [Kedar-Levy (2003)] (PLM) and the actual law of motion (ALM) could be based on societal time and long periodic events caused by human sociology rather than market portfolio valuations or simple dynamic asset pricing models. Economists [Walter (2001)] will have to look beyond a 'New Economy' to study the causes and effects of events. Integration for banks [Derrer (2002)] can not be complete by bringing 'together a wide range of different processes, based on different technologies, and synthesize them into a coherent whole' unless that includes the human values and the human societal processes on which financial assets are created and used.

The virtual matching utilities (VMU) that 'allow for the seamless real time matching of trade data throughout the trade life-cycle' [Walsh (2001)] need not limit its concept of real-time to the present day geographical time. By not doing so, the cul-

tural aspects of a societal relationship that caused that transaction are not utilized and are lost in the analytical studies.

If we extend this understanding to hedge fund investing [Lhabitant (2003)] we might question the effectiveness of a diversification strategy that is limited to styles and market inefficiencies alone. Diversification by demographic characteristics and the societal timescapes of the investing and the marketing members of the global citizenry is likely to produce the hedge funds of the right radar type.

## Conclusion

Societal time and timescape is a dynamic and comprehensive medium to value exchanges. Societal-time pricing mechanism could be trusted to incorporate all relevant variables in real-time and the economic analysis of that data-time series would be able to better signify the effects of macro and micro policy. Information technology has a role to play in bringing about the integration of an individual with all of the communities and all of the roles taken-up in those communities and their impact on the rest of those community members and their roles. Since all these relationships are changing, evolving, and occurring simultaneously data, information, knowledge, and wisdom have to be extracted continually to fit a societal need and its scope. The technology, architecture, and the logic to transform the meaning of these relationships are likely to preoccupy the minds of many next generation solution providers for several decades to come. I hope they could be trusted to look into these societal-time phenomena as well to impart a degree of utility to their integration mechanisms [Thillairajah (2004)].

## References

- Boone and Kurtz, Contemporary Business, 11<sup>th</sup> ed., Thompson-South-Western, 2005 p.13
- Bryan, A., 2002, "The many faces of risk," Journal of Financial Transformation, 5, 66-67
- Clemons, et al., "Impacts of e-Commerce and enhanced information endowments on financial services: Transparency, differential pricing and disintermediation", Journal of Financial Transformation, April 2002 p.9-18
- Davies, G., From opportunity to entitlement : the transformation and decline of Great Society liberalism, 1996
- Derrer, A., 2002, "Integration, Integration, Integration," Journal of Financial Transformation, 6, 34-35
- Dilkes A., 2004, "Data management in financial services 2004 and beyond," Journal of Financial Transformation, 11, 58-61
- Feiger, G., and S. Shojai, 2001, "Wealth management in the 21<sup>st</sup> century: The imperative of an open product architecture," Journal of Financial Transformation, 3, 74-76
- Feiger, G., and S. Shojai, 2003, 7, Market credibility and other dietary fads," Journal of Financial Transformation, 7, 63-70
- Gregory, P. R., "Essentials of Economics," 6<sup>th</sup> edition
- Hayami, Y., 1997, "Development economics: From the poverty to the wealth of nations," Oxford; New York Oxford University Press
- Hayek, F. A., (1945) "The Use of Knowledge in Society," American Economic Review, 35:4: 519-530
- James, W. 2000, "Pragmatism and the meaning of truth," Harvard University Press
- Kedar-Levy, H., 2003, "Technology shocks and financial bubbles," Journal of Financial Transformation, 7, 53-62
- Kovalerchuk, B., and E. Vityae, 2004, "Data Mining in Finance: From extremes to realism", Journal of Financial Transformation, 11, 81-89
- Lhabitant, F-S, 2001, "Hedge fund investing: A quantitative look inside the black box," Journal of Financial Transformation, 1, 82-90
- Litan, R. E. and A. M. Rivlin, 2001, "Projecting the Economic Impact of the Internet," Journal of Financial Transformation, 2, 35-41
- Mansfield, W., 2004, "A Single Market for Hedge Funds," Journal of Financial Transformations, Vol. 10, 80-81
- Marchand, D. A., 2004, "Extracting the business value of IT: It is usage, not just deployment that counts!" Journal of Financial Transformation, 11, 125-131
- McDonald, Robert L., Derivative securities, Pearson-Addison Wesley, 2003 p.218
- Scholes, M. S., 2004, "The future of hedge funds," The Nobel Laureate view, Journal of Financial Transformation, 10, 8-11
- Shojai, S., 2001, Financial Trading Networks, Journal of Financial Transformation, 1, 30-37
- Shojai, S., and R. Preece, 2001, "The future of the US asset management industry," Journal of Financial Transformation, 1, 72-79
- Shojai S., and S. Wang, 2003, "Transformation: the next wave," Journal of Financial Transformation, December, 9, 11-16
- Shojai, S., P. Gray, C. Keeling, and S. Wang, 2001, "Liberating human capital: The search for the new wave of liquidity," Journal of Financial Transformation, 3, 117-126
- Subramanian, Bala R., 2003a, "Time-technology centers- Engineering Education for designing and using timescapes." Mid-Atlantic Conference of American Society of Engineering Educators (ASEE), Saturday April 12
- Subramanian, B. R., 2003b, "A case for U.S. Currency (Dollar) re-valuation," Unpublished paper
- Subramanian, B. R., 2004, "Teaching economics in the 21st century," Paper presented on October 23<sup>rd</sup> at West Coast Conference, California State University, Fullerton, CA
- Samuelson, P., 2004, "The World of Economic Data," The Nobel Laureate view, Journal of Financial Transformation, 11, 6-7
- Thillairajah, V., 2004, Thoughts from The Integration Consortium, DM Review, December
- Turk, J., 2004, "The evolution of currency," Journal of Transformation, 12, 108-109
- Walsh, P., 2001, STP/T-I: The European Challenge, The Journal of Financial Transformation, 3, 53-61
- Walter, N., 2001, "Effects of September 11<sup>th</sup> on the World Economy," Journal of Financial Transformation, 3, 13-14
- Wild, J. et al., International Business, Prentice-Hall, 2003 p.418-420
- Zak, P. J., 2003, "Trust," Journal of Financial Transformation, 7, 17-24