

EXCHANGE RATE AND THE REAL ECONOMY: TYPES OF MANAGEMENT AND MECHANISMS OF TRANSMISSION

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ABSTRACT

The dispute over the exchange rate and its relation with the economic development has generated a thorny debate about using this macroeconomic variable as a key driver to ensure a sustainable level of development. Another controversy comes from questioning the direction of this causality: is it from exchange rate to the economic development, and here the variable is one of the important criteria to achieve accepted levels of progress or is the level of expansion and growth that gives rise to a strong, healthy and stable exchange rate? This paper tries to explain the mechanism of the exchange rate management and the transmission processes between the exchange rate and the real economy.

Keywords: Exchange rate, management, transmission.

MANAGEMENT OF THE EXCHANGE RATE

The world economy witnesses an ever increasing pace toward the global-harmonious economic concept. This term means that the economies have the same pattern of change both vertically and horizontally (vertically via improving the conditions of products and services manufacturing, developing the welfare state of the individuals and respecting the environment requirements. Horizontally portrays the geographical expansion of the countries and establishing economic bases beyond the borders). These interests pressed countries to draw the appropriate bi-dimensional strategies in which the target remains to serve the economic laws and increase the social welfare.

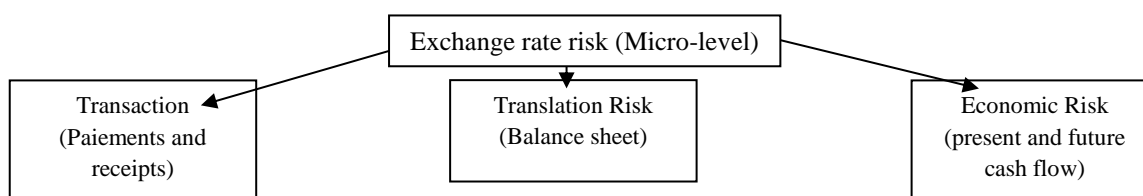
Among the economic variables that link the internal economy by its external side is the exchange rate. The Literature defines the latter as a price of a country currency measured by units of another currency. It considers it as an economic unit which depends on the supply and demand law. In this context, the management of the exchange rate means the preservation of the law consistency when it is applied on the exchange rate. It is also aims at reducing the current or potential deviation of this price from its long run equilibrium trend. Furthermore, the process of management can be analyzed through two lenses: the micro-level management of the exchange rate (enterprise hedging against the risks of the exchange rate: transaction risk, translation risk and economic risk) and the macro-level investigates the impact of the regime adopted, the process undertaken (overvaluation versus devaluation) and the exchange rate value (nominal versus real) on the real and nominal factors of the economy.

MICRO- LEVEL MANAGEMENT OF THE EXCHANGE RATE

The objective of this kind of management is to keep the firm value steady with the unexpected changes in the exchange rate movements. These movements may endanger the financial position of the firm by losing directly (lack of hedging efficiency) or indirectly (through the reduction of the assets and liabilities values, market value of the firm or the net profit). The firms which operate externally are exposed to reception and contract payment (export and import) problem as the different transactions are dealt by a different currency or a different amount of domestic currency. The second risk is represented by difficulty of

coordinating the economic and financial strategies between the parent company and the subsidiary. The strategy of hedging depends on the consolidation of the balance sheets of both the parent and subsidiary and technique used to strengthen this position (average, quarterly, monthly or daily exchange rate). The third risk of the exchange rate that obstructs the smoothly financial behavior is the problem of discounting the future cash flows. It impacts the economic revenues due to the exchange rate movements and the result of the movement will be either a cost or a benefit.

Figure.1. Exchange rate micro analysis



Source: the researcher

MICRO- LEVEL MANAGEMENT OF THE EXCHANGE RATE

Firms adopt different methods of hedging in order to keep the financial position safe after sharp or unpredictable movements of the exchange rate. They generally take either a tactical or strategic hedging process. The former means that the firms try to circumvent the difference of currencies prices in the short term transactions (payments and receipts); while the long term is a subject of another hedging method called: the strategic hedging. In this case, firms use different optimization models to see whether the balance sheet (debt optimization model) and the future values are hardly impacted by the exchange rate movements. In this vein, firms try to apply a debt optimization model to reduce at the highest possible level the degree of the consequence debt (not an economic debt but a debt that emanates from the behavior of the exchange rate).

Firms may also use benchmarking strategies to hedge against the harsh movements of the exchange rate. This strategy is relied on defining and computing the distance that separates the indicator hedged and the given benchmark rate. Suppose that:

FV : The potential future value of the firm

BV : The benchmark given to the future value

S_t : The exchange rate (one unit of domestic currency per units of foreign one)

Then, the firm hedges the risk exposure by resolving the following model:

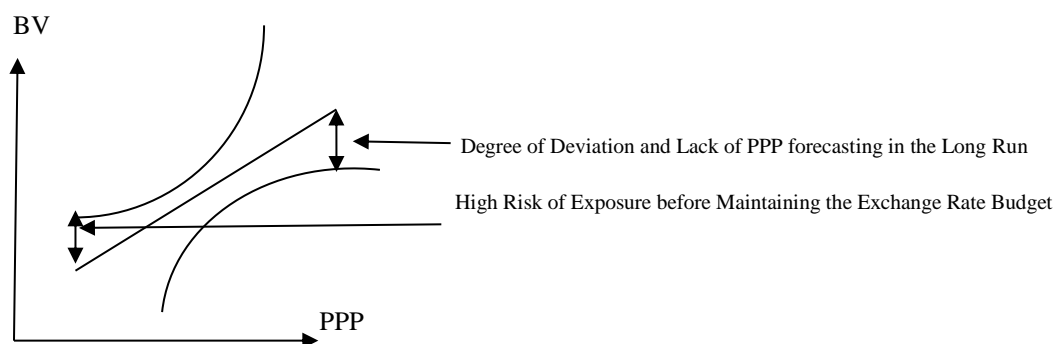
$$\left\{ \begin{array}{l} FV = f(BV, S_t) / S_t \text{ is the endogenous variable of the model} \\ R = \xi(\phi) / \phi = \frac{\sum_{t=1}^{t=n} (FV - BV)_t}{t-1} / R \text{ is the risk exposure} \\ \text{Under Min } R \end{array} \right.$$

The third possible strategy is the budget exchange rate. The latter is defined as a budget of reference of the exchange rate levels. This budget is considered as special benchmark that helps firms analyze and forecast the future values of the exchange rate. In this situation, firms in general prefer using the PPP (Purchasing Power Parity) as a basis of the budget as it includes the prices and the purchasing power of different currencies in one relative value (it denotes the financial and the strategic link between the firm and its affiliates). However, one

of the shortcomings of the PPP is its lack in forecasting long period movements of exchange rates. Hence, the benchmark is the Purchasing Power Parity and the model takes the form:

$$\left\{ \begin{array}{l}
 FV = f(BV, PPP, \rho) / PPP \text{ is an endogenous variable of the model} \\
 \rho : \text{Long term price indicator (shows the trend and reinforces the lack of} \\
 \text{PPP)} \\
 R = P(\phi) / \phi = \frac{\sum_{t=1}^{t=n} (FV - PPP)_t}{t-1} / R \text{ is the risk exposure}
 \end{array} \right.$$

Figure. 2. PPP and risk forecasting



Source: the researcher

MACRO-LEVEL OF THE EXCHANGE RATE MANAGEMENT

The Exchange Rate is a macro-economic indicator par excellence. It shows the magnitude and the scope of interconnection between different economies. By this indicator, various mechanisms are analyzed dynamically via two dimensions: Vertical dimensions how the devaluation or the overvaluation affects the basic macroeconomic aggregates (output, balance deficit, inflation? And horizontal dimension: How the movements of the exchange rate affect the competitiveness and the attractiveness of the economy vis-à-vis the others? These questions find their answers in two different channels of analysis according to the variables included and the horizon adopted.

THE ECONOMIC MANAGEMENT

This management tackles the issue of dependency between economic variables in which the exchange rate is generally considered as the independent variant. This co-dependency is based on the degree of pressure exerted by the exchange rate on the macroeconomic variables: income, consumption, trade balance, balance deficit and the structural balances. The effect changes according to three preset conditions: the level of the exchange rate random walk, the soundness of the economic indicators and the legal framework of application.

The level of the exchange rate random walk

Several models have been used to explain the linear towards non linear behavior of the exchange rate (Huizinga, 1987; Meese & Rogoff, 1983; Black, 1973; Frankel & Mussa, 1980). The level of randomness (coming from new information about future economic

conditions) influences both the value and the behavior of the other economic variables impacted.

The randomness versus the value of the economic variable

The random walk of the exchange rate affects the value of the dependant variable as well as its trend, and the unexpected component leads the economic agents to react according to the news and the unpredictability even if the news is well expected (the rational expectation paradigm).

Suppose that:

$e(t)$: is the logarithm of the exchange rate

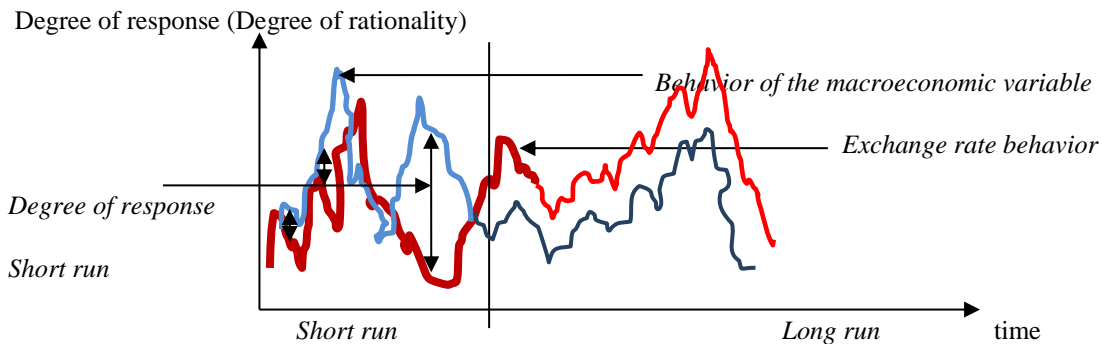
$x(t)$: is the economic fundamentals affecting the behavior of the exchange market, then,

The economic agent behaves according to the expectation theory presented by:

$$\left\{ \begin{array}{l}
 E(t) = x(t) + b(E[e(t+1)|t]) \text{ Backward looking with } 0 < b < 1 (\text{degree of sensitiveness}) \\
 E[e(t+j)|t] = E[e(t+1)|t] + b(E[e(t+j+1)|t]) \text{ Forward Looking with the specific convergence:} \\
 DisE(t+j) = \sum_{j=0}^{\infty} b^j [x(t+j)] / DisE \text{ is the discounted economic variable arises from changes in ER}
 \end{array} \right.$$

This model represents the degree of compatibility between the rationality of the economic agents and the unexpected behavior of the exchange rate:

Figure. 3. Rationality of economic agents and behavior of exchange rate



Source: the researcher

As the diagram presents, the expectation will be more rational at long horizons than the short one. The reason behind this assumption is that the agents would be more efficient to predict and adjust the economic variables to changes in the exchange rate.

Appreciation versus depreciation of the exchange rate

The second view that is necessary to analyze is the level of change in terms of value of the domestic currency unit per units of the foreign and the impacts of this on the value and movements of the other macro variables. In this context, the issue is to investigate the correlation of change extents among the macro variables and between the exchange rate and theses variables. Here, the price of domestic currency is impacted by the difference in economic factors levels as it is represented by the following table:

Factor	Change in Factor	Response of the exchange rate E
Domestic Price Level	↑	↓
Tariffs and quotas	↑	↑
Export demand	↑	↑
Import demand	↑	↓
Productivity	↑	↑

Frederick Mishkin (2010), *The economics of Money, Banking and financial institution*, 9th edition, p.158

This positive or negative correlation respects two conditions:

1. The impact condition: This means that the economic factor is capable enough to have an effect on the exchange rate. This effect depends on the importance of the variable *per se* in determining the behavior of the exchange rate and its economic context. Suppose that:

V_t : Denotes the macro-variable

S_t : The exchange rate at time t (one unit of domestic currency per units of foreign one)

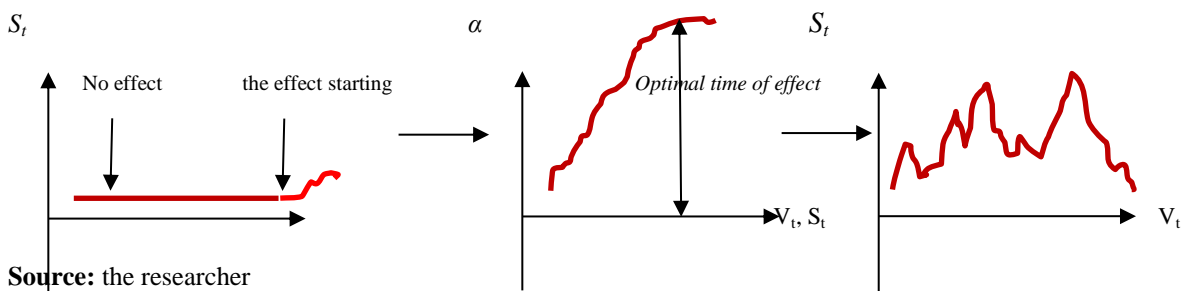
P : The value impact of the macro-variable

α : The lag variable (time between the 0 effect and the first time effect)

Then, the impact condition is represented by the following model:

$$\left\{ \begin{array}{l} S_t = F(V_t, P, \phi) \text{ Behavioral model} \\ S_t = f(V_t) \text{ Macroeconomic model} \\ \alpha = \gamma(V_t, S_t) \text{ Inter-temporal model} \\ \frac{\partial \alpha}{\partial (V_t, S_t)} = 0 \text{ The optimal time lag of influence} \end{array} \right.$$

Figure 4. The optimal time of the effect on the exchange rate



2. The trend condition: This effect raises also another question concerning the importance of the macro variable in determining the exchange rate behavior. It is a process of economic transmission by which the variable impacts according to its position and nature (monetary, economic, fiscal or financial variable). This importance is measured by the effect distance that separates the two variables: as far as the distance is closer between the dependent and independent variable, the impact will be much more evident. We use the algorithm of the weighted average and the standard deviation to show the importance of variables.

Suppose that:

$(V_{t1}, V'_{t2}, V''_{t3}, \dots, V_m^*)$: Samples of independent variables

S_t :The exchange rate (units of domestic currency per units of foreign one)

The distance is given by:

$$\Delta = \frac{\lambda(V_{t1} - S_t)^2}{n-1} + \frac{\lambda'(V_{t2} - S_t)^2}{n-1} + \frac{\lambda''(V_{t3} - S_t)^2}{n-1} + \dots + \frac{\lambda^*(V_{tm} - S_t)^2}{n-1}$$

But each variable is different, and then the parameter of the importance (λ) is used:

$$\Delta = \frac{\lambda(V_{t1} - S_t)^2}{n-1} + \frac{\lambda'(V_{t2} - S_t)^2}{n-1} + \frac{\lambda''(V_{t3} - S_t)^2}{n-1} + \dots + \frac{\lambda^*(V_{tm} - S_t)^2}{n-1}$$

The Parameter λ which is different according to the difference of each variable determines the magnitude of the impact (How far the exchange rate increased or decreased according to the variability of V)?

The following network represents the contribution of the position parameter in determining the degree of the exchange rate:

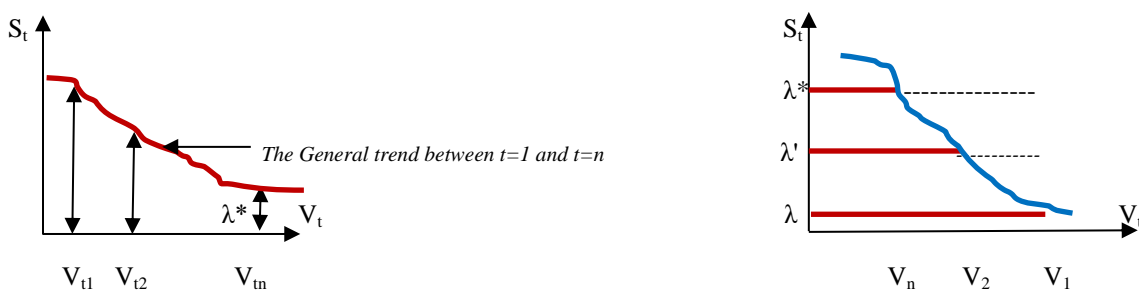
$$\left\{ \begin{array}{l} \lambda > \lambda' > \lambda'' > \dots > \lambda^* \\ \Lambda \qquad \qquad \qquad \Rightarrow \psi(V_{t1}) > \psi(V_{t2}) > \psi(V_{t3}) > \dots > \psi(V_{tm}) \\ S_t = f(V_t) \\ S_t = \psi(V_t) \text{ is the Micro impact function} \end{array} \right.$$

$\psi(V_{t1}) > \psi(V_{t2}) > \psi(V_{t3}) > \dots > \psi(V_{tm})$ the relation means that the impact exerted by the first variable is greater than the other one. Hence, this variable conducts the general trend of the exchange rate as follow:

$$\left\{ \begin{array}{l} V_{t1} > V_{t2} > V_{t3} > \dots > V_{tm} \text{ (the position parameter)} \Rightarrow S_t \square S_t = f(V_t) \\ (\lambda > \lambda' > \lambda'' > \dots > \lambda^* \text{ (the importance parameter)}) \end{array} \right.$$

This trend is shown by the diagram:

Figure. 5. Exchange rate general trend



Source: the researcher

The general trend at time $t = a$

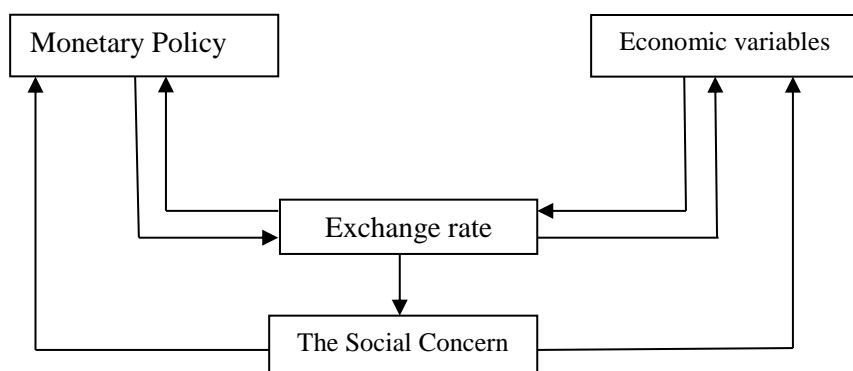
The strategic Management

This process deals especially with the position of the variables that conduct the long run behavior of the exchange rate. First, it is interested in controlling the macro variables (interest rate, inflation, GDP) to serve the aspirations of the currency value (Currency targeting). Second, it tries to make a feedback in order to sustain the managed macro variable. The strategic management looks for long horizons of analysis and includes policies affecting the

behavior of the exchange rate through intermediate policies and intermediate targets (Monetary policy, economic policy, social policy).

The monetary policy has a strong effect on the movement of the exchange rate (variables of the same origin) but the economic variables are generally impacted by the rise or decrease of this variable. The social aspiration occupies a large position in managing the behavior of the exchange rate as it takes into consideration the aspiration of the individuals. The diagram below presents the intersections borders between the policies according to their importance in determining the exchange rate:

Figure.6. Exchange rate and the mechanisms of transmission



Source: the researcher

CONCLUSION

This paper lays out the channels through which the real economy affects the behavior of the exchange rate. The impact of the economy on this macroeconomic variables leads to different consequences in terms of behavior, value, capacity to absorb shocks and consistency over time. In this context, the issue of the exchange rate management is a crucial strategy to safeguard its consistency over time and maintain a strong variable able to go along with the economic development strategies. The management is divided according to the micro and macro consideration and to the strategic and tactical views. All processes of management go hand in hand without an interruption or the existence of intervals between the stages. This research paves the way for further investigations about the possibility to join together the time and space consideration in an attempt to reach a best quality of the exchange rate capable to boost the development strategies and face the different crises.

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