Theoretical Aspects of the Economic Transition: The Case of Romania

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For Romania, as for all other ex-communist countries from Eastern Europe, the transition from the rigid centrally planned economic system to the free-market economy, fair competition based, was an amazing experience. From the academic standpoint, the economic reform was a huge research opportunity, as well as having extremely important practical consequences. Based on the case of Romania, the authors have developed an original, bi-dimensional matrix model of this transition process (Scarlat Model), emphasizing the typology of four basic economic systems. Managerial aspects are underlined – both for economic systems and transition process – as well as some stability considerations. Two features of the transition strategy are presented: the transition path and duration of the process. Special attention was paid to assessing the moment by when the economic transition ends. Analysis of the transition path – based on the theory of deterministic chaos (i. e. short-run predictability) – has led to interesting results: a comprehensive research on the evolution of the Romanian currency exchange over a period of sixteen years (1990–2005) revealed three intervals in the Romanian recent history of economic transition and confirmed the diagnostic of transition end. The general model is applied in the case of Romania and some interesting findings are presented, but it is also fully applicable to all Eastern European countries and not only Romania. The EU accessing process is a different type of transition – rigorously planned, regulated and monitored.

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Introduction

In 1989, the seemingly solid system of centrally planned economy collapsed. The revolutionary changes that started in Poland demolished the

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whole Soviet-style command economic system of Eastern Europe and the Soviet Union itself. Dramatic changes in the economic systems of these countries followed, but the scientists were not prepared for such a moment: there was no valid theory of economic reform to rely on – as there was no such precedent. Within the empty space of the economic theory in this respect, the fall of communism has given way to a variety of strange, archaic, alternate and even 'informal' and 'parallel' forms of management and enterprise – as the entrepreneurial energy existed but it was not properly channelled (Dana and Dana 2003).

As Aligica describes (2006), the raise of the *new institutionalism* is one of the most significant reactions of the economic reform experience.

A comprehensive World Bank report (World Bank 2004) evaluates the World Bank assistance in 26 countries in Europe and Central Asia. After 1989, the transition countries 'have undertaken massive reforms of their economic systems, transforming institutions, processes, attitudes, and fundamental concepts of individual and organisational behaviour'. Considering its complexity, the development of an 'easy-to-understand' but working model of economic transition is a considerable challenge.

The economic reforms have had significant impact in all sectors and important research efforts have been made to clarify, explain or solve problems related to the transition processes. Even gender issues were such a subject (Homlong and Springler 2006) – in order to identify the quality and quantity of female labour participation in such processes.

Based on the authors' experience and research during more than fifteen years of transition from a centrally planned economy toward a free-market economic system, an *original model of the economic systems and transition* was developed.

More or less authorised voices speak knowingly about 'privatisation', 'economic reform' or 'transition toward market economy' and – more recently – the European Union. In spite of their actuality, they often generate questions and are even confusing.

The proposed model allows for clear definitions, and possible transition strategies are analyzed. The role of government is emphasized, as well as the key-role of the public administration in the process of accession to the European Union.

The economic and transition model, which is proposed by the authors as a conceptual framework, is bi-dimensional. Types of ownership (state/private) and management (centralized/decentralized) are considered. Consequently, the resulting 'two by two matrix' reveals four types

of economic systems – among them the centrally-planned economy and the free-market economic system. The major advantage of this model is its analytical potential. The different transition strategies are presented and the position of a certain economic system, on its path toward the free-market economy, at a certain moment, can be easily identified. The topic of this paper is very actual, extremely important and relevant to the current state of knowledge for – at least – two reasons:

- The proposed transition model is both theoretical and practical (explanatory) as well as being an investigation tool (Ardelea and Scarlat 1991; Scarlat 1994; 1999; 2001; 2003a; Scarlat and Curaj 2004).
- The research conducted in Romania, the analysis of time series of certain macroeconomic indicators (such as the exchange rate) during the transition period or the transition path, from the standpoint of deterministic chaos (i. e. short-term predictability), has revealed interesting characteristics (Scarlat 2005; Scarlat, Stan, and Cristescu 2007a; 2007b) and was in accordance with the other estimations about the end of transition.

Some of the conclusions of the research might be applicable to other transition economies as important decision support tools.

Economy Model

Using a political economy approach, and based on different criteria (political structures, 'What is a good society?' and the pace of implementing the transition policies), Marangos (2005; 2006) has identified and developed five alternative models of transition: Shock Therapy, the Neoclassical Gradualist model, the Post-Keynesian model of transition, the Pluralistic Market Socialist, and the Non-Pluralistic Market Socialist model of transition (the Chinese model). These models are associated with alternative institutional development processes – i. e. the decision depends on what institutions are considered to be more efficient: institutions produced by state intervention or market-generated. The neoclassical gradualist model maximizes the social welfare under the given internal and external constraints (Marangos 2006). Unfortunately, this meritorious and complex typology presents definition elements of both economic transition (as shock therapy) and economic system (others), which might be confusing.

Definitely, an economic system is described by a certain number of features: more features, more information and – finally – the system is

better described. The issue is to investigate the possibility of characterising (any) economic system by a *minimum number* of parameters, in order to simplify the analysis as much as possible (but they still describe the system completely). The point is to find the *most important features.* The basic assumption is that any economic system can be characterised by two major features, considered as determining features:

- The type of ownership that could be, basically, state ownership or private ownership (the intermediate or mixed ownership is accepted).
- The type of management adopted by businesses/organisations active within the economic system.

We agree to define the management type as centralised if all the vital decisions are made at the macroeconomic level (government), and the decentralised management, where decisions are made at the microeconomic (organisation) level (intermediate forms of management are also accepted).

The result of these assumptions is the two-dimension (matrix) model presented in figure 1. Validity of the model's assumptions is proved by the fact that all the important types of economic systems are described fairly completely. While the association 'private ownership' & 'decentralised management' is typical of the democratic countries' 'market economy' (quarter I), the association 'state ownership' & 'centralised management' defines 'the command economy' or centrally planned economy of the communist/socialist countries (quarter III). Analysing the model with combinatorial techniques, two more associations are shown: 'private ownership' & 'centralised management' (quarter II), defining the economy of monopoly and 'state ownership' & 'decentralised management' (quarter IV), introducing the so-called 'social-market' economy.

It is important to avoid the confusion between 'centrally planned economy' and 'planned business activity' – core of the modern free-market economy. Unfortunately, such confusions were frequently presented in Romanian newspapers and mass media, right after 1990. Another trap to be avoided: the modern free-market economy *is not* the old 'market' economy dominated by powerful monopolies (economy of monopoly).

The free-market economic system is superior to the centrally planned economy for two reasons, at least: *motivation* (as a result of private ownership) and *flexibility* (as a result of decentralized management).

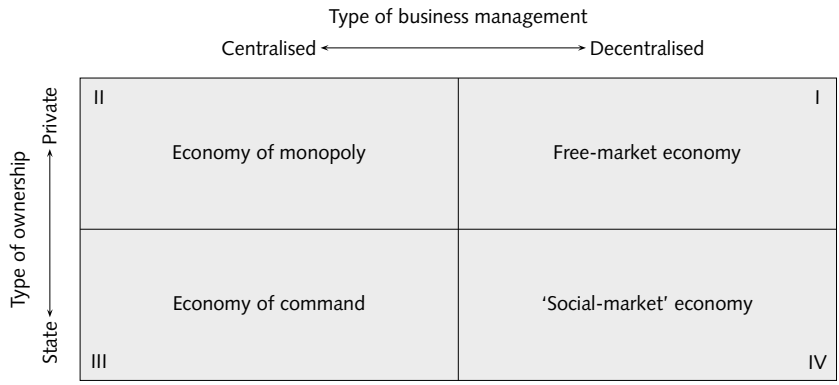

FIGURE 1 The matrix model of four basic types of economic systems

STABILITY AND MANAGEMENT CONSIDERATIONS

From the management standpoint, the description of the proposed model (Scarlat's Model) starts from two basic prerequisites:

- private ownership, opposed to the public one, generates motivation;
- decentralisation, determines the flexibility of management systems and processes.

On the other hand, the basic management principle states that *the owner makes the decisions (regardless of who are the owners – individuals, businesses or the government)*. This situation is met in quarters I and III, which corresponds to relatively stable systems. Any other situation means conflicts or potential conflicts between the owner and decision maker (quarters II and IV). This explains the relatively short life of economic (and political) systems corresponding to quarters II and IV. The failure of centrally planned economies (quarter III) is not because of management conflicts but mostly due to rigidity, poor motivation and low efficiency. It is interesting to underline the unstable character of the economic models belonging to quarters II and IV. Contradiction between the private ownership and centralised management (quarter II) will have serious effects like economic and social unbalance, excessive and immoral revenue sharing and, finally, the danger of significant unemployment.

The opposition between state ownership and decentralised management (as much as it is possible) leads to the property's depreciation through poor efficiency, as a result of the back interest, with a major negative consequence, inflation (quarter IV).

A different situation, wherein the frames of private ownership and free competition principles are broken and/or replaced by the centralised command mechanisms, is that of the war economy (Germany, Italy, and Romania, during World War II). By laws and/or decrees, the economy's direction is accomplished by the state both at macro and, somehow, microeconomic levels. The state targets all the nation's resources in order to sustain the war efforts. During the crisis this strategy can lead to results that are superior to those from quarter I. But in normal times it hinders initiative and dynamism, placing the economy behind the free markets.

It is also important to analyze the relation between company management and ownership, by quarters.

- Quarter I. Interest aroused by private ownership and managerial flexibility results in elastic and efficient management. Under the necessity of free-market circumstances, governed by the principles of the demand-supply balance and fair competition, the necessity of a fast market information transfer appears. Extensive and intensive use of information technology becomes a management tool.
- Quarter II. There is private ownership motivation, but also centralised leadership that creates over-sized structures with slow reaction time and a long information circuit. Quite rigid and disadvantageous management is the result. This can be improved by using information systems.
- Quarter III. Management is imposed from outside the system. The economy is of 'command' type but the company is deprived of a basic managerial function: 'decision-making'. That is ultra-centralised, the communication channel is long, and information is distorted and weakened through a bureaucratic chain with non-existent feedback. In the few situations where it appears, it does not contribute to the decision making. The lack of motivation increases the system's immobility.
- Quarter IV. Accepting that a company is allowed to make decision: state ownership rejects that kind of motivation. The result is a formal management. The information systems are used in an inefficient way, as well.

TRANSITION PROCESS

A successful transition process from communism to democracy and/or market economy may be a tool for the economic development of a coun-

try (Bitzenis 2007). The free market economy's superiority (through motivation, adaptability and flexibility, and progress, and finally through productivity and efficiency) is practically proved as well, confirmed by the social and historical dynamics of economic systems. At least for economic reasons, as the free-market economic system is more efficient than the centrally planned one, the transition to free-market economy is a must.

Since the late 1990s, a rich literature has been developed, screening the various aspects of the transition. The prestigious journal *Post-Communist Economies* (formerly *Communist Economies and Economic Transformation*) has published, systematically, interesting articles on various economic sectors, in different transition countries such as: Azerbaijan (Sabi 1997), Bulgaria (Mihaylova and Howe 1998), Croatia (Cengic 1996), (East) Germany (Hölscher 1997), Hungary (Mihalyi 1996), Poland (Kaminski 1998), Romania (Hunya 1998), Russia (Magomedov 1998), Kazakhstan and Uzbekistan (Abazov 1997), Ukraine (Ishaq 1997; Hirschhausen 1998). The critical issue of economic development is important for each individual country as well as for an entire region – it could be either Central Asia or Eastern Europe (Brzeski and Colombatto 1999).

Over the last decade, comparative and multi-country studies were conducted. Such a research completed in four countries from Central and Eastern Europe (Romania, Bulgaria, Czech Republic, Hungary) has identified several areas of concern for the very dynamic sector of small and medium-sized enterprises (SMEs), active internationally: lack of appropriate financial instruments, difficult access to market intelligence, lack of professionalism within the business support infrastructure (Lloyd-Reason et al. 2005). At the other extreme, there are numerous examples of successful economic development, SMEs-based. Analysing the Vietnamese economy, Harvie (2004) concludes that SMEs are job creators, which contribute to sustainable economic development by efficient allocation of resources, expand the exports, achieve a more equal distribution of incomes, and assist the rural and regional development.

Actually, the 'Scarlat Model' demonstrates that SMEs are the ideal actors to play on the stage of free-market economy: SMEs are totally private and decentralized decision makers.

The Scarlat Model can be used to analyze the economic transition as well. The transition process – from centrally planned economy to the free-market economy – means simultaneous privatisation and decentral-

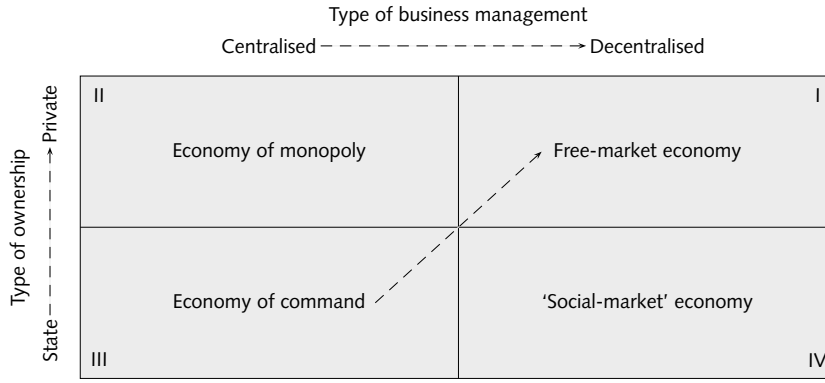

FIGURE 2 The transition model: From centrally planned economy to the free-market economy

isation of the business management (figure 2). The adopted legal acts in Romania (the Reorganisation of the State Owned Enterprises Act, the Corporations Act, the Act of Land) target all the transition aspects mentioned before.

The fundamental problem is choosing and justifying the optimal strategy, defined by:

- Duration and speed of transition ('shock' or 'gradual' transition).
- Transition path (trajectory).
- Privatisation techniques – as an essential component of the transition and economic reform.
- Transition management and strategy – as a result of all the above.

As far as duration/pace of transition is concerned – either 'shock therapy' or 'gradual transition' – the champions of each of them might have their arguments. However, ten years of transition offer enough hard evidences – as some countries have opted for 'shock' while most of them (as Romania) have decided to follow the 'gradual' path (Giannaros 2000).

The proposed model allows for analysing all these aspects. For example, regarding the transition path, the model's analysis reveals three types of trajectories, at least:

1. Direct transition (quarters III ⟶ I); theoretically the most advantageous but requires an outstanding managerial effort.
2. Transition through quarter 2 (quarters III ⟶ II ⟶ I), which is potentially high unemployment generative.

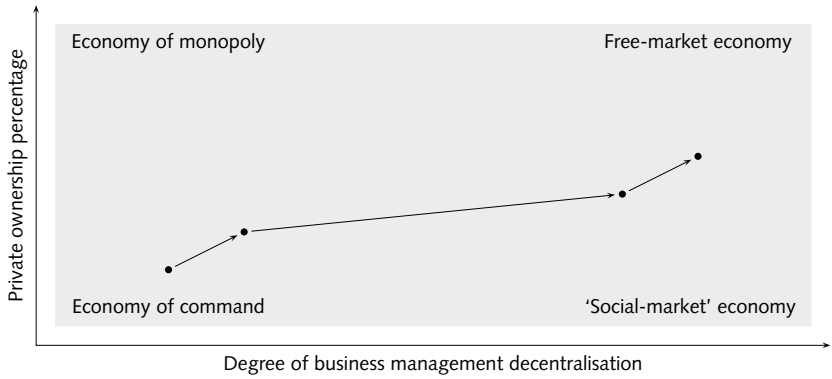

FIGURE 3 The model of the transition path of the Romanian Economy

3. Transition through quarter IV, threatened by inflation (quarters III ⟶ IV ⟶ I).

It is important to mention that these three types are just basic trajectories. Bitzenis (2007) has introduced nine general reform paths of transition.

If the economic criterion (inflation avoidance) is overwhelming, variant (2) will be chosen meaning prioritising the privatisation. If the social criterion (lowest possible unemployment) prevails, (3) will be followed and companies will become fully autonomous.

From the theoretical, managerial standpoint, transition should be as short and straight as possible. Prolonging the transition through unstable statuses (quarters II and IV) induces stresses and leads to a drop in economic efficiency, or else a decrease in the speed of the economic reform process.

As mentioned before, the split between private/state or centralized/decentralized is pretty rigid. The model can be improved, considering both ownership and decentralisation as having continuous variation: ownership percentage and degree of decentralisation. The proposed model – slightly modified (figure 3) – allows for investigating the real path followed by Romania on its way to a free-market economy.

The overall survey on the Romanian economy and business environment allows us to conclude that most of the legal framework is in place and the business is very active. According to a detailed survey conducted and published back in 2004: 'Romania does not request a transition period or impairment of law and states that it will be possible to fully enforce the *acquis* after the accession' (Fuerea et al. 2004, 29).

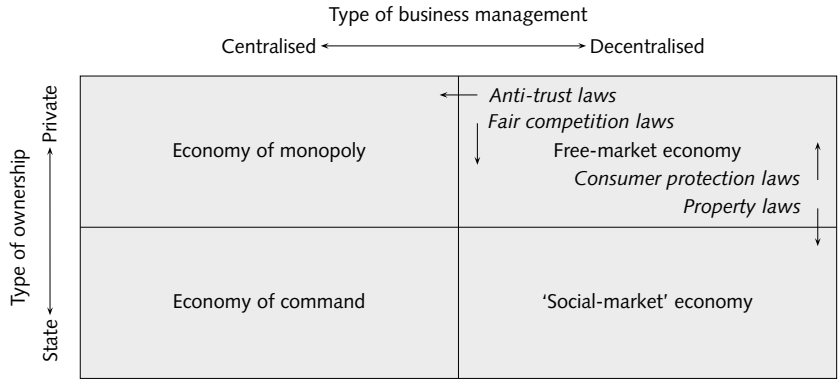

FIGURE 4 The role of government: The legal environment development and protection

ROLE OF THE GOVERNMENT

As we have seen, the match between ownership and management in quarter I is only the background for an efficient economic system. For countries in transition – as Romania – the government is less and less an economic actor but a crucial rule maker. After the transition management role, the government must play another essential role: the guard and the guarantor of the free-market economic system. In order to maintain the viability of the free-market economy system, its borders should be safely defended by (figure 4):

- 'anti-trust' regulations (antimonopoly) in order to discourage the movement back to quarter II,
- laws for property protection and limitation of nationalisation processes that should not allow access towards quarter IV,

as well as measures of stability within the system:

- fair competition legislation, and
- laws for consumers' protection.

To all these, the legal framework for environment protection is a *sine-qua-non* condition for sustainable development.

During its EU accession process, Romania had to pay attention to all these aspects as follows (Fuerea et al. 2004):

- *Fair competition:* 'In this field [...] legislation is harmonized with similar European legislation. There is a high proportion of compatibility with EU legislation regarding the regulation of corporate

agreements, dominant position abuse and the control of economic concentrations.'

- *Consumer protection:* 'In conclusion, the degree of concordance between the Romanian legislation and *acquis* [. . .] is estimated to be relatively high since all measures taken by Romania are fully compatible.'
- *Environment protection:* in this area, Romania still has 'to promote a normative measure to support the local budgets in creating/improving the environment infrastructure.'

Justification of those measures lies in the fundamental principles of the free-market economy: open competition, balance between the demand and supply, and company autonomy.

As far as the private sector is concerned, the government plays an important role, too. The 'privatization' process is only one of the ways to create a significant private sector in the economy:

- privatisation of the former state-owned enterprises,
- creation of new private firms – small business start-ups, mostly (which started right after December 1989),
- restitution of the properties confiscated by the communist regime between 1945 and 1985.

This is why the 'creation of the private sector' syntagm – which is strongly recommended to be used – reflects the real-life processes better than the word 'privatization'.

The Romanian government took action in all the above directions. Only the pace was different. As an example, the major steps for property restitutions are chronologically displayed in table 1. Similar investigations can be performed for other means to create the private sector. The Romanian Statistics Authority periodically provides data in this respect.

It has to be emphasized that the government has to be the referee of the economy game, not a player. But its role and implication are sometimes rather difficult to assess, mainly in transition economies. For example, in Czech Republic, the influence of the government in the economy was higher than what the government officially conceded during the 1990s (Kreuzbergova 2006). So-called 'banking socialism' has meant the indirect control of the recently privatized companies by the government-controlled banks.

TABLE 1 Property restitution acts in Romania

Act number/year	Restitution object
18/1991	Land for agriculture (less than 10 ha)
82/1992	Urban pieces of land
1/2000	Forests, land larger than 10 ha
10/2001	Buildings (restrictive)
247/2005	Most of the properties

Too much involvement of the government in the economy means less economic freedom. The Heritage Foundation and Dow Jones & Company, Inc. is annually publishing – since 1995 – the world ranking of economic freedom, according to the 'index of economic freedom', which is based on some tens of independent variables, grouped in 10 broad factors of economic freedom, strongly influenced by the government policy.

The economic freedom 'encompasses all liberties and rights of production, distribution, or consumption of goods and services. The highest form of economic freedom provides an absolute right of property ownership, fully realized freedoms of movement for labour, capital, and goods, and an absolute absence of coercion or constraint of economic liberty beyond the extent necessary for citizens to protect and maintain liberty itself. In other words, individuals are free to work, produce, consume, and invest in any way they please, and that freedom is both protected by the state and unconstrained by the state' (Beach and Kane 2007, 38). It should be noted that the absence of government coercion or constraint must also include a sense of liberty as distinct from anarchy.

The 2007 Index of Economic Freedom ranks Romania on 67th place (compared to 92nd place in 2006) in a global list of 161 countries (Kane, Holmes, and O'Grady 2007). The position corresponds to the considerably large group of 'moderately free-countries' – where the majority of former communist countries are ranked. The lower the position, the greater the level of government interference in the economy, and the less economic freedom the respective country enjoys.

END OF TRANSITION

The question of 'when the transition process ends' (Scarlat 1999) is doubly important: not only for the sake of theory, but for practical reasons as well (just think about the status of 'functional market economy' according to which the candidate countries for EU accession were assessed).

On the other hand, Kumar (2006) finds that there is a strong correlation between world trade and a well-established market economy such as in the USA, Japan and countries in EU, while there is a small correlation between the world trade and a transitional economy such as Russia. In other words, the 'functional market economies' have better established import and export transactions and, consequently, economic welfare.

The Scarlat model is able to offer a reliable answer to the sensitive question of 'when the transition process ends'. In theory, by the time when the private ownership is prevailing and the business management is dominantly decentralized, then the free-market economy system is in place (figure 2). In practice, during the transition process, it is necessary to measure both the private ownership percentage and degree of business management decentralisation (figure 3). When more than 50% in both of them (or a different but higher than 50% privatisation and/or decentralisation target) is reached, then the process of *economic transition towards the free-market economy* is considered over.

While the percentage of private ownership is relatively easy to calculate, based on regular statistics (see, for example, figure 5, which depicts the Romanian case for its privatization target), the degree of business management decentralisation is rather difficult to assess.

In any case, a coherent set of criteria for assessing the degree of decentralisation has to be developed. Such a set of criteria should include vital decisions at the company level – such as decisions on: company mission and strategy, budget, company suppliers and clients, pricing policy, personnel policy (number, structure, salaries, hiring and firing), investments, acquisitions and mergers, insolvency and bankruptcy. Further research on this issue is to be completed and eventually published.

There are also other standpoints, methods and/or information sources that could be used to assess, conventionally, the point in time when the economic transition gets – conventionally – to its end. The question is, somehow, rhetorical – because ... the transition never ends: the economic system – even after reaching the 'free-market economy' quadrant – is not rigid, it is continuously evolving (within the same quadrant, hopefully). Several approaches mostly used to diagnose and identify that moment when the economic transition is conventionally over are mentioned below.

- *The* political *approach* (altough it also considers a complex of elements): the transition is over when the EU sentences it – in Country

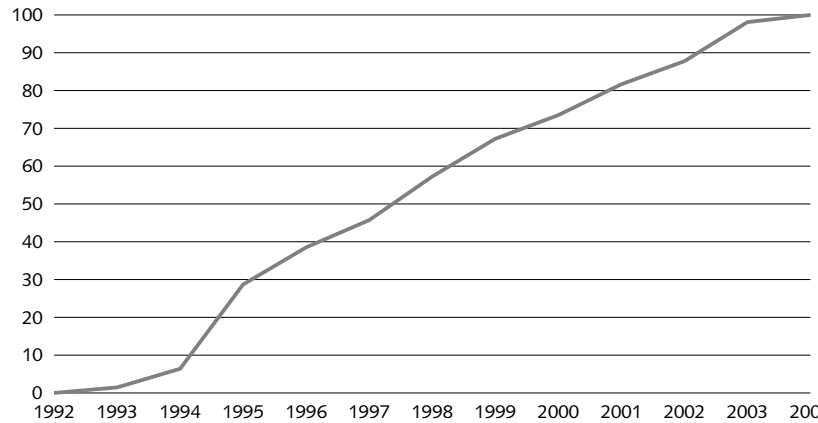

FIGURE 5 Privatisation dynamics in Romania, 1992–2004

Report – and considers the economic system as a 'functional market economy'. For Romania, this happened by the end of 2003: 'Romania can be considered as a functional market economy once the good progress made has continued decisively' (European Commission 2003, 7).

- *The* economic *approach:* the economic transition is over when the country's yearly GDP reaches the pre-transition maximum level. The Romanian economy has reached this value in the years 2002–2003, according to WB and UN estimates, respectively, at market prices, current prices, in USD (see United Nations Common Database at http://unstats.un.org/unsd/cdb). It is significant that countries, which were forced to follow reform paths in belligerent and/or violent forms, have reported limited economic growth and 'not only lag behind the other transition countries in the region, but also, as of today, have not even reached the levels they had attained in 1989' (Bitzenis 2007).
- *The* management *approach:* the economic transition is completed at that point in time when the strategic objectives are reached (in terms of GDP, private sector dimension, etc). For example: the privatisation target was achieved by 2003 (figure 5).
- *The* econo-statistics *approach:* based on time-frequency series analysis, which will be further discussed.

As all the above may present cross – influences, a correlated approach is recommended. In the case of Romania, the different approaches con-

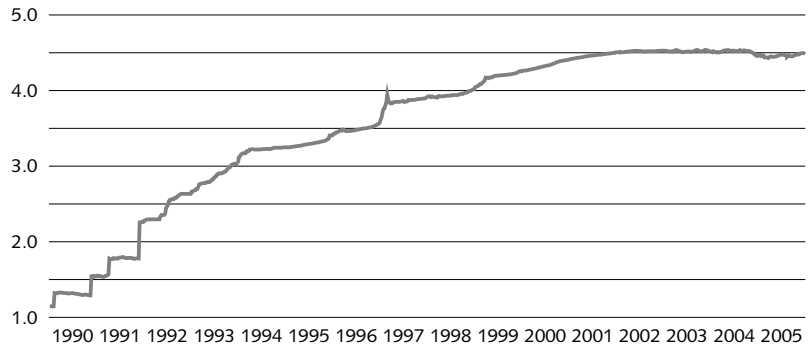

FIGURE 6 Time evolution of the ROL/USD exchange rate, at logarithm scale (based on the data published on the National Bank of Romania web site, www.bnr.ro)

verge to indicate that economic transition reached its end by 2002–2003. This conclusion will be supported by the conclusions of the next section.

Analysis Tools for the Transition Path

The transition process was not linear. Besides its trajectory and duration, it is interesting to assess when the transition ends and identify if other elements have occurred on the transition path. There are also more sophisticated tools to analyze the transition path, behavioural patterns and specific features. For example, from the point of view of the deterministic chaos (i. e. short-run predictability), the analysis of time series might lead to interesting results. A time series might be anything between randomness and determinism; in turn, the determinism might be chaotic (i. e. sensitive to initial conditions) or classic (non sensitive).

The research methodology is based on the analysis of the time series of macroeconomic indicators, by statistical methods; the macroeconomic indicator chosen: the US dollar (USD) exchange rate. The figures were collected based on the daily values reported by the Romanian central bank (Banca Nationala a Romaniei) over a period of sixteen years of Romanian recent history: 1990–2005.

This period includes the interval used previously for presenting the privatisation process: 1992–2004 (figure 5). A comprehensive research was conducted on the evolution of the Romanian currency exchange rate (ROL) with respect to the US dollar (USD). Figure 6 depicts the overall evolution. The logarithm scale was used because of large variations of the indicator (up to 104).

The analysis was performed taking into consideration three criteria:

- System complexity (this is not necessarily the whole economy, but part of it, as monetary system).
- Sensitivity to initial conditions (as a pointer of the predictability).
- Persistence of the evolutionary trend (indicating the similitude with the random-walk behaviour, i. e. the lack of deterministic predictability in favour of probabilistic predictability).

In the nonlinear dynamics theory, the corresponding quantities for the above mentioned criteria are the correlation dimension, the largest Lyapunov exponent (Bask 1996) and the Hurst coefficient (Tsonnis et al. 2001).

The degree of complexity of the underlying system is quantitatively given by the correlation dimension referring to the minimum number of variables that is needed to replicate the dynamic system. The last one is the same with the dimension of the (strange) attractor characterizing whichever one of the topological-equivalent systems (Takens 1981). It is worth noting that the number of variables that replicates the system is fractional, according to the theory of the strange attractors (Kantz and Schreiber 1997).

The sensitivity to initial conditions could explain the spreading diversity of the present – day economic systems, even if they were starting from quite similar prerequisites. This is a basic feature of the chaotic systems. Hence, one way of revealing the existence of deterministic chaos in a time series is to measure the degree of divergence of nearby orbits in the phase-space. Such divergence $\delta(t)$ can be measured by the Lyapunov exponents λ, and the presence of at least one positive exponent is taken as indicating to what extent the evolution is predictable over a specific time range (Rosenstein 1993):

$$\delta(t) \cong \delta(0) \cdot e^{\lambda t}. \tag{1}$$

As far as concerns *the persistence of the evolutionary trend,* the Hurst exponent is an additional pointer for making the distinction between randomness and causality; besides, its value of 0.5 separates the persistent and anti-persistent evolutionary trends (Stanley and Mantegna 2004). It is defined by the time evolution of the root-mean-square fluctuation of the averaged displacement over all possible positions t_0 (the bars indicate the average):

$$\left\{\overline{[x(t_0+t)-x(t)]^2} - \left[\overline{x(t_0+t)-x(t)}\right]^2\right\}^{\frac{1}{2}} \sim t^H \tag{2}$$

The values of the Hurst exponent (H) range between 0 and 1. A value of 0.5 indicates a true random walk (a Brownian time series). In a random walk there is no correlation between any element and a future element. A Hurst exponent value $0.5 < H < 1$ indicates 'persistent behaviour' (e. g. a positive autocorrelation). If there is an increase from time step $i - 1$ to i, there will probably be an increase from i to $i + 1$. The same is true for decreases: a decrease tends to follow a decrease. A Hurst exponent value $0 < H < 0.5$ indicates a time series with 'anti-persistent behaviour' (or negative autocorrelation): an increase tends to be followed by a decrease, or conversely, a decrease will be followed by an increase. This behaviour is sometimes called 'mean reversion'.

Some results of the research conducted in Romania are further presented. The analysis of the transition path – using all the above criteria – has revealed three intervals, as follows (figure 7):

I. 1990–1997

II. 1998–2001

III. 2002–2005.

Obviously, the three intervals are splits of the diagram depicted in figure 6.

Interval I (1990–1997) is characterized by simple underlying dynamics and low fractal dimension, weak sensitivity to initial conditions, and a very aggressive, positive long-run trend. After the social and political events that provoked the fall of the totalitarian regime, the inertia of the total deterministic evolution of the economy of command that had been legally operated until the end of 1989 prolonged the effect for several more years, when the economy diminished to work as a 'national holding', and both the lack of an adequate institutional feed-back and the social pressure led to political decisions of maintaining the exchange rate at artificial constant values. Thus, the accumulation of the demand pressure upon the slow-developing supply led to an increased import of goods; the insufficient feed-forward of a weak monetary system could not balance the long response time of production, and explosive corrections occurred in the form of stepped jumps of the exchange rate ROL/USD (see figure 7a). The exchange rate is deterministic and 'very' predictable from the long-run perspective (short-run understood), with a lot of angular points. The main features of this time interval are summarized in table 2.

Interval II (1998–2001), as figure 7b shows, is characterized by in-

creased correlation dimension, i. e. more complex dynamics, and clear positive values for the largest Lyapunov exponent. All the usual hypotheses for chaotic dynamics are fulfilled, and this is the domain with significant functional changes toward the open market economy. The positive long-run trend continues, but the averaged relative variation per year of the exchange rate is a hundred times lower (72.27% compared to 7264.29% for interval 1). The exchange rate remains predictable both from the short- and long-run perspective (table 2), exhibiting a much smoother curve.

The interval III (2002–2005) – see figure 7c – is closer to the random walk behaviour, as pointed out by the anti-persistence of the short run trend. It might be a chaotic deterministic, with a higher volatility than the previous one, or stochastic, or mixed; in order to decide in this matter, further analysis is necessary. To simplify, we only mention here that the evolution remains of causal type. For the purpose of this paper, it is important that there are arguments to state that the transition seems to come to its end by the end of 2001 due to at least two reasons: the first is the disappearance of the long-run trend and, consequently, the beginning of the steady state regime, and the second is the complexity of the structure revealed by the fractal dimension of interval III. As stated in the literature (Schwartz and Yousefi 2003), a free market economy in a steady state regime contains a strange attractor with a correlation dimension around 4.5, and that is the case for Romania (table 2). The exchange rate predictability is weak, with small deviations from the nearly horizontal baseline (excepting a significant fall in March 2005 – see figure 7c). This is the consequence of the new settled macroeconomic equilibriums, very sensitive to the environmental stimuli, but also with high capacity to recover the functional 'working points'.

Significantly low predictability is consistent with the long run behaviour, which in fact has no trend, and the curve approaches a random walk appearance (figure 7c). In a steady-state-running economy, as mentioned by other authors, a positive real part of the largest Lyapunov coefficient seems to be normal. Moreover, the greater the correlation dimension, the more complex the economic system (and the monetary policy of the Central Bank).

The Romanian transition trajectory seems to be of the type III ⟶ IV ⟶ I. A smaller Lyapunov exponent is consistent with a higher degree of short run predictability in an economic system; for the first period, the exchange rate is predictable from the long run perspective (posi-

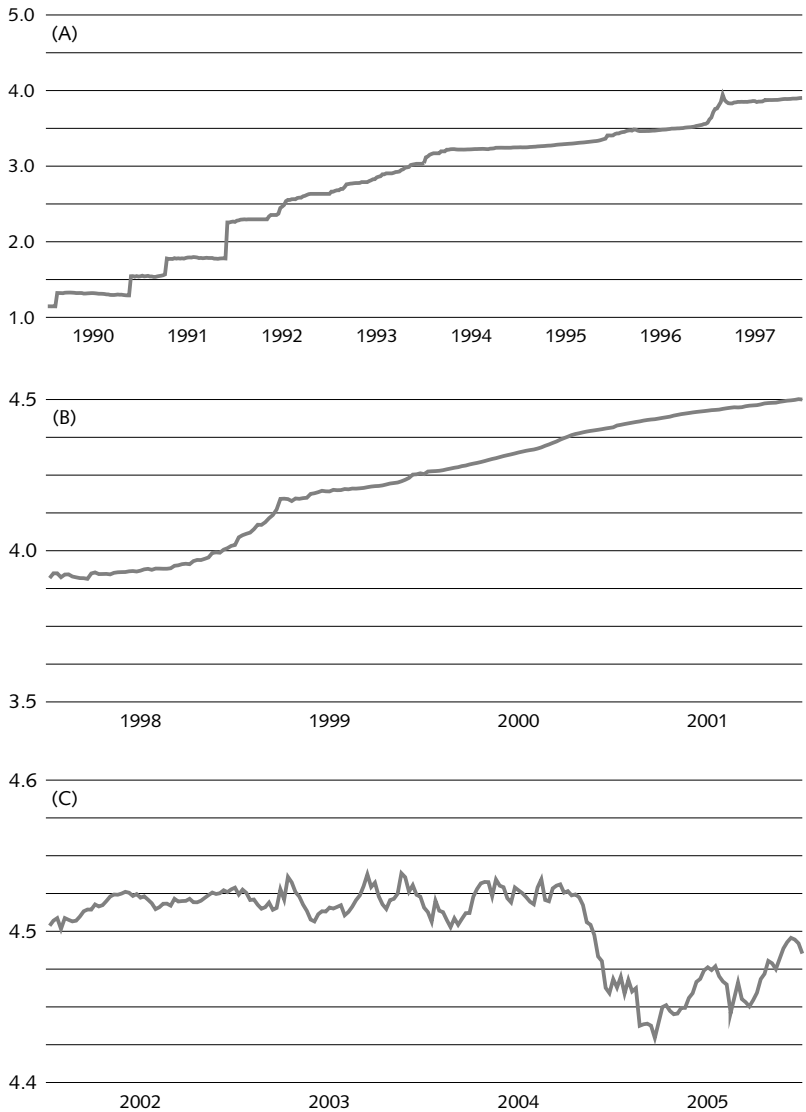

FIGURE 7 The dynamics of the three intervals of the transition period (1990–2005) – the evolution of the USD exchange rate against Romanian ROL

tive trend). The smaller Lyapunov exponent characterizing the period of structural changes indicates smaller sensitivity to the initial condition together with a non-randoml evolution toward a more complex system characterizing the steady-state-regime.

Overall, it is important to note that time series analysis indicates the

TABLE 2 The three time intervals and their characteristics (based on the evolution of USD exchange rate against Romanian ROL)

Characteristics	Interval I	Interval II	Interval III
Time range	1 January 1990–31 December 1997	1 January 1998–31 December 2001	1 January 2002–31 October 2005
Complexity (system dimension)	1.74	3.09	4.45
System sensitivity to initial conditions	Weak	Strong	Strong
Trend	Persistent	Persistent	Anti-persistent
Type of predictability	Long-run, deterministic	Long-run, chaotic deterministic	Short-run, chaotic deterministic

end of 2001 as the end of the transition process – which confirms the previous conclusion (end of transition process in Romania: 2002–2003).

Open Closing: EU Accession Process – A Different Type of Transition

As the EU accession is a transition process itself, Romania – like other Eastern European countries – has been 'in transition process' twice. Fortunately, the transition to the 'functional' free-market economy is naturally connected to the EU accession process (Scarlat and Richevaux 2006). Several impact studies were conducted in Romania under PAIS (Pre-Accession Impact Studies): PAIS I (2001–2002), PAIS II (2003–2004), PAIS III (2005–2006). Overall, the PAIS studies were intended to provide recommendations to the Romanian Government to support negotiations with the European Commission.

Under PAIS I (Scarlat, Popescu, and Warner 2002) primary and secondary research (desk research and formal face-to-face interviews) was conducted. The main objective of the study was to provide an overview of the institutional requirements for implementing the *acquis communautaire* in Romania and to provide a set of recommendations.

Most of the above issues and recommendations were presented to the RIA International Conference in Sofia (Scarlat 2003b). As these recommendations were acknowledged by the Conference participants coming from ex-communist countries, it means that *this set of recommendations are applicable not only to Romania but to most of the ex-communist,* EU *accession countries.*

The studies conducted under PAIS II (Fuerea et al. 2004) confirmed that Romania – like other EU candidate countries in economic transition

– is aiming at a 'mobile target': harmonization of the Romanian legislation with the *acquis communautaire* is based on two processes (transposition of the Community legislation into the Romanian legislation and rendering compatible the national normative measures which transpose the *acquis* with the provisions of the Community legislation). The research revealed that the concordance degree of the Romanian legislation with the EU legislation (in force in 2002) was approximately 75%. The problem is that the *acquis* covers more than 90,000 pages (out of which about 20,000 are continuously being amended!)

The EU *accession process was a different type of transition – not only planned but rigorously regulated and monitored. Following the* EU *accession, the* EU *integration process is a different topic, both quantitatively and qualitatively different.*

Conclusions

- The general economy model that was presented ('Scarlat Model') is a useful analysis framework to discuss the transition features – mainly its path but also transition duration, delays, priorities (privatisation vs. decentralisation) – ultimately the transition strategy.
- The sophisticated research tools applied for transition path analysis, based on the theory of deterministic chaos, lead to revealing results: in the case of Romania, three neatly distinct intervals were identified and described. According to its transition policy and development strategy, the Romanian transition trajectory seems to be of the type III (centrally planned economy) ⟶ IV ('social market' economy) ⟶ I (free-market economy).
- Despite several improvements still expected to be made, the basic structural changes towards a functional market economy in Romania were implemented up to the end of 2001. It is important to note that time series analysis indicates the end of 2001 as the end of the transition process – which confirms the previous conclusion (end of transition process in Romania: 2002–2003).
- This model was applied in the case of Romania but it is fully applicable to all Eastern European countries and not only Romania. In this case, interesting comparative analyses might be performed.

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