Forecasting Of Probabilities of Iraqi Dinar Exchange Rate against (US) Dollar by Using Stochastic Process for the Period (2013-2014)

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ABSTRACT

There are distinctive models that are utilized to discover the future swapping scale of a coin. On the other hand, just like the case with expectations, these models are brimming with complexities and none of these can claim to be 100% powerful in determining the careful future conversion scale. Conversion scale Forecasts are inferred by the calculation of estimation of opposite other remote monetary forms for an unequivocal time period. There are various speculations to anticipate trade rates, however every one of them have their own restrictions. To execute stochastic procedure and markov chain implementation for the future predictions. To break down and show the expectation of money trade rates of Iraqi dinar versus US dollar. It will offer outside organizations, some assistance with banking, people, remote cash merchants, and venture administration firms and so forth. In this study we list and examine the three procedures utilized for estimating trade rates as a part of a gliding rate framework: basic investigation, specialized examination, and market-based figures.

Keywords: Exchange Rate, Forecasting, Iraqi Dinar, Markov Chain, Stochastic Process

INTRODUCTION:

Swapping scale is characterized as cost of one cash communicated regarding another money. Remote trade business sector is an over the counter market (OTC) where brokers and specialists arrange with one another without clearing house. It is the most fluid and greatest money related business sector on the planet. The greatest geographic exchanging focus London is becoming quickly. The distinction in the middle of Bid and Ask spread is the benefit of the broker. Conversion scale guaging is critical to maintain the business capably, to dodge misfortunes, to procure benefit, and increment and reduction of advantages and liabilities because of the adjustments in swapping scale. As world is turning into a worldwide town, likelihood is expanding to team up with different nations for the advancement of economy.

In this way there is more interest for the outside trade and there is expanding significance of swapping scale and accordingly the conversion standard anticipating has involved focal spot in exploration chip away at worldwide fund. Numerical models of any common marvel ought to lay on some fundamental information of the wonder and the information gathered to track and comprehend it. Numerous years back, J.L.Doob had characterized a "stochastic procedure" as the scientific deliberation of an experimental procedure whose advancement is represented by probabilistic laws.

Note that the expression "stochastic procedure" alludes to the scientific reflection, model, or representation of the observational process and not to the experimental procedure itself. Amid late years, the hypothesis of stochastic procedure

has grown quickly and has discovered application in countless. Specifically, a class of stochastic procedures termed Markov chains or forms has been explored widely. Markov chains are one of the wealthiest wellsprings of models for catching element conduct with an extensive stochastic part.

It is of awesome significance in numerous branches of science and building and in different fields, including material science, modern control, unwavering quality examination, optimality investigation, financial aspects, and so forth. The Markov chains hypothesis is a technique for making quantitative examination about the circumstance in which the framework exchanges starting with one state then onto the next, henceforth foreseeing future propensities.

This gives a premise to making key investigation. In the field of prescription and general wellbeing, the event, improvement

and visualization of an ailment will definitely be influenced by outside variables and the human body components. As these variables are firmly interrelated with each other, it is hard to clarify them in an auxiliary causal model. In any case, it is the reliant connection between these information that is the most critical and helpful normal for the examination destinations. Here, it will be a powerful path for us to set up a dynamic model in time request as indicated by the change law of the ailment.

Previously, numerous researchers have connected the Markov anchor hypothesis to estimate the occurrence of irresistible maladies, and set up some comparing numerical models. Along these lines, different sorts of irresistible ailments can be broke down and concentrated thoroughly utilizing the Markov chain hypothesis. Markov forms have been

connected in the investigation of the AIDS, contraceptives, nature, growth and different ailments. Contingent upon the specific states of every study, diverse philosophies have been utilized. In the meantime, distinctive Markov models have been utilized as a part of biomedical information examination, particularly for the study of disease transmission research. In this paper we will take a gander at the utilization of Markov models for guaging and examination in the particular field of frequency of irresistible ailments.

These systems for quantitative investigation appreciate wide prevalence since they are less reliant on verifiable information, have similarly high precision and broad versatility. In any case, this sort of anticipating examination in view of the conventional Markov affix hypothesis is bound to have absconds and defects. The homogeneity of the Markov fasten has yet to be demonstrated. There is gigantic trouble connected with changing the move likelihood framework, and the exactness of the figure is influenced by target elements.

This article endeavors to defeat every one of these challenges, and to build up a scientific model to figure the irresistible maladies in light of the weighted Markov chain hypothesis. The creators will both influence the upsides of the conventional Markov chain hypothesis, and utilizing the connection examination approach and authentic information, look for additional top to bottom investigation of the standard qualities that exist in the event of the irresistible sicknesses. These qualities incorporate long haul patterns, regular attributes, periodicities, fleeting vacillations and sporadic varieties.

Financial analysts and speculators constantly tend to gauge the future trade rates with the goal that they can rely on

upon the forecasts to infer fiscal quality. There are distinctive models that are utilized to discover the future swapping scale of a coin. On the other hand, just like the case with expectations, these models are brimming with complexities and none of these can claim to be 100% powerful in determining the careful future conversion scale. Conversion scale Forecasts are inferred by the calculation of estimation of opposite other remote monetary forms for an unequivocal time period. There are various speculations to anticipate trade rates, however every one of them have their own restrictions.

EXCHANGE RATE FORECAST: APPROACHES

The two most regularly utilized systems for determining trade rates are –

Crucial Approach – This is a guaging strategy that uses basic information identified with a nation, for example, GDP, expansion rates, efficiency, parity of exchange, and unemployment rate. The guideline is that the 'genuine worth' of a coin will inevitably be acknowledged eventually of time. This methodology is suitable for long haul speculations.

Specialized Approach – In this approach, the speculator slant decides the adjustments in the swapping scale. It makes forecasts by making a graph of the examples. Likewise, situating studies, moving-normal pattern looking for exchange rules, and Forex merchants' client stream information are utilized as a part of this method

Exchange Rate Forecast: Models

Some important exchange rate forecast models are discussed below.

Purchasing Power Parity Model

The acquiring power equality (PPP) estimating methodology depends on the Law of One Price. It expresses that same

merchandise in various nations ought to have indistinguishable costs. For instance, this law contends that a chalk in Australia will have the same cost as a chalk of equivalent measurements in the U.S. (considering the conversion scale and barring exchange and dispatching costs). That is, there will be no arbitrage chance to purchase shabby in one nation and offer at a benefit in another. Contingent upon the guideline, the PPP approach predicts that the offsetting so as to swap scale will alter the cost changes happening because of expansion. For instance, say the costs in the U.S. are anticipated to go up by 4% throughout the following year and the costs in Australia are going to ascend by just 2%. At that point, the expansion differential in the middle of America and Australia is:

$$4\% - 2\% = 2\%$$

By suspicion, the costs in the U.S. will rise speedier in connection to costs in Australia.

Along these lines, the PPP methodology would anticipate that the U.S. dollar will deteriorate by around 2% to adjust the costs in these two nations.

Relative Economic Strength Model

The relative monetary quality model decides the taking so as to bear of trade rates into thought the quality of financial development in various nations. The thought behind this methodology is that a solid financial development will draw in more ventures from outside speculators. To buy these interests in a specific nation, the financial specialist will purchase the nation's cash – expanding the interest and value (thankfulness) of the coin of that specific nation. Another element conveying financial specialists to a nation is its loan fees. High loan fees will draw in more speculators, and the interest for that cash will build, which would let the money to appreciate. On the other hand, low financing costs will do the

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inverse and speculators will timid far from interest in a specific nation.

The financial specialists might even acquire that nation's low-estimated money to support different ventures. This was the situation when the Iraqi dinar financing costs were amazingly low. This is normally called convey exchange methodology. The relative monetary quality methodology does not precisely figure the future conversion scale like the PPP approach. It just advises whether cash is going to acknowledge or deteriorate.

FORECASTING:

Guaging is the procedure of making expectations without bounds in view of over a wide span of time information and examination of patterns. A typical case may be estimation of some variable of enthusiasm at some predetermined future date. Forecast is a comparative, however more broad term. Both may allude to formal factual techniques utilizing time arrangement, cross-sectional or longitudinal information, or on the other hand to less formal judgmental strategies. Use can contrast between zones of use: for instance, in hydrology, the expressions "figure" and "determining" are here and there held for assessments of qualities at certain particular future times, while the expression "expectation" is utilized for more broad appraisals, for example, the quantity of times surges will happen over a long stretch. Hazard and vulnerability are vital to estimating and expectation; it is for the most part thought to be great practice to demonstrate the level of instability appending to figures. Regardless, the information must be forward all together for the estimate to be as exact as would be prudent.

STOCHASTIC PROCESS AND MARKOV CHAIN ANALYSIS

Determining the Problem:

In many countries deal with currencies, especially the US dollar against the official currency of the state and must control this because of currency instability in exchange for the local currency and should be monitored periodically to determine its policy and its situations.

Data Description:

Data were obtained from this research statistical bulletin issued by the bank Iraq central directorate of statistics and research and the data is in the form of time series extended from 2013 and 2014 and will be the study of three cases (height, stability and reduction).

1. Take the data for two years
2. The data calculates the dollar exchange rate against the Iraqi dinar.
3. Data were taken on actual basis for each year for 12months.
4. Through data monitoring observe stability and low and high cases.

Stochastic Process:

In probability theory, a stochastic process, or often random process, is a collection of random variables, representing the evolution of some system of random values over time. This is the probabilistic counterpart to a deterministic process (or deterministic system). Instead of describing a process which can only evolve in one way (as in the case, for example, of solutions of an ordinary differential equation), in a stochastic or random process there is some indeterminacy: even if the initial condition (or starting point) is known, there are several (often infinitely many) directions in which the process may evolve. In the simple case of discrete time, as opposed to continuous time, a stochastic process is a sequence of

random variables (for example, see Markov chain, also known as discrete-time Markov chain). The random variables corresponding to various times may be completely different, the only requirement being that these different random quantities all take values in the same space (the codomain of the function). One approach may be to model these random variables as random functions of one or several deterministic arguments (in most cases, the time parameter). Although the random values of a stochastic process at different times may be independent random variables, in most commonly considered situations they exhibit complicated statistical dependence.

Familiar examples of stochastic processes include stock market and exchange rate fluctuations, signals such as speech, audio and video, medical data such as a patient's EKG, EEG, blood pressure or temperature, and random movement such as Brownian motion or random walks. A generalization, the random field, is defined by letting the variables be parametrized by members of a topological space instead of time. Examples of random fields include static images, random terrain (landscapes), wind waves or composition variations of a heterogeneous material. Given a probability space $(\Omega, \mathcal{F}, P)$ and a measurable space (S, Σ), an S-valued **stochastic process** is a collection of S-valued random variables on Ω, indexed by a totally ordered set T ("time"). That is, a stochastic process X is a collection

$$\{X_t : t \in T\}$$

Where each X_t is an S-valued random variable on Ω. The space S is then called the **state space** of the process.

Finite-dimensional distributions

Let X be an S-valued stochastic process. For every finite sequence

$T' = (t_1, \ldots, t_k) \in T^k$, the k-tuple $X_{T'} = (X_{t_1}, X_{t_2}, \ldots, X_{t_k})$ is a random variable taking values in S^k. The distribution $\mathbb{P}_{T'}(\cdot) = \mathbb{P}(X_{T'}^{-1}(\cdot))$ of this random variable is a probability measure on S^k. This is called a finite-dimensional distribution of X. Under suitable topological restrictions, a suitably "consistent" collection of finite-dimensional distributions can be used to define a stochastic process (see Kolmogorov extension in the "Construction" section). In the ordinary axiomatization of probability theory by means of measure theory, the problem is to construct a sigma-algebra of measurable subsets of the space of all functions, and then put a finite measure on it. For this purpose one traditionally uses a method called Kolmogorov extension.

Kolmogorov extension

The Kolmogorov extension proceeds along the following lines: assuming that a probability measure on the space of all functions $f : X \to Y$ exists, then it can be used to specify the joint probability distribution of finite-dimensional random variables $f(x_1), \ldots, f(x_n)$. Now, from this n-dimensional probability distribution we can deduce an $(n-1)$-dimensional marginal probability distribution for $f(x_1), \ldots, f(x_{n-1})$. Note that the obvious compatibility condition, namely, that this marginal probability distribution be in the same class as the one derived from the full-blown stochastic process, is not a requirement. Such a condition only holds, for example, if the stochastic process is a Wiener process (in which case the marginals are all gaussian distributions of the exponential class) but not in general for all stochastic processes. When this condition is expressed in terms of probability densities, the result is called the Chapman–Kolmogorov equation. The Kolmogorov

extension theorem guarantees the existence of a stochastic process with a given family of finite-dimensional probability distributions satisfying the Chapman–Kolmogorov compatibility condition.

MARKOV CHAIN ANALYSIS:

A Markov chain is a sequence of random variables X_1, X_2, X_3, ... with the Markov property, namely that the probability of moving to next state depends only on the present state and not on the previous states

$$\Pr(X_{n+1} = x \mid X_1 = x_1, X_2 = x_2, \ldots, X_n$$
,

If both conditional probabilities are well defined, i.e. if

$$\Pr(X_1 = x_1, \ldots, X_n = x_n) > 0$$
.

The possible values of X_i form a countable set S called the **state space** of the chain. Markov chains are often described by a sequence of directed graphs, where the edges of graph n are labeled by the

probabilities of going from one state at time n to the other states at time $n+1$, $\Pr(X_{n+1} = x \mid X_n = x_n)$. The same information is represented by the transition matrix from time n to time $n+1$. However, Markov chains are frequently assumed to be time-homogeneous (see variations below), in which case the graph and matrix are independent of n and so are not presented as sequences.

These descriptions highlight the structure of the Markov chain that is independent of the initial distribution $\Pr(X_1 = x_1)$. When time-homogeneous, the chain can be interpreted as a state machine assigning a probability of hopping from each vertex or state to an adjacent one. The probability $\Pr(X_n = x \mid X_1 = x_1)$ of the machine's state can be analyzed as the statistical behavior of the machine with an element x_1 of the state space as input, or as the behavior

of the machine with the initial distribution

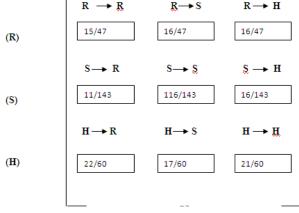$$\Pr(X_1 = y) = [x_1 = y]$$ of states as

input, where $[P]$ is the Iverson bracket. The fact that some sequences of states might have zero probability of occurring corresponds to a graph with multiple connected components, where we omit edges that would carry a zero transition probability. For example, if *a* has a nonzero probability of going to *b*, but *a* and *x* lie in different connected components of the

graph, then $$\Pr(X_{n+1} = b | X_n = a)$$ is

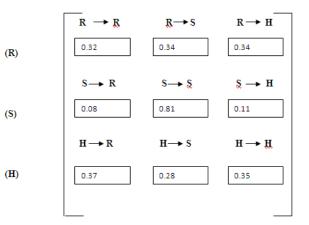defined, while

$$\Pr(X_{n+1} = b | X_1 = x, ..., X_n = a)$$
is not.

RESULTS

Analysis for the Year 2013:

	(R)	(S)	(H)	ROW SUM (Σ)
(R)	R → R 15	R → S 16	R → H 16	47
(S)	S → R 11	S → S 116	S → H 16	143
(H)	H → R 22	H → S 17	H → H 21	60
				250

Probability Matrix:

	(R)	(S)	(H)
(R)	R → R 15/47	R → S 16/47	R → H 16/47
(S)	S → R 11/143	S → S 116/143	S → H 16/143
(H)	H → R 22/60	H → S 17/60	H → H 21/60

	(R)	(S)	(H)
(R)	R → R 0.32	R → S 0.34	R → H 0.34
(S)	S → R 0.08	S → S 0.81	S → H 0.11
(H)	H → R 0.37	H → S 0.28	H → H 0.35

$$\sum Pi = 1$$

0.32	+	0.34	+	0.34	= 1
0.08	+	0.81	+	0.11	= 1
0.37	+	0.28	+	0.35	= 1

VECTOR FIRST π^0

$\pi^0 = [\ 47/250 \qquad 143/250 \qquad 60/250]$

$\pi^0 = [\ (0.19) \qquad (0.57) \qquad (0.24)]$

$0.19 + 0.57 + 0.24 = 1$

ANALYSIS MATRIX

0.32 = Transition Probability from Reduction to Reduction

0.34 = Transition Probability from Reduction to Stability

0.34 = Transition Probability from Reduction to High

0.08 = Transition Probability from Stability to Reduction

0.81 = Transition Probability from Stability to

0.11 = Transition Probability from Stability to

0.37 = Transition Probability from High to Reduction

0.28 = Transition Probability from High to Stability

0.35 = Transition Probability from High to High

ANALYSIS VECTOR FIRST π^0

0.19 = Transition Probability from of all cases of the state Reduction

0.57 = Transition Probability from of all cases of the state Stability

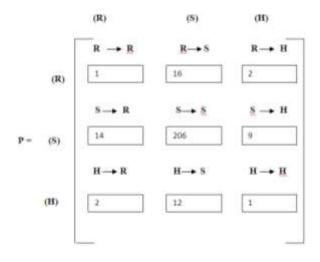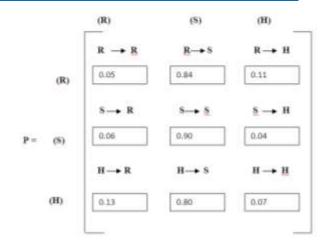0.24 = Transition Probability from of all cases of the state High
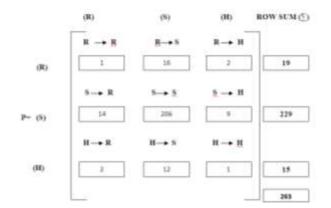
Analysis for the Year 2014:

	(R)	(S)	(H)
	R → R	R → S	R → H
(R)	1	16	2
	S → R	S → S	S → H
P = (S)	14	206	9
	H → R	H → S	H → H
(H)	2	12	1

	(R)	(S)	(H)
	R → R	R → S	R → H
(R)	0.05	0.84	0.11
	S → R	S → S	S → H
P = (S)	0.06	0.90	0.04
	H → R	H → S	H → H
(H)	0.13	0.80	0.07

$\sum Pi = 1$

0.05 + 0.84 + 0.11	= 1
0.06 + 0.90 + 0.04	= 1
0.13 + 0.80 + 0.07	= 1

	(R)	(S)	(H)	ROW SUM (∑)
	R → R	R → S	R → H	
(R)	1	16	2	19
	S → R	S → S	S → H	
P = (S)	14	206	9	229
	H → R	H → S	H → H	
(H)	2	12	1	15
				263

VECTOR FIRST π^0

$\pi^0 = [19/263 \quad 229/263 \quad 15/263] = [\,0.07 \quad 0.87 \quad 0.06]$

$\sum Pi = 1$

$0.07 \quad 0.87 \quad 0.06 = 1$

ANALYSIS MATRIX:

0.05 = Transition Probability from Reduction to Reduction

	(R)	(S)	(H)
	R → R	R → S	R → H
(R)	1/19	16/19	2/19
	S → R	S → S	S → H
P = (S)	14/229	206/229	9/229
	H → R	H → S	H → H
(H)	2/15	12/15	1/15

Probability Matrix:

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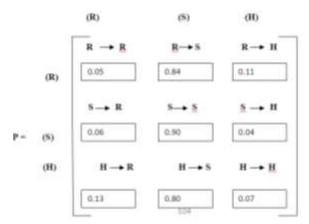
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0.84 = Transition Probability from Reduction to Stability

0.11 = Transition Probability from Reduction to High

0.06 = Transition Probability from Stability to Reduction

0.90 = Transition Probability from Stability to

0.04 = Transition Probability from Stability to

0.13 = Transition Probability from High to Reduction

0.80 = Transition Probability from High to Stability

0.07 = Transition Probability from High to High

0.07 = Transition Probability from of all cases of the state Reduction

0.87 = Transition Probability from of all cases of the state Stability

0.06 = Transition Probability from of all cases of the state High

COMPARATIVE ANALYSIS OF 2013 AND 2014

Analysis for the Year 2013

Analysis for the Year 2014

ANALYSIS VECTOR FIRST π^0

$\pi^0 = [0.07 \quad 0.87 \quad 0.06]$

Here the 2013 and 2014 analysis data is compared. Now, the two matrix for 2013 and 2014, each matrix has three cases reduction and stability and high.

Depending on design 2013 has case reduction to reduction P (0.32) as 2014 has case reduction to reduction P(0.05).The study shows that the case 2013 is greater than case 2014. This observation transition probability of reduction to reduction in 2013 and 2014 P(0.32 > 0.05).

The observed year 2013 has case reduction to stability P(0.34) as year 2014 has case reduction to stability P(0.84). So in the year 2013 the case value is less than the year 2014. The transition probability of reduction to stability in 2013 and 2014 is P(0.34 > 0.84).

The study analysis shows that year 2013 has case reduction to high P(0.34) as compared to year 2014 has case reduction to high as P(0.11). The observation shows that 2013 greater than 2014. Therefore the transition probability of reduction to igh is P(0.34 >0.11).

The study observes the year 2013 has case stability to reduction P(0.08) as year 2014 has case stability to reduction P(0.06). The study also observes 2013 less than 2014 also observe transition probability of stability to reduction is P(0.08 < 0.06).

According to analysis 2013 has case stability to Sability P(0.81) as 2014 has case stability to stability P(0.90). The study also observes 2013 less than 2014 and the transition probability of stability to stability is P(0.81 < 0.90). The study shows 2013 has case

stability to high P(0.11) as 2014 has also case stability to high P(0.04). The observation shows that 2013 greater than 2014 and transition probability of stability to high is P(0.11 > 0.04). The study also states 2013 has case high to reduction P(0.37) as 2014 has also case high to reduction P(0.13). It observes also transition probability of high to reduction is P(0.37 > 0.13).

The study analysis shows that year 2013 has case high to stability P(0.28) as compared to year 2014 has case high to stability as P(0.80). The observation shows that 2013 less than 2014. Therefore the transition probability of high to stability is P(0.28 < 0.80). The study also states 2013 has case high to high P(0.35) as 2014 has also case high to high P(0.07). It also observes 2013 greater than 2014 and transition probability of high to high is P(0.35 > 0.07).

2013	2014
R $\longrightarrow$ R = 0.32 R $\longrightarrow$ S = 0.34 R $\longrightarrow$ H = 0.34 S $\longrightarrow$ R = 0.08 S $\longrightarrow$ S = 0.81 S $\longrightarrow$ H = 0.11 H $\longrightarrow$ R = 0.37 H $\longrightarrow$ S = 0.28 H $\longrightarrow$ H = 0.35	R $\longrightarrow$ R = 0.05 R $\longrightarrow$ S = 0.84 R $\longrightarrow$ H = 0.11 S $\longrightarrow$ R = 0.06 S $\longrightarrow$ S = 0.90 S $\longrightarrow$ H = 0.04 H $\longrightarrow$ R = 0.13 H $\longrightarrow$ S = 0.80 H $\longrightarrow$ H = 0.07

Table 1: Comparative analysis of 2013 to 2014

Comparative analysis with π^0 2013 π^0 = [(0.19)   (0.57)   (0.24)]

$2014 \ \pi^0 = [\ 0.07 \quad 0.87 \quad 0.06]$

Now forecasting of 2013 to 2014

$\pi^0 \cdot P^i = P^1$

$\qquad$ R $\qquad$ S $\qquad$ H

$P^1 = [\ 0.20 \quad 0.59 \quad 0.21]$

Now comparing the π^0 we have tear 2013 has three cases reduction and stability and high also 2014 same cases. Now 2013 has reduction case P(0.19) as 2014 has also reduction case P(0.07). It observes P(0.19) > P(0.07) 2013 has stability case P(0.57) as 2014 has stability case P(0.37).

The observe P(0.57) < P(0.87) 2013 has high case P(0.24) as 2014 has also high case P(0.06). The study also observes that P(024) > P(0.06). The study of forecasting of 2013 to 2014.

From 2013

$\pi^0 \cdot P^i = P^1$

$P^1 = [\ 0.20 \quad 0.59 \quad 0.21]$

The study observation states that the reduction case has 0.20 and stability case has 0.59 and high case has 0.25. Now transition probability to stability case P(0.59) > high P(0.21) > reduction P(0.20) so dollar will be stability.

CONCLUSION:

This study concludes that the probabilities computed show that how the reduction, stability and high probabilities we have for the years 2013 and 2014 are as follows:

From probability matrix we have the following observations;

$\qquad$ R->R and R->S and R->H

$\qquad$ S->R and S->S and S->H

$\qquad$ H->R and H->S and H->H

From Probability Matrix we have the stability factor probability is 0.81 for the year 2013 the probability matrix has the stability matrix the probabilities is 0.90 for the year 2014. From these probability matrices for 2013 we can forecast to 2014 along with the final three case reduction

stability and high. From 2013 data we forecasted for 2014 and the forecasted probability is 0.59 For Stability the probability is 0.20 for reduction is 0.21 for high. From this study we can tell dollar will be stable confirm from Case Stability has a Probability of 0.90 in 2014 we have case Probabilities 0.90 stability to stability in year 2014.

From this study we find that 0.59 greater than any case, so the empirical that the study prove that the Forecasting from 2013 give us the following three case Probabilities 0.20, 0.59, 0.21.

$$P(0.59) > P(0.21) > P(0.20)$$

For the year 2014, we have the stability to Stability is having a probabilities of 0.90. From forecasting the value of the stability is 0.59. The final Conclusion is that Dollar will be stable in both the years 2013 and 2014.

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