Market Wide Liquidity Instability in Business Cycles

Chatterjee, Sidharta

Andhra University

24 October 2009

Market Wide Liquidity Instability in Business Cycles[†]

Sidharta Chatterjee*

ABSTRACT

This paper deals with an existing question; does market liquidity disequilibrium leads to stock market bubble burst? Contemporary research has shown that liquidity is the key driving force behind capital market growth and its sustenance. Stock markets usually react to changes in market-wide liquidity, whose supply-demand cycle fluctuates with investor behavior actions. Market illiquidity due to supply shocks or sudden redemption, does exert strain on the financial markets as of when if too much untenable, lead to market crash. In this paper, we investigate how market-wide fluctuations in liquidity result in return volatilities and stock market return asymmetries as also to prove the notion whether liquidity per se, is the sole driver of stock market growth.

Keywords: Liquidity, business cycles, investor behavior, returns asymmetry

JEL Code: C32, E44, G43

Note; Usual Disclaimer Applies October 24th, 2009

I. Introduction

In this paper, we investigate the utility and importance of liquidity as a driving force behind stock market growth and return to inquire whether market-wide *illiquidity* cause bubbles to burst. We empirically attempt to measure how idiosyncratic changes in market-wide liquidity causes resonance in stock return patterns, alongside return volatilities associated with bubbles and crashes. In

[†] This research has been undertaken by the author as a visitor at the School of Economics, Andhra University, Visakhapatnam. The author is also affiliated to the Informatics Institute, Singapore. The author extends his gratitude and thanks to Prof. K.Rao, Faculty and Research Head of Economics Unit, School of Economics, Andhra University, India, for without his acquiescence, this research wouldn't have been possible, to all those involved in this research, and particularly, to the library staff of Dr. V.S. Krishna Central Library, Andhra University, for their assistance.

This research is in progress and hence the findings are those of the author/s only, and do not necessarily represent the views of any other entity.

*Author's email address: sidharta123@yahoo.com

this endeavor, we try to ascertain the dynamicity of market-wide liquidity volatility fluctuations as an effect of investor behavior actions which mediate such resonance patterns. We may define financial market actions as;

> *'reactions due to collective behavioral actions of groups of investors, both experienced and green, whose changing behavioral dynamics propend to change in market-wide liquidity in unit time brought about by a multitude of trading decisions which drive investment outcomes.'*

If one is to go by the above definition, then one finds that financial market reactions are on account of investor behavior heterogeneity; and it is this commonality which determines what level of liquidity per unit time exits in a particular stock exchange. As also, liquidity factor of an asset per se, a stock or a portfolio, influences its very own return variances over a period. This is determined by its liquidness, which is in effect, its exchangeable utility function into commonness within an undeviating probable juncture, the frequency of which is governed by reciprocity of its disposition as a self-determinant of its interchangeability. The reciprocity of liquidity's disposition is not, however, its sole determinant whereby, this resend normatively on action dynamics of investor groups who seek excess returns from their empowered assets. It is this disposition which determine whether assets would be more liquid, or else illiquid. In stock markets, if returns correspond to changes in marketcap, the intemperance return on liquidity function determines the momentum, direction component and the magnitude of aggregate liquidity flow. To state more simply, excess returns from a type of assets or stocks attract more liquidity and vice versa.[1] There is a contention that measuring market wide liquidity betas is important for pricing assets.[2] Common findings include of the fact that order

---

[1] See for example, Lubos Pastor and Robert F. Stambaugh (2003), in *Journal of Political Economy*. In their paper, they have investigated whether cross section of returns is related to stocks' liquidity betas. According to Amihud and Mendelson (1986), stocks with higher liquidity earn an average higher return. Well, this contention although generally accepted, that least liquidity stocks are in common, less frequently traded than illiquid stocks. However without loss of generality, stocks become more attractive to investors on account of new information sets relative to its market performances that have broad impact on their returns. Uncertainty on this point still remains.

[2] Pastor and Stambaugh (2003) differ slightly from Amihud and Mendelson (1986) on the fact that, they find that the least liquidity stocks tend to have highest liquidity betas, though stocks with higher liquidity betas possess higher systematic risks.

flow induces greater return reversals when liquidity is low. As also, Fama observed that returns are on average higher on stocks having high sensitivities to liquidity. This brings onto the ramp the liquidity risk factor which accounts to a momentum strategy profits. Pricing market wide liquidity has been attempted successfully in earlier studies by Pastor and Staumbaugh (2003), and others. They have also measured sensitivities of returns to fluctuations in aggregate liquidity. However, in contrast to their approach, we take a simple yet different path to assess the importance of aggregate liquidity fluctuations that cause market perturbations. Our model tests independent variables by altering them to obtain maximum dependent variations in test results. One of our prime objectives is to get best estimate of slope coefficient as a measure of minimum ratio of the variance in slope. This is important to ascertain the relationship of the slope coefficient to the market responses. It is utterly difficult to ascertain probabilities with absolute certainty since, independent variables are known only in terms of probability distributions.[3] Herein, we have considered taking index independent variables in this case; open, high, low and closing price, by bypassing a more complex heterogeneity of the Fama French three factor model. As also, we did not seek to experiment with combinations of independent variables here, and the Fama three factors, that would have in certainty, yielded maximum of the dependent variable. This would entail evaluating the function in the neighborhood of the maximum, but we content our study to the determination of local maxim, which is necessary in this otter. Further, the more complex model with most of the market factors as independent variables require knowledge and relative importance, as well as characteristics of different independent variables, which is of more importance in 'Factorial Design'. Hence, our approach is toward a more superficial exploration of the liquidity disposition in effect of fluctuations to determine whether such volatilities induce bubbles to crash, indeed. This will further help us to explore the level of illiquidity of assets as a determinant of low volume, low trading and crash.

---

[3] Reader may refer to contemporary classical studies by Wesley Mitchell in one of his most remarkable works, *Business Cycles,* Vol. I and II, NBER publications. It may thus be quite appropriate to draw possible relationship between liquidity flow and business cycle variations, since, booms and busts corresponds to fluctuations in the parameters of business cycle variables. See the section on discussion for an explanation drawn from classical studies of causal-relationship on this subject The reader may wish to refer to several books on this subject matter by Wilhelm Rophke in '*Crisis And Cycles,*', '*Investment and Business Cycles',* by James W. Angell and in *'Some International Aspects of the Business Cycle'*- by Hans Neisser.

II. Background Investigation:

A. Investor Heterodoxy Effect

Contemporary research have established the fact that a sustained deviation from equilibrium in fundamentals of asset valuation parameters resulting in price appreciation of assets give rise to bubbles.[4] Credibility for this stands on the behavioral actions of heterogeneous groups of investors as causatum, which we refer to investor heterodoxy, and what in-effect, provide *liquidity*, the most important factor behind stock market function and growth, whilst over and above, they egregiously contribute to the events of synchronized bubble formations and their bursting. A large and variable amount of literature is primarily devoted to the study of, and the causes behind, asymmetric asset returns in lieu of asset price volatility. Also, there has been a spurt in generalized interests among researchers in the field of empirical finance to investigate and formalize the dynamicity of bubble formation and crashes over the time. In this paper, we delineate the trajectory of development induced on account of investor actions presented as gyrated waves affecting liquidity supply-demand cycle variations for organized understanding of return volatility asymmetries, as well as the impact of market-wide cyclical liquidity demand-supply formation changes. These factors have some resonance effects in models of stock returns.

B. What causes price volatility and bubble burst?

It is of common knowledge that variations in price responsiveness to changes in excess demand and supply leads to evolution of, and then, simultaneous bursting of asset price bubbles. Although, bubbles occur primarily due to continuous deviation from equilibrium in the fundamentals of the parameters of valuation of assets, there are certain other factors that help gesticulation of bubbles.[4] Dufwenberg and others (2005) have shown that bubbles tend to occur with the presence of a few inexperienced traders. Under controlled laboratory

---

[4] One may refer to Honggang Li and J. Barkley Rosser, Jr. (June 2008), *Discrete Dynamics in Nature and Society*, 2001, vol. 6, no. 3, pp. 171-180, where they have studied emergence of volatility dynamics in asset markets.

[5] See for reference, the paper by Martin Dufwenberg et.al, Bubbles and Experience: An Experiment, *The American Economic Review* Vol.95 Dec 2005

experimental setup, they included both experienced as well as inexperienced traders and find that, even a presence of a fewer naïve and inexperienced traders help sustain a bubble. Various other factors have been implicated as causative agents of asset price bubbles. Of these, investors' behavior actions predominates other factors and the widespread participation of these so called 'noise traders' or technical analysts, who chase trends under speculative frenzy,[6] complement to volatility and oscillations in the market. It is important to appreciate that investors are opportunists in a sense, in which they try to profit from other investor's overvaluation. The *overvaluation* indicates herein, a particular stock or assets has become *too much on to value,* and this provokes overestimation by investors about returns previewed in future from that asset. The demand price of assets thus moves up therefore causing an increased demand for liquidity with a limited supply of assets. This causes more overconfidence on the part of the agents who speculate more superiorly, and superficially, since the fundamental values remain imperceptible. Consequently, the fluctuations in the relative belief among agents generate more trade whilst the investors are not in accord, and these factors precipitously cause sustenance of a bubble arising from discord between investor beliefs.

C. Some Historical Account of Bubbles and Crashes:

Particularly interesting examples provide historical accounts of bubbles; the 'Dutch Tulipmania' of the 1630's, the 'South Sea Bubble', the stock market and Real Estate Bubble of Japan in the mid 1980's the dotcom bubble and lastly, the 'New Millennium Bubble' of the present time.[7] This study thus earmarks inquisitive analysis to understand volatility of returns associated with the bubbles and their return variances during asset price boom-bust cycles. From all these événements passes, two things provide a common ground for inquisitive interest; one that is, the occurrence of speculative trade in financial assets and commodities, which increases the quantity of liquidity available for such trading,

---

[6] This speculative frenzy is what we have referred to as *redundant sigmoid heterodoxy of the financial markets*: the investor heterodoxy effect in our previous unpublished work 'Calculating Stock Market Index Closing Value Using Risk Function Curve Equation, Logistic, B-Spline Curve and Polar Conversion techniques', Chatterjee Sep. 2008. Here, we made an effort to quantify investor risk to systematic shock from an entirely different viewpoint. The heterodoxy effect refers to too much inclination on abnormal return patterns under speculative frenzy.

[7]See the seminal work by Garry Gorton, *the Subprime Panic of 2008*

and the other being, the increased demand for liquidity from investors who would take part in such events. The intersectional affirmativeness between these two factors seems complementary as a consequence of which, it is presupposed that bubbles burst. As such, when bubbles do bursts, both speculation and liquidity tends to diminish substantially, causing volatility in co-variances of returns during the auction-bust cycles in asset prices while the availability of market-wide liquidity starts drying up. One such not-so-long, but well-known event encircling acute systematic nature of liquidity crisis involved the default of the Russian government debt[8] in August 1998, which precipitated the failure of Long Term Capital Management (LTCM) and put in distress other fixed-income relative value hedge funds. This hedge fund took long positions in less liquid instruments while went short on more liquid ones. When the debt crisis deteriorated market-wide liquidity conditions, LTCM's liquidity sensitive portfolio dropped acutely triggering redemptions to meet margin calls. This is perhaps, more highlighted on recent version of global liquidity crisis on account of the US mortgage market failure, resulting in a series of correlated defaults among financial institutions. These events propend to inter-temporal market return asymmetries that can be measured, and our goal is to compute market-wide liquidity fluctuations which induce these resonance effects. (Dufwenberg 2005) extensively studied the activities of arbitrageurs which contributes to the sustenance and simultaneous bursting of asset bubbles. It shall be noted equivocally that, liquidity is an activity function and of commerce to an investor like such, during when bubbles burst, market-wide crisis of liquidity take shape in the form of liquidity shock, since investor redemptions flush out liquidity from the stock markets, while investors approximate further liquidity risks as a consequence, trading stretches to diminish.[9] Investors at these times are more skeptical about their assumptions of spread between liquidity's marginal utility and liquidity risk; rather, they tend to hoard as much as possible as in risk free investments until the level of anticipation rises in due time. Dynamicity of institutional investor activities likewise contributes to the fluctuations of

[8] See Longstaff, Santa-Clara, and Schwartz (2001) and Han (2004) for pricing errors during the LTCM crisis during the summer of 1998.

[9] A diagnostic example could be sought for on this subject matter by correlating to the October crash of 1987. Grossman and Miller (1988) contend that the market was highly illiquid on October 19, the day of the 1987 stock market crash. Apart from statistical model based OLS regression test study by Chatterjee July (2009), which verified that the rampant volatility that prevailed on the week of the crash, R.J. Shiller (1987) stated there was no major trigger(s) which might have precipitated the crash of 1987, barring some amount of investor over-activity.

market-wide liquidity at these times, and a particular paradox is defined; *'market wide liquidity dries up, demand for liquidity is high pressing up on interest rates, assets are in abundance supply since there are fewer buyers, and the price fundamentals become perceptible as assets become cheaper, and liquidity more expensive.'* There occurs random disagreement of beliefs among investors and between arbitrageurs ensuing higher volatility, which in turn door upon volatility based option traders to take advantage of the volatility, spreads and cross-correlations. There has been a wider perception that take shape as of, for how much more discounted the assets are to become perceivable, relative to liquidity expensiveness.

Nevertheless, before we van any further, we need to know how *illiquidity of assets* have its influence on stock market returns, that is, to ask whether liquidity's disposition causes markets to crash or bubbles to burst. Since market liquidity propels stock market growth, it is undeniably important to categorize liquidity according to its functional sources. In the subsequent sections, we shall seek to understand the dynamics of liquidity flow, along with its categorizations in order to measure market wide liquidity and study the dynamics of cyclical variations in liquidity demand-supply model. Moreover, we will further study the asymmetric volatility of the volatile returns associated with bubbles and crashes using test statistics with controlled model for error detection, which is crucial.

III. The Model

We propose a simple model where we contend our study relative to sudden fluctuations in endogenous liquidity escarping the stock markets. We measure market-wide liquidity using closing price of a particular index, in this case, the DJIA. Previously, Fama measured distribution of market using defined by the equation:

$$E[R_i] = \gamma_0 + \gamma_i \beta_i \qquad \text{eq. .....I}$$

While computing conditional covariance of market return, the equation is,

$$\beta_i = \mathrm{Cov}(R_i, R_m)/\mathrm{Var}[R_m] \qquad \text{eq.....2}$$

where, R_i return on any asset and R_m is return on market portfolio. In our model, we construct a simple equation that measures mean variance in market returns, and the ratio of C_{ov} and V_{ar} as a measure of market-wide liquidity volatility. The equation is given by;

$$R_i = (C_{pm/s} + P_1/P_0)[(1-P_1)/(1-P_0)] \quad \text{.....eq.3}$$

Or,

$$\left(r = \frac{Cpm}{s} + \frac{P_1}{P_0} * \left(\frac{1-P_1}{1-P_0}\right), s\right) \quad \text{.....eq.4}$$

While solving for return (r_i), we derive by combining with likelihood ratio

$$r = \frac{Cmp}{s} + \frac{P_1(-P_1+1)}{P_0(-P_0+1)}$$

.....eq.5

Where, $C_{pm/s\ is}$ given by the ratio of mean by the standard deviation parameter of closing prices over a period of three years. While solving for C, we get

$$\left(s = \frac{Cmp}{r - \frac{P_1(-P_1+1)}{P_0(-P_0+1)}}, C\right)$$

Thus, ...eq. 6

$$C \in \mathbb{R} \text{ or, } C_p \in \mathbb{R}_i$$

This states that, returns congregate in proportion relative to closing prices. To this, we need to add the liquidity factor as market cap variable, which is, $L_{MKT,}$ which shapes the equation as;

$$\log L_{mkt/vd} = (Lmkt^0/Lmkt^{CL}) / \left(r = \frac{Cpm}{s} + \frac{P_1}{P_0} * \left(\frac{1-P_1}{1-P_0}\right), s\right) \quad \text{.....eq. 7}$$

we formalize the equation further one step to obtain,

$$\frac{\frac{Lmkt}{v}\, d\left(\frac{Lmkt_0}{L}\, mktCL\right)}{r \cdot \left(\frac{Cpm}{s}\right) + \frac{P_1}{P_0}\left(\frac{1-P_1}{1-P_0}\right) s} \quad \text{.....eq. 8}$$

It is presupposed that market wide liquidity do provide a bases for volatility in asset returns.[10] In fact, in the light of liquidity diffusion theory, the amount of liquidity at a particular unit time is time invariant, which is to say that, the quantum state holding banks (or more so, liquidity holding banks) functions much on the action behavior dynamics of investors per unit time, as of in similar yet analogous to stock markets.

Again by solving for definite integral of L, we get,

$$\int \frac{\frac{Lmkt}{v} d\left(\frac{Lmkt_0}{L} \quad m \quad k \quad t \quad C \quad L\right)}{r\left(\frac{Cpm}{s}\right) + \frac{P_1}{P_0}\left(\frac{1-P_1}{1-P_0}\right)s} dL \qquad \ldots . eq. 9$$

as output, we derive;

$$\frac{Cdt_0 t^2 k^3 L^3 m^3}{3v\left(\frac{C^2 m^2 p^2}{s^2} - \frac{CmpP_1{}^2}{s\left(-P_0{}^2+P_0\right)} + \frac{CmpP_1}{s\left(-P_0{}^2+P_0\right)} - \frac{sP_1{}^2}{P_0(-P_0+1)} + \frac{P_1 s}{P_0(-P_0+1)}\right)} + C$$

.....eq. 11

While again by partial differentiation on L, we obtain, [10]

$$\frac{d}{dL}\left(\int \frac{\frac{Lmkt}{v} d \cdot \left(\frac{Lmkt_0}{L} mktCL\right)}{r \cdot \left(\frac{Cpm}{s}\right) + \frac{P_1}{P_0} \cdot \left(\frac{1-P_1}{1-P_0}\right) s} dL\right)$$

...eq. 12

---

[10] Previously, Pastor and Staumbaugh priced liquidity risk for the purpose of beta estimation for portfolio formation using 3 factors of Fama and French (1993). They defined $ß_i{}^L$ as the coefficient on L_t regression as stated;

$$r_{i,t} = ß_i{}^0 + ß_i{}^L L_t + ß_I{}^M MKT_T + ß_i{}^S SMB_t + ß_I{}^H HML_t + \epsilon_{i,v}$$

Where, the independent variable denotes excess returns on marketcap, payoffs on long-short spreads, and book-to-market ratio. While $r_{i,t}$ refers to assets *i*'s excess returns. For more details, see Liquidity Risk, pg 663-664, *Journal of Political Economy,* 2003, Vol. III, no. 3 by Pastor and Staumbaugh.

From the above equation, we obtain a dynamic component of liquidity supply-demand cycle which has a direct relationship to market risk premium that varies over time. Our model also considers another characteristic of liquidity transmission channel across stock markets, which is, the random component of liquidity cycle. We also cross-check whether average returns varies with liquidity apportion per unit time. The random component of global liquidity cycle, and to some extent, country specific is of particular interest, since, Chari (2003), ascertained the importance of capital flows to financial booms and crises. This random component may be defined in terms of magnitude of liquidity effusion shock from the stock markets. Here, we define two types of shock; slow and fast liquidity shocks which may be represented by the equation; [11]

$$L^2_s \leq -[\tau]^{-1}[p] \leq L^2_f \qquad \text{.....eq. 13}$$

Where, L^2_s and L^2_f denote the value of m corresponding to slow and fast liquidity shocks respectively. Sub-classifying market wide liquidity shocks of the above two types into transverse, continuous and discontinuous shocks; a condition admissible to the subtypes of shocks which corresponds to the dynamic relations of fluxes in the fast and slow types of liquidity shocks. However, it is the investor actions which endogenize the timing of expansion and contraction of market wide liquidity conditions. As we mentioned in the earlier sections, we will apply test statistics to our model variables, the closing prices of DJIA to realize the mechanism of shock transmission and its impact on returns. Our model generates test statistic outputs which we correlate to patterns of capital flows, or liquidity movements. We perform standard OLS based regression analysis on three independent variables of this index, the open, high, low and closing prices from which, we derive means and standard deviations, and variance-covariance returns, and then employ these values to perform likelihood ratio test. The reason for this, we simply propose that, returns can be measured by analyzing the changes in closing prices over time series and thus, the variations in liquidity supply-demand cycle fluxes relative to changes in stocks' returns, as stated in the equation 6 through 3, where we defined returns as a function of; $C_p \in \mathbb{R}_i$.

[11] This equation is adapted from the chapter, 'Magnetohydrodynamics shocks, pg.219.

Methodology:

We obtain our data on index values of DJIA from Yahoo! Finance and perform statistical analysis to derive the index means and standard deviation values over the period of 3 years. The tests are performed simultaneously on volume, and all the variables of the index. We segregate the three year period data into each single year and perform time series analysis over the same period. OLS based regression statistic are performed on the index variables to derive the t-statistic and the p-value which are significant. The regression equation is given by;

$$\hat{y} = b_0 + b\,x_1 + b\,x_2 + bx_3 \quad \text{.....eq.14}$$

Where, $\hat{y}$ is the Open, $b\,x_1$ the high, $b\,x_2$ low and bx_3, the Close respectively. P-values derived from the model indicate that the returns flattened during the years of 2007 and '08, while it recovered again 2009 post-crisis.

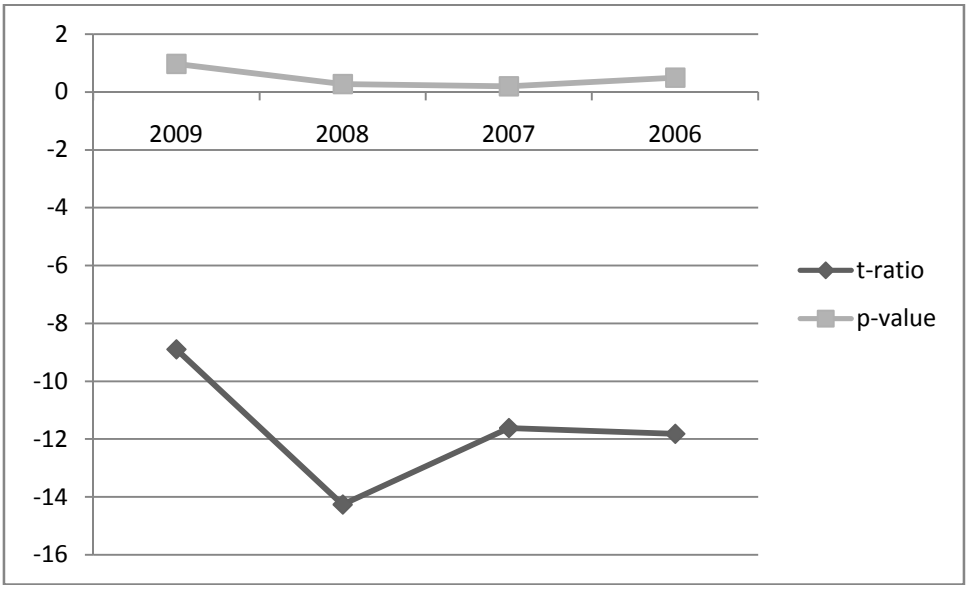

Fig. I

IV. Discussion

A. Market illiquidity due to capital outflow

Perhaps every major financial crisis brought about by hurtles in stock markets, results in liquidity constraints due to sudden apoptotic behavior of market-wide funds, which is in due, effect of, redemption pressures from investors to meet margin calls, or outright crashes leading to redemption stampedes. Calvo (1998), Chari (2003), Bikhchandani, Hirshleifer and Welch (1992) study the herd behavior of investors in their model which states that, investors must move in a pre-specified order during stock market clouts. The investors as well as business entities weigh the risks involved in their investments further down the line in these intangible times concerning future returns on their capital. This results in generalized depression among investors who seek shelter in less risky investments, and tend to park their remaining liquidity in safer, yet liquid instruments, such as, the money markets and gold. The impact flushes out money away from the stocks which creates volatility in returns. A sustained depressive behavior among investors is what gives rise to market illiquidity, under-investment, and return shock which ultimately lead to recession.

B. The 1929 Stock Market Crash and Market Illiquidity

Again, recessions are in general a result of some combined effect of cyclical fluctuations and volatility of different processes of business cycles, particularly, volatility in industrial activity and output. In associating the causatum of 1929 crisis as an effect of market illiquidity, it has been implicated that over-saving led to the American crisis of 1929. In a sharp contrast however, under-saving and over-consumption is thought to have played a significant role in the present Sub-prime crisis of this millennium, besides a multitude of other factors that precipitated this debacle (Gorton 2008). In establishing the causality of 1929 great depression, we revisit some historical accounts that specify underlying relation between general business conditions and speculation, which led to early stock market boom during 1928. Several factors might have precipitated the crash. Evidence of overproduction in 1929 and breakdown of the coffee valorization stand out against the backdrop of a psychological effect of declining grain prices associated with a less favorable crop, and its impact on the stock exchange, cannot be overruled. Using statistical series as a safe indicator of stock market volatility, we find the existence of investor behavioral indifference and the presence of high speculative activities in the early milieu of 1928.

Fluctuations in interest rate are also a good indicator of industrial overproduction and overcapacity. In effect, the years preceding the crisis witnessed prolonged high interest rates that might have depressed business activity, although no such exemplary co-relationship exists. Higher call rates prevailed as a response to a decline in the supply of credit and current capital, (Friedman and Schwartz 1963). The year 1932 onwards witnessed deflationary declines in world market prices and there occurred currency depreciations of the then sterling bloc countries. The first symptom of the crisis took shape in the form of declining real estate bond prices which were affected during the great crisis. Home ownership and demand for real estate bonds declined during early months of 1928 as there caused a sudden diminution of the domestic currency reserve. A prevailing higher interest rate scenario also increased the claims on the banking system. In fact, the US economy witnessed a rise in consumer credit as early as 1928. This has been implicated due to the increase in the velocity of money flow with increased rate in the volume of real costs. As also, in ascertaining the order of magnitude of speculative profits, this builds sense that there occurred rampant speculative trading, since; profits from stock market proceedings were reinvested. Evidence also suggests that an increase in net displacement resulted in a shift in the income distribution and over-savings. Displacement results due to increase in output per worker per hour, as against absorption, and gives rise to income distribution disturbances the profit proceeds if not, are passed on to wage increment, causes pressure on the wage level, whilst, absorption causes a net increase in quantity of output. Statistical phenomenon of technological displacement was evident that might have stressed wage-price spiral. Moreover, falling prices annihilated profits which resulted in lowered real investments below savings that might have contributed to the deflationary spiral. Over-saving disturbance has been stated as a hallmark of 1929 crisis. As also, a sudden change in the profit expectations of the investors might have led to the crash of 1929. However, authors debate over whether the year of 1929 was characterized by a net absorption or displacement. The theory of spending and the structure of expenditure states that whenever corporate profit shrinks, corporate investments are deferred. Increase in profits tends to increase real investments and causes changes in the patterns of savings. Any act of savings means the withdrawal of the purchasing power (liquidity) from the market. Hence, a high savings rate produces business depression. As such,

business cycle fluctuations are cumulative consequences of over-savings and under-investment. The bottom of the matter is, whether over-savings precipitate business depression as such. During boom times, corporate profits increases as well as investments do. Surplus profits cause investment boom in productive capital that increases output and causes market congestion. With oversupply, where markets are flooded by goods which cannot be bought, thereby prices tend to fall as do corporate profits. With falling corporate profits, business entities defer investments and tends to save more, while the costs of deferring the projects runs higher than the value of information by waiting (Bernanke 1980) . Investment is predicted to take place when probable returns over the life of the project exceed its costs. This higher savings rate depresses business sentiments and further incurs less real investment which ultimately leads to generalized depression. The economy began its slow emergence from Depression only after the New Deal's rehabilitation of the financial system in 1933—35 did (Bernanke 1983). Also, during boom times, consumption increases to the point that commodities are in short supply that precipitates inflation. The general public is often prevented from increasing its consumption beyond certain limits as banks put brakes upon consumption by increasing the rate of interest. This constrained commodity supply cycle is the prime cause whereby as a consequence, outputs cannot be expanded freely during boom times.

C. *Relationship between Volatility and Liquidity supply-demand cycle*

In the same tune, liquidity constrains have been the hallmark of the present crisis of 2008 when the DJIA fell by a more than 51%. Returns on average over the previous two years before the crisis struck were in the tune of 5.95% in 2007 and 12.96% in 2006, from January till December of each year. The consumption-real investment-savings cycle started to equilibrate only from the month of March '08 that saw the market on a revival path, although, under much speculation. We present the descriptive statistics and OLS output in this table below which depicts the mean, standard deviation, t-statistic, p-value of the intercept and variance from where, we may compute return stats under normal assumptions. From the table below, we find the year 2008 has been marked by rampant volatility, as a consequence of liquidity crisis. The mean-to-std.dev. ratio scores an absolute low of 7.27, indicating high volatility, while, no

such market illiquidity can be ascribed to the preceding years. The t-statistic ratio for '08 read a high of -14.26, which is significant. From this analysis, it may be empirically, yet inconclusively, presumed that during instances of higher volatility, there occurs disequilibrium in liquidity supply-demand cycles.

	Mean	Std. Dev.	M/S	S/M	t-ratio	p-value	Variance
2009	8034.87	562.38	14.28726	0.069992	-8.9	0.9694	316268.4
2008	11244.11	1545.38	7.275952	0.137439	-14.26	0.2688	2388186
2007	13178.26	525.59	25.07327	0.039883	-11.62	0.1893	276249.9
2006	11409.78	494.24	23.08551	0.043317	-11.82	0.4893	244268.9

Table I

This topic remains an interesting pursuit for future research. These findings prove the notion that volatility induces market-wide liquidity fluctuations, and is one of the prime drivers of stock market growth and appreciation, besides, the investor action heterogeneities. While, a sustained drop in marketcap gesticulates randomness in returns and vacillations in market-wide liquidity, that sets in motion speculation among investors as well as an ambience of solicitude, trepidation and inter-temporal indecisiveness which depresses general trading activities.

V. Conclusion

The history of recessions is as old as the history of trade and business cycles itself. Through the ages, gyrations are rendered as cyclical fluctuations in national income and commercial output within the generality of trade and business tenured through the phases of boom, bust, depression and lastly, recovery. In this paper, we have thus formalized in short, the dynamic interrelationships between economic activities of consumption, savings and investment spending as inherent components of business cycles, in order to elucidate the true causes behind the propagation of liquidity shocks due to limitations of new real investments that leads to noticeable decline in general economic activities, or simply, *depressions*, and hence, study the patterns of the onsets of recessions dotted over a period extending from the beginning of the last century till the present times. We have elaborated the events that follow dynamic changes in outputs, which tend to adjust the business cycle as a whole.

In our pursuit, we revisited some quantitative aspects of historical boom-bust cycles that clearly marks the events related to the generality of trade cycle dynamics.

Here, we have constructed a simple model to show the nature of relationships between market-wide liquidity fluctuations and stock market volatility induced by investor behavior action heterogeneities that propend to liquidity shocks, which in effect, influence returns on a backdrop set on classical contemporary events in the history of business cycles. Also herein, we have elucidated the vista encircling occurrence of investor activities which induce fluctuations in market-wide liquidity that causes disequilibrium in supply-demand cycles.

Further research on some of the phenomenon correlated to the frontier of volatility effects on liquidity flow are called in for some more literal insights into these dynamic interrelationships which may, in course of time, bring forth new theories related to the subject.

References

Bernanke, Ben S., "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review* Vol. 73 (June 1983), pp. 257-276.

Bernanke, Ben S., 'Irreversibility, Uncertainty, and Cyclical Investment', NBER Working Paper No. 502, July 1980.

Eugene Fama and Kenneth R. French; 'Multifactor Explanations of asset Pricing Anomalies', *The Journal of Finance*, Vol.51, No.1 March 1996

Geoffrey H. Moore; 'What is a Recession?', *The American Statistician* and NBER

Honggang Li and J. Barkley Rosser, Jr.; 'Emergent Volatility in Asset Markets with Heterogeneous Agents', *Discrete Dynamics in Nature and Society*, 2001, vol. 6, no. 3, pp. 171-180, (June 2008).

Jose A. Scheinkman and Wei Yiong; 'Overconfidence and Speculative Bubbles', *Journal of Political Economy*, No.6 (Vol.III) Dec 2003

Lubos Pastor and Robert Stambaugh; 'Liquidity Risks and Expected Stock Returns,' *Journal of Political Economy* Vol.III June 2003, NBER

Martin Dufwenberg, 'Bubbles and Experience: An Experiment,' *The American Economic Review*, Vol.95 Dec 2005

Owen A. Lamont and Richard H. Thaler; 'Can the Market Add and Subtract? Mispricing in Tech Stocks Carve outs,' *Journal of Political Economy*, Vol.III April 2003

S. Edwards and R. Susmel; 'Volatility dependence and contagion in emerging equity markets', *Journal of Development Economics*, Special Issue, Vol.66, No.2, Dec 2001

V.V Chari and Patrick J. Kehoe; 'Hot Money', *Journal of Political Economy,* Vol.3, no.6, 2003, Federal Reserve Bank of Minneapolis

Wesley C. Mitchell; '*Business Cycles',* Vol. I and II, NBER publications.