

## Crisis Phoenix

“We have created a financial system which has greatly exceeded the safety bounds we have instituted in the 1930’s to protect ourselves from crises. We should have realized that, by stepping over the safety mechanisms, we expose ourselves to a new crisis.”

**Paul Krugman**

For a few decades economic crises seemed to have their origin in the behavior of emergent economies. The forward leap, when forced, proved deadly. The description of the effects is complete, in the specific literature. The causes, though, have never constituted a reason for intellectual consensus.

Though over the nebulosity of causal explanations has settled a sort of belief, that the projects for breaking the vicious circle of underdevelopment are most often undermined either by unbridled ambitions, or by the lack of consolidation in the advance of development. The crises of Mexico, South-East Asia, Russia, Argentina etc., all from the last two decades, were subsumed under the vision mentioned above. They were crises which were easy to exit because the center had the resources to finance the periphery, on one hand, and to protect itself from contamination, on the other.

Starting with August 2007, crises no longer have their origin in the behavior of emerging countries. Through the trigger of the present global economic crisis – the irregular mechanism of American subprime credit – the origin of the crisis returned to the heart of the system, the engine of development. The crisis has exploded in the center of the global economy and has implacably contaminated the periphery of emerging countries.

Inverting the origin of the crisis and its sense of propagation signals the end of a long cycle of evolutions, which respect Kondratieffian calculations. The problem is whether this crisis truly will prove to generate – as a counterweight to recessionary effects – transformational effects on the nature of fundamentals (to the level of basic principles inclusively) for another long cycle. In other words, the great challenge of a great crisis is a great change.

The past does not shed too much light in the way of understanding behaviors. After the crisis of 1929 there

was no triggering of a linear cycle of evolution due to the overuse of violence as a means of control over the benefits of development. The globalization trends which seemed to set the rules around the changepoint between the 19<sup>th</sup> and 20<sup>th</sup> centuries were irreversibly blocked after the crisis of 1929-1933, until 1989-1991. The interval of 1992-2007 was characterized by the recessionary transformation of the periphery, often with flares of global contamination.

The great change expected with the restarting of a new Kondratieff cycle with this crisis has a discrepancy – mathematically speaking – of 6 to 9 years. If we estimate that the exit from the crisis could be achieved in 2 to 4 years, the sense of change is risky to reveal, being dependent on the type of solutions which will be globally approved for coming out of the crisis. The transformational processes resulting from the Washington Consensus have defied expectations, for both their length of time and their finality. The predictions are insecure on the medium term and powerless on the long term.

In fact, the crisis could be interpreted as a result of both insecurity and powerlessness in global government, meaning exactly the interval which covers the disparity of the closing of the long cycle of evolution and of the length of time for emerging from the crisis. It is, in the end, a crisis of adequate behavior with regard to the use of the specific means of an economy which is turning global. The means cover both the class of financial resources and the one of the institutional methods of allocating resources in general.

In this context, resuming the debate on evaluating the functional relevance of the basic principles of the global economy is unavoidable, as well as the debates on the efficiency of the management of behaviors stemming from the trust in the system and on the reform of economic policies which can no longer forego the Archimedian guideline of global coordination.

Marin Dinu

## Contents

Towards a Comprehensive Policy on Entrepreneurship Education in the European Higher Education	
■ Mihai Korcka, Olav Spilling .....	3
The Labour Mobility in the European Union: Economic and Social Determinants	
■ Liana Son, Ioan Talpoş, Ciprian Şipoş .....	17
The Impact of Trades on Daily Volatility: an Empirical Study for Romanian Financial Investments Funds	
■ Bogdan Negrea, Lucian Țătu, Andreea Stoian .....	31
The Impossibility of a Paretian Libertarian: a Solution through the Imposition of a Rationality Condition on Individual Preferences on Conjoint Alternatives	
■ Mihai Ungureanu .....	37
Application of Discriminant Analysis on Romanian Insurance Market	
■ Constantin Anghelache, Dan Armeanu .....	51
Environment Protection and Implementation of its Policies in Romania	
■ Marieta Stanciu, Carmen Puiu .....	63
An Analysis of the Romanian General Accounting Plan. Opportunities for Adaptation to the Activity-Based Costing (ABC) Method	
■ Sorinel Căpuşeanu, Irina-Alina Preda .....	71
Productivity and Performance through Marketing Planning	
■ Elena Enache, Cristian Morozan .....	79

Note: The authors are responsible for the content of their articles and for obtaining necessary permissions.

Text revision: Gabriela Ochiană  
Computerized drawing up:  
Nicoleta Bobocea  
Cover: Alexandru Ion  
Subscriptions distribution:  
Viorela Petrici (021/312.22.48 – int. 24)

Data base indexation:  
**Research Papers in Economics (RePEc)**  
<http://www.ideas.repec.org>  
**Directory of Open Access Journals (DOAJ)**  
<http://www.doaj.org>  
CNCSIS categoria B+

**[www.economieteoreticasiaplicata.ro](http://www.economieteoreticasiaplicata.ro); [www.ectap.ro](http://www.ectap.ro)**  
**Reception of texts: [economia.ta@edeconomica.com](mailto:economia.ta@edeconomica.com)**

# Towards a Comprehensive Policy on Entrepreneurship Education in the European Higher Education

■

**Mihai Korca**

Academy of Economic Studies and Group of Applied Economics, Bucharest

**Olav Spilling**

Norwegian Institute for Studies in Innovation, Research and Education, Oslo

***Abstract.** The paper discusses policy issues related to entrepreneurship education in higher education and how entrepreneurship education may be related to the science-industry link. The first part of the paper is dedicated to the rationale for fostering entrepreneurship and the entrepreneurial function in the economy of a given country or region. In a second part, the authors comment European events and policy documents on entrepreneurship education in the last twenty years. The most significant drawback is that a specific policy targeting the explicit role of universities in the provision of entrepreneurship education is lacking and that there is a huge interest and potential to its future development. In this context, the authors suggest in the last part of the article strategic and operational measures as parts of a comprehensive policy on entrepreneurship education in the European higher education.*

**Key words:** entrepreneurship education; entrepreneurial function; science-industry link; education policy for entrepreneurship education.

■

**JEL Codes:** A22, M13, O15.

**REL Codes:** 4B, 4D.

## Introduction

The purpose of this paper<sup>(1)</sup> is to discuss policy issues related to the provision of entrepreneurship education (EE) by higher education institutions (HEIs). While during the last decade there has been a significant development of entrepreneurship education in general, the policy discussion has addressed to a little extent issues specific to the role of higher education in the provision of EE.

Based on previous state of the art reports<sup>(2)</sup>, a picture has emerged of a rather significant potential for further development of EE in terms of quantitative as well as qualitative aspects. The quantitative aspect relates to the number of programs offered at various levels (bachelor, master or doctoral studies) by the HEIs, while the qualitative aspect relays to the ways and means EE is provided and above all, to the need for relating EE systematically to the science-industry link. Apart from a few interesting good practice exceptions, our conclusion is that there is a great potential in most of the institutions providing EE to take more advantage of the potential existing in the science-industry link.

The background for the growing concern about EE is the shared awareness of the importance of entrepreneurship to economic development. However, there are significant differences between countries regarding entrepreneurial activity, and it is necessary to base assumptions about the need for EE on an analysis of the situation of the actual country, its economic performance and qualities of its entrepreneurial function. In our previous paper, we have discussed aspects related to

this by summarising various indicators of relevance to the entrepreneurial function of countries.<sup>(3)</sup>

Obviously, the issue of designing programs for individual countries should be related to the specific situation of each country. What may be adequate to do in one country, may not be adequate in another country. A country with a high level of entrepreneurship may have a different need for developing programs for entrepreneurship education than countries with a low level of entrepreneurial activity; and the need for specialising EE may depend on the specific characteristics of the national economies.

In this paper, we summarise the current policy status in the field of EE in higher education, and then we conclude with policy recommendations.

### Rationale for fostering entrepreneurship education

In the 1960s and 1970s, large companies dominated the economy, as the size of firms was seen as a means to obtain economies of scale, to encourage and support innovation, research and implementation of new technologies, to enter and dominate foreign markets and to face barriers and regulations.

In the last two decades of the twentieth century, economists acknowledged a reverse trend. Three basic factors offer an explanation for this come back to the Schumpeterian approach of entrepreneurship of the mid 1930s, which is strongly related to the mechanism of economic development and to the process of introducing novelty in the economy:

- The structural changes at the level of companies under the move towards the knowledge driven economy and to larger size of markets;
- The globalisation of markets for goods and services;
- The impact of the modern information and communication technologies (ICT) on goods and services offered to businesses and to the public at large.

More and more large companies rationalise their activities by restructuring, out-sourcing and/or downsizing production. The goal is to give better and more efficient response to the fast changing business environment, to easier react to new business opportunities, to avoid/diminish risks and to offer answers to the challenges in even larger and more sophisticated markets. The enlarged European Union is now an internal market of more than 450 million inhabitants which significantly simplifies and facilitates trading by the removal of trade barriers and by the harmonisation process of market regulations; but at the same time, it enhances competition as the number of companies competing in the single market is now considerably higher in each of its segments.

On the other hand, structural changes in the economy shifted Europe's comparative advantage towards the knowledge-based activities. These develop faster and more effectively in small and medium sized settings. Under such circumstances, the number of businesses increased sharply in all the European countries.

The creation of large free trade areas and the globalisation of markets determined an increased competitive pressure on

manufacturing companies. Their reaction consisted in the shift of production towards cheaper locations and lower labour costs, in diversification and sophistication of the supply (personalised goods and new services to the clients), but also in more investments in new technology aiming at significant increase of productivity.

The new information and communication technologies (ICT) gave rise to new markets, such as personal computers, software and ICT-based services, which dramatically changed management and production processes in virtually all the other industries and led to growth and diversification of the services sector.

According to the *Green Paper on Entrepreneurship in Europe*,<sup>(4)</sup> these changes have led to opportunities for new entrepreneurial initiative:

- The increased complexity of production processes requires a variety of specialised inputs;
- The reduced costs of transmitting knowledge across space makes inputs by external providers cheaper;
- Large markets allow firms to specialise for niche goods and services and, at the same time, to operate on a more European or worldwide scale.

Yet, research data show that Europe does not exploit appropriately its entrepreneurial opportunities and potential. Americans were involved in three times more new entrepreneurial ventures than Europeans, according to a 2002 Eurobarometer survey.<sup>(5)</sup> “*Europe needs to foster entrepreneurial drive more effectively*” – is said in the above mentioned *Green Paper on Entrepreneurship*.

One of the key factors to speed up the movement towards recovering the existing gap

in terms of entrepreneurial propensity is entrepreneurship education in the initial education and in all formal, informal and non-formal programmes and activities of lifelong learning. The entrepreneurial function of individuals and/or companies is strengthened by quality education and training and good practices in university-industry linkages that encourage intellectual entrepreneurship and the commercialisation of outputs of academic research.

Education and training should contribute to encouraging entrepreneurship by:

- Fostering the right mindset;
- Providing relevant skills for self employment;
- Raising awareness of career opportunities as an entrepreneur.

Entrepreneurship teaching and learning is present in the curriculum of preuniversity education almost everywhere in Europe, but the share of entrepreneurship oriented curriculum is still too small. Teaching about entrepreneurship is rather theoretical, while focus should be on building entrepreneurial attitudes and leadership. There is little use of practitioners – successful entrepreneurs, even successful students – in teaching entrepreneurship. Teachers need to be trained in order to better teach entrepreneurship. Manuals and case studies have to be developed in close connection to the specific needs of each community/region. In this context, we have to remember that “*learning to do*” is one of the four pillars of the education analyzed in the Delors 1996 Report “*Learning: The Treasure Within*”.

“*Learning to do*” gains a special significance in the light of the Lisbon Agenda of the European Commission and in the context of the Bologna Process to enhance the employability of graduates of higher

education. By a closer analysis, the “*Learning to do*” pillar shows three facets that have to be appropriately addressed by universities:

- Firstly, learning to do means acquiring specific (professional) job-skills;
- Secondly, learning to do means acquiring job-related social skills;
- Thirdly, learning to do means to educate students to become agents of change, to be willing to take risks in uncertain situations in order to shape the future.

These three facets of entrepreneurship education in European universities aim at fostering the new mindset of young people. A large range of initiatives have been considered by the universities and by the European Commission to enhance entrepreneurial mindsets and skills: entrepreneurial training and programmes, apprenticeships for students to work with entrepreneurs, inviting entrepreneurs to classrooms and increasing the number of MBA programmes. Intellectual entrepreneurship is becoming for the most dynamic universities now a philosophy of master and doctoral degree education and a framework for a better design of the university-industry link.<sup>(6)</sup>

In the European higher education systems, the provision of entrepreneurship education registers a large spectrum of experiences. In most of the European countries, entrepreneurship education is mainly offered in schools of economics and business administration and only in a few cases in technical universities or in faculties of sciences. In most of the HEIs it is still neglected that “*Entrepreneurship drives innovation, competitiveness, job creation and growth. It allows new innovative ideas to turn into successful ventures in high-tech sectors and can unlock the personal potential of disadvantaged people to create*

*jobs for themselves and find better place in society*".<sup>(7)</sup> Entrepreneurship is also recognised as a basic skill that should be fostered throughout lifelong learning.

### **Twenty years of events and policy documents on entrepreneurship education**

The awareness at European level of the objectives to be attained through EE and the exchange of good practice between the EU Member States have been initially stimulated by international forums organised in 1998 in Stockholm ("*Training for Start-ups*") and in Baden ("*Training for entrepreneurs*").

The "*European Charter for Small Enterprises*" adopted by the General Affairs Council and endorsed by the Feira European Council in June 2000 has recognised the importance of entrepreneurship as one of the basic skills to be provided through life-long learning. The Charter committed the educational systems throughout European Union to teach business and entrepreneurship at all school levels, and to develop training schemes for managers.<sup>(8)</sup>

The *Nice/Sophia Antipolis Forum* organised in October 2000 by the European Commission and the French authorities on "*Training for entrepreneurship*"<sup>(9)</sup> approached the subject of entrepreneurship from three different perspectives:

- In the educational system, from primary to the tertiary level;
- In the vocational training system;
- In the companies themselves (intrapreneurship).

In the "*Report on the future objectives of the education systems*"<sup>(10)</sup> adopted by the Education Council on 12 February 2001 and addressed to the European Council, some of

the key areas identified to be dealt with are:

- Links between education institutions and businesses, and
- Development of the enterprise spirit throughout education and training.

During the EU multiannual programme for enterprise and entrepreneurship (2001-2005), following the Lisbon Council (2000), the "*Best procedure project on education and training*"<sup>(11)</sup> has been designed and implemented. As part of the project implementation, a group of experts from all the EU Member States and Norway was set up in order to bring together the existing expertise in the field and to provide information and data on entrepreneurship measures and programmes. A number of relevant aspects have been identified in order to be distinctively addressed:

- Entrepreneurship education in primary and secondary schools;
- Training of teachers on the subject of entrepreneurship;
- Links between schools/universities and businesses aimed at promoting entrepreneurship;
- Entrepreneurship chairs, departments and activities at university level.

One of the tangible outcomes of this project is the report published in 2004 with a collection of 21 cases of good practice under the generic title "*Helping to create an entrepreneurial culture. A guide on good practices in promoting entrepreneurial attitudes and skills through education*".<sup>(12)</sup> The cases are proposed as possible models, but the editors recognise that there are certainly many other cases of good practice in the European countries.

In January 2003, the European Commission launched a debate on entrepreneurship policy. The starting point



of this public consultation which included the widest possible range of stakeholders was the publication of the *Green Paper “Entrepreneurship in Europe”*.<sup>(13)</sup> By approaching *entrepreneurship as a mindset*, the Green Paper expanded the scope of entrepreneurship policy, beyond levelling out the barriers for business development and growth; in order to get more people interested and equipped to become entrepreneurs.<sup>(14)</sup> Among the key objectives for entrepreneurship policy, the public debate revealed the need for:

- Training and support services, particularly for new entrepreneurs seen as pre-requisites for entrepreneurs to have the appropriate knowledge and skills to run their businesses. Virtual universities, distance learning, in house training for employees and shared good practice of successful entrepreneurs could provide easy access and effective training;
- Incubators, including those set up in university campuses, seen as important during the first difficult period when mentoring and other support services are welcomed;
- Entrepreneurship education seen as a full part of the school curricula throughout all levels of pre-university education, as entrepreneurial skills are considered as valuable life skills even in other careers than those which are business related;
- Interface between science and business, between universities and industries seen as a factor of commercial success for students, teachers and researchers and as an

opportunity to exploit research results commercially;

- Unlocking the knowledge and expertise held in universities, developing advice on intellectual property rights and improving access to well-equipped incubator space for academics are seen as valuable means to enhance the contribution of higher education institutions to the entrepreneurial mindset of people.

A *Summary Report on the public debate* following the Green Paper was published by the European Commission in October 2003.

One of the responses to the Green Paper is that of dr. Bert Twaalhoven. His *Red paper on Entrepreneurship*<sup>(15)</sup> is based on the “*Ten Proposals to Accelerate Change in the European Entrepreneurial Culture*” by Professor Juan Roure representing Growth-Plus. Among the various factors that are important for entrepreneurship, the Red Paper mentions the need for promoting EE on a Pan-European level through the following action steps that should be translated into measurable targets and monitored on a yearly basis:

- Teaching the teachers;
- Creating networks between technical schools and business schools;
- Promoting partnerships between universities and businesses.

In February 2004, the European Commission adopted an “*Entrepreneurship action plan*”,<sup>(16)</sup> which suggested horizontal measures to create a supportive framework for entrepreneurship policy in the EU Member States. The cultural dimension and the need for more supportive measures in all the levels of education are included in



the *European agenda aiming at enhancing entrepreneurship*.

In March 2005, the “*European Youth Pact*”<sup>(17)</sup> adopted by the European Council mentions as a key element the promotion of entrepreneurship among young people.

In November 2005, the European Commission launched an integrated “*Modern SME Policy for Growth and Employment*”.<sup>(18)</sup>

“*Education and Training 2010 Work Programme*” is the proposal of the European Commission for a *Recommendation on key competences*. Adopted in 2005 by the European Parliament and the Council, this document includes entrepreneurship in a reference framework of eight key competences for lifelong learning, necessary for personal fulfilment, social inclusion, active citizenship and employability.<sup>(19)</sup>

In February 2006, the European Commission addressed to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions a Communication aiming at implementing the Community Lisbon Programme: “*Fostering entrepreneurial mindsets through education and learning*”.<sup>(20)</sup> In the wider context of lifelong learning, this Communication focuses on education from primary school to university, including also secondary level vocational education (initial vocational training) and technical institutions of tertiary level and aims to support EU Member States in developing a more systematic strategy for entrepreneurship education. As the Communication underpins, best practice can be identified in Europe; the challenge is to spread further the existing positive examples.

In October 2006, the European Commission together with the Norwegian Government invited the various actors involved in EE to a *European Conference on Entrepreneurship Education* in Oslo.<sup>(21)</sup>

Entrepreneurship Education in Europe: Fostering Entrepreneurial Mindsets through Education and Learning. Oslo, 26-27 October 2006, Final Proceedings, also available at:

Through the presentation of 38 cases of good practices from across Europe, the Conference aimed to discuss how to move forward in promoting entrepreneurial education more systematically. The origins of the debate were the recommendations presented in the Commission’s Communication adopted in February 2006. The Conference covered policies and practices in fostering entrepreneurial mindsets of young people through education at all the levels, from primary school to university. Among the concrete proposals and commonly agreed ideas, one can mention:

- A better integration of programmes and activities aiming at entrepreneurship education in the established curriculum;
- The scope of entrepreneurship education goes far beyond training on how to start a business;
- A common European platform in order to help sharing and dissemination of existing projects and teaching material;
- An increased public-private partnership as a means to promote mentoring and/or caching from people with business experience;
- Students should be directly involved in enterprise projects as a complementary means to strengthen entrepreneurship education in higher education.

The high number of ideas advanced by relevant stakeholders from 33 countries during the Conference resulted in a detailed *Catalogue of proposals for action* – the “*Oslo Agenda for Entrepreneurship Education*” – for all the actors involved: the European Commission, national and regional/local governments, educational institutions, NGOs, businesses, pupils and students.<sup>(22)</sup>

The *Oslo Agenda* may be regarded as a „menu of proposals” for how to promote entrepreneurship in society, and with a particular focus on actions that may be taken in the educational system, and it is structured in the following six parts: (A) Framework for political support; (B) Support to Educational Establishments; (C) Support to Teachers and Educators; (D) Entrepreneurship activities in Schools and in Higher Education; (E) Building links and opening education to the outside world; (F) Communication activities.

The items relevant to higher education are in section D:

- Integrate entrepreneurship across different subjects; all faculties/disciplines should develop opportunities for students at all levels to experience entrepreneurship;
- Bring entrepreneurs into the classroom and involve students directly in enterprise projects;
- Increase the production of European case studies;
- Give entrepreneurship more academic esteem;
- Encourage students, graduates and researchers with commercially viable business ideas to develop them into companies;
- Embed evaluation systematically into all programmes.

Although higher education is not specifically addressed in section E, most of the items of that section are also of interest to the provision of EE in HEIs:

- Encourage the creation of learning communities – links between public and private sector;
- Encourage private partners involvement in education for entrepreneurship – funding or in kind contributions;
- Businesses should dedicate part of the staff working time for activities within schools and universities;
- Research on how employers can be better engaged in education;
- Develop pedagogical abilities of entrepreneurs and business people aiming at improvement of classroom activities;
- Conceive, develop and promote a label for “entrepreneurial schools” and “entrepreneurial universities”;
- Build Entrepreneurship Centres at the local level for assisting schools and universities in establishing links with enterprises.

Generally, the *Oslo Agenda* seems to be based on good, qualitative insights on entrepreneurship and pedagogical principles related to entrepreneurship education. However, the approaches suggested in the *Oslo Agenda* are fairly general in nature; to some extent it seems to disregard the importance of relating the strategies to specific aspects of entrepreneurship and the industrial structure of the individual country and region. As we have pointed out in previous sections of this report, there are significant variations between countries (and regions) regarding how the entrepreneurial function is working. A more explicit bottom-

up strategy should be developed in which the specific characteristics of the entrepreneurial function may be an important basis for designing national and regional strategies for entrepreneurship education.

Furthermore, a significant drawback of the current policy framework is that there are made very few distinctions between the role of higher education and the lower levels of the educational systems. Obviously, the role of higher education should be differentiated from that of the lower level institutions, in terms of more specialised programs in the general business related topics as well as the discipline specific issues related to commercialisation; there may be very different challenges faced by an entrepreneur starting up a company based in biotechnology compared to an entrepreneur starting up based on humanistic disciplines. Moreover, as we have pointed out earlier in our discussion, a specific challenge to higher education is to relate EE programs to the science-industry link in a systematic way.

In March 2007 the European Commission raised the idea to launch a *European Forum on Cooperation between Higher Education and the Business Community* as a new contribution to the enhancement of the socio-cultural environment. The *Forum* was seen as an opportunity to encourage partnerships between the “providers” of knowledge, skills and competences and the “users” aiming at supporting each other for the benefice of their own organisations, of their staff and their students, for the benefit of society at large.

The first meeting of the *European University/Business Forum* took place in Bruxelles on 28-29 February 2008. It was in

fact a platform for the exchange of best practice and for the identification of innovative solutions among the around 200 participants. It was organised in plenary meetings and in four parallel workshops:

- *Modernising governance structures within universities.* Focusing on governance reform of HEIs, participants have discussed the introduction of more market-type mechanisms and responsiveness to society’s diverse needs. This includes to increase capacity and to motivate willingness of HEIs to become more involved in a wider range of activities and to involve more stakeholders in modern university governance.

- *Curricular development* in close linkage to the introduction of the three cycle’s university education is also on the agenda of higher education’s modernising reform. Learning outcomes of the various programmes should be relevant for the job market in order to ensure the employability of graduates. The entrepreneurial mindset of students should also be stimulated by offering modules or full programmes dedicated to this issue as self employment is seen as an alternative to getting a job in a company.

- *Continuing education.* There is a growing need for ongoing education to keep the workforce up to date with competitive qualifications for Europe. The fast changing nature of many professions in the context of using modern ICTs, the more highly educated people entering the labour market and the decline of manufacturing jobs are some of the factors which determine an increased need for continuing education all over Europe. Continuing education is also seen as a tool for widening participation and better social inclusion.

- *Mobility* has several meanings in the context of university/business link. It is firstly a tool to promote knowledge and know-how transfer between national and international participants to various cooperation schemes between universities, research institutes and industries. Secondly, it facilitates researchers and post docs to spend time in industry placements. Thirdly, it offers students internship and placement opportunities in companies. All these activities help companies improve their understanding of the types of skills available in the three different cycles of university studies and in the post docs. On the other hand, mobility helps students to understand real working experience and encourages entrepreneurship and innovation.

The feedback received during and after the first *University/Business Forum* demonstrates a high interest of all the stakeholders involved and the initiative to set up this platform for a structured dialogue between the relevant actors was highly appreciated.<sup>(23)</sup> As follow-up events new thematic fora were scheduled to be organised on *Continuing Education and Lifelong Learning* and on *Curriculum development and Entrepreneurship*.

### Policy recommendations

The general conclusion to be drawn from the previous discussion is that there is a great potential for developing EE policy further, at the European level as well as at the country level. A lot is happening in the EE field, and particularly at the level of higher education policy approaches so far are less developed.

The main trends in the development of EE in European universities may be summarised in the following points:

- EE is expanding in volume;
- New target groups are identified. While EE traditionally was based in economics, business administration and technology, programmes now also include target groups belonging to other fields, like the social sciences, the humanities, and creative and cultural disciplines;
- More specialised programmes are developed focusing on specific types of commercialisation activities related to specific disciplines (physics, chemistry, biology, etc.) or specific industrial fields;
- More experience based learning.

In line with these trends, a number of issues may be raised regarding the future provision of EE in higher education and the role of policy related to this.

The basic approach taken here is that the design of policy should be based on a bottom-up perspective, i.e. the need for skills and competences related to entrepreneurship among people with higher education should be based on an analysis of the entrepreneurial function. As discussed, the entrepreneurial function may be characterised in many ways, and the quality of the entrepreneurial function may vary a lot between countries. Thus, the design of EE policy should be based on an analysis of these characteristics and an assessment of what needs for entrepreneurial skills and knowledge that is of importance for the future development of the society.

All the master and doctoral programmes designed by universities to meet new challenges in professional development should train students for multiple career opportunities and hence must adapt and innovate to build up appropriate skills and

generic aptitudes to work in a changing environment. Entrepreneurship education is part of the more comprehensive or lesser extent response offered by universities to the needs of the knowledge society and economy.

In the design of a policy framework at least *five references* should be considered: scale, orientation, pedagogy, specialisation, science-industry link.

The first aspect is the *scale* of providing EE – to what extent should EE be offered at the level of the three study cycles, and to what extent should EE be offered in general or specialised courses? Our recommendation would so far be that EE should be offered at most HEIs at the first cycle (bachelor) level as well at the second cycle (master's degree) level. For groups of students that may be regarded as of specific strategic importance to industrial development, like students in engineering or business administration, a basic (introductory) course to entrepreneurship should be compulsory for virtually all the students, while elective courses should be available for smaller groups.

The second issue is the *orientation* of EE, i.e. to what extent should theoretical or practical approaches be prioritised, and to what extent should teaching be aiming at developing entrepreneurial skills and behaviour. Generally, there should be a mix of approaches, as theoretical knowledge about entrepreneurship may be as important as the practical skills. However, given the information from the country reports, there so far seems to be a bias towards theoretical courses, at least in some countries, which indicate that at least to some extent it is important to develop programmes with stronger emphasis on entrepreneurial skills and behaviour.

The third issue is related to *specialisation*, i.e. what should be the balance between general introductory courses aiming at all students independent of disciplinary backgrounds, and specialised courses focusing on specific issues related to the commercialisation of specific technologies or types of knowledge. Our impression from the country reports is that there currently is a great potential for developing more specialised entrepreneurship programmes. In particular, this seems to be important to facilitate the commercialisation of research output in fields that are recognised of strategic importance to future development of the knowledge driven economy.

The fourth issue is about *pedagogy*, and here there is a strong bias in most entrepreneurship programs of being too traditional and based on lectures and traditional class room teaching. More emphasis should be on designing programs in order to give the students contacts with real entrepreneurs and give the opportunities for working with real cases.

The fifth issue is the relationship between EE and *the science-industry link*. As pointed out above, most HEIs do not organised their entrepreneurship programs so they actively can interfere with ongoing processes of commercialisation and take advantage of opportunities to work with real cases. Thus, there is a great potential for improving EE programs, and given the tendency that most HEIs in the future will be colocated with some kind of technology transfer institution, it should also be relevant for most HEIs to design programmes that are based on close interaction with these institutions.

In addition to these five points, we will also point at gender and regions as important

aspects to consider when designing EE. Generally, there is a strong male bias in entrepreneurial activities, and the share of women taking the role as entrepreneur is generally low, in most countries below 30 percent, and in some countries even below 20. Moreover, there is a significant variation between industries, in some traditionally male dominated industries, the share of female entrepreneurs is extremely low, like in construction and some technology based industries.<sup>(24)</sup>

The issue of regions may also be of great importance in some countries, as start-up rates may vary a lot between regions depending on the regions' industrial structure and culture for entrepreneurship. In particular, it may be important to relate entrepreneurship programmes to the specific situation of regional industries and clusters<sup>(25)</sup>.

### Concluding remarks

The approach taken in this paper may be regarded as a demand-oriented approach in which the need for EE is assessed by taking into account the performance of the entrepreneurial function in each country/region. However, the exercise of summarising the various indicators has revealed some problems related to how to interpret the results. Partly, this is due to conflicting results obtained by similar indicators, partly to the great diversity revealed through the indicators. Thus, the indicators provide no basis for straight forward conclusions regarding the provision of entrepreneurship education, and the examination of the statistical evidence thus has to be supplemented by qualitative

assessments of various aspects of the entrepreneurial function.

Our discussion of the current policy status at the EU-level as well as for Romania and Norway reveals a great potential for further development of policy issues and strategies for the provision of EE by higher education. The policy strategies are very general in nature, there is little discussion on the diversity of countries and regions and how this should be reflected in entrepreneurship programs. And above all, there is little discussion of what should be the specific role of higher education compared to the lower levels of the educational system. Thus, the most significant drawback in the current situation is that a specific policy targeting the explicit role of HEIs in the provision of EE is lacking.

A *first* step in the development of a future EE policy is to raise the issue of what should be the specific role of HEIs when providing entrepreneurship programmes. Given that the pre-university level of the educational systems provide basic knowledge about entrepreneurship as well as the basic skills for operating smaller businesses, the role of higher education should be to offer more comprehensive and specialised programmes to develop competences beyond what is given by the lower level programmes.

An important issue related to this is what should actually be the role of Government policy related to the provision of EE in higher education. As HEIs are autonomous institutions, the role of the Government is mainly to work through incentives. Moreover, as many HEIs are far beyond the Ministry of Education regarding knowledge about entrepreneurship education, the main tasks for policy might be to facilitate



processes of information exchange and to organise some kind of coordinated process in collaboration with the universities in order to clarify the objectives for the future provision of EE.

A *second* step in this process might be to coordinate the efforts of HEIs in developing more specialised strategies for addressing needs for knowledge and competencies both related to various disciplines and to specific target groups. There should be a clear distinction between what is offered at the bachelor level and what is offered at the master level. As many issues related to starting up new firms are general in nature, it seems feasible to offer general introductory courses at the bachelor level which are open to all students, while this may be followed up at the master level with more specialised courses with focus on specific issues related to the actual disciplines.

An important issue for the future development of EE is how to design

programmes to more actively contribute to knowledge transfer and to start-ups of knowledge based firms in fields or disciplines the programmes are focusing on. Moreover, there is generally a great challenge to integrate EE with the science-industry link. The currently more theory oriented educational programmes in entrepreneurship should to a greater extent include issues related to the science-industry interface and the commercialisation of knowledge products.

Programmes offered at the master's degree level should focus on the commercialisation of research output relevant to the specific disciplines, and a more experience based pedagogical approaches should be developed. Europe-wide and in most of the countries there are interesting cases of how this can be organised. The main task for the Government might be to facilitate the dissemination of that information and to provide incentives to HEIs to develop comprehensive programmes for entrepreneurship education.

---

## Notes

---

- <sup>(1)</sup> This paper is based on intermediate outcomes of the second phase of the U-Know research project [Understanding the Relationship between Knowledge and Competitiveness in the Enlarging European Union] which is partially financed by the European Commission in Framework Programme 6, Priority 7 on "Citizens and Governance in a knowledge based society." The authors are solely responsible for the contents which might not represent the opinion of the European Commission.
- <sup>(2)</sup> According to Spilling, O., Pîslaru, D., Sauermann, J. (2007) "State of the Art in Researching Entrepreneurial Education" and Spilling, O. (2008) "Entrepreneurship education in some European countries", papers presented as parts of the U-Know Project.
- <sup>(3)</sup> See Spilling, O., Korka, M., Borlaug, S. (2008), "Entrepreneurship Education and the Entrepreneurial Function in Higher Education – Some Reflections on Policy Implications"- part of the U-Know Project.
- <sup>(4)</sup> Green Paper. Entrepreneurship in Europe, European Commission, Brussels, 2003, COM (2003) 27 final.
- <sup>(5)</sup> Flash Eurobarometer 134 "Entrepreneurship", November 2002
- <sup>(6)</sup> See Miclea, M. (2004). "Learning to do" as a Pillar of Education and its Links to Entrepreneurial Studies in Higher Education: European Contexts and



- Approaches”, in “Higher Education in Europe“, vol. 29, No.2.
- (7) Summary Report. The public debate following the Green Paper “Entrepreneurship in Europe”, European Commission, Brussels, 19.10.2003, p.3.
- (8) Available at: <http://europa.eu.int/com/enterprise/enterprise-policy/charter/index.htm>
- (9) Available at: [http://europa.eu.int/com/enterprise/entrepreneurship/support\\_measures/training\\_education/index.htm](http://europa.eu.int/com/enterprise/entrepreneurship/support_measures/training_education/index.htm)
- (10) Available at: [http://ec.europa.eu/education/policies/pol/policy\\_en.html](http://ec.europa.eu/education/policies/pol/policy_en.html)
- (11) Available at [http://europa.eu.int/com/enterprise/entrepreneurship/support\\_measures/training\\_education/index.htm](http://europa.eu.int/com/enterprise/entrepreneurship/support_measures/training_education/index.htm)
- (12) “Helping to create an entrepreneurial culture. A guide on good practices in promoting entrepreneurial attitudes and skills through education“, European Commission, Directorate-General for Enterprise, Brussels, 2004.
- (13) Green Paper. Entrepreneurship in Europe, European Commission, Brussels, 2003, COM (2003) 27 final.
- (14) Summary Report. The public debate following the Green Paper “Entrepreneurship in Europe”, European Commission, Brussels, 19.10.2003, p.3.
- (15) Red Paper on Entrepreneurship, 2003.
- (16) The European Agenda for Entrepreneurship, European Commission, COM (2004) 70 final
- (17) Available at: [http://ec.europa.eu/youth/policies/youthpact\\_en.html](http://ec.europa.eu/youth/policies/youthpact_en.html)
- (18) Modern SME Policy for Growth and Employment, COM (2005), 551 final.
- (19) EC proposal for a Recommendation on Key Competences for Lifelong Learning, COM (2005), 548 final.
- (20) Fostering entrepreneurial mindsets through education and learning, COM (2006) 33 final [http://ec.europa.eu/enterprise/entrepreneurship/support\\_measures/training\\_education/oslo.htm](http://ec.europa.eu/enterprise/entrepreneurship/support_measures/training_education/oslo.htm)
- (22) The Oslo Agenda for Entrepreneurship Education in Europe. Available at: [http://ec.europa.eu/enterprise/entrepreneurship/support\\_measures/training\\_education/oslo.htm](http://ec.europa.eu/enterprise/entrepreneurship/support_measures/training_education/oslo.htm)
- (23) Report available at: [http://ec.europa.eu/education/policies/educ/business/forum\\_en.html](http://ec.europa.eu/education/policies/educ/business/forum_en.html)
- (24) See Spilling, O. (2005). *Women entrepreneurship, management and ownership in Norway 2004. A statistical update*, NIFU STEP, Oslo.
- (25) The authors have developed specific policy recommendations for the higher education systems in Norway and Romania available on the web-site of the U-Know project: <http://iwh-halle.de/projects/uknow/index.html>

---

## References

---

- Entrepreneurship Education in Europe: Fostering Entrepreneurial Mindsets through Education and Learning*, Final Proceedings, Oslo, 26-27 October 2006
- The European Agenda for Entrepreneurship*, European Commission, COM (2004) 70
- European Youth Pact*, available at: [http://ec.europa.eu/youth/policies/youthpact\\_en.html](http://ec.europa.eu/youth/policies/youthpact_en.html)
- Green Paper on Entrepreneurship in Europe*, European Commission, Brussels, 2003, COM (2003) 27
- Helping to create an entrepreneurial culture. A guide on good practices in promoting entrepreneurial attitudes and skills through education*, European Commission, Directorate-General for Enterprise, Brussels, 2004.
- Miclea, M. “Learning to do” as a Pillar of Education and Its Links to Entrepreneurial Studies in Higher Education: European Contexts and Approaches”. In: “Higher Education in Europe”, vol. 29, No.2/2004
- The Oslo Agenda for Entrepreneurship Education in Europe*, Available at: [http://ec.europa.eu/enterprise/entrepreneurship/support\\_measures/training\\_education/oslo.htm](http://ec.europa.eu/enterprise/entrepreneurship/support_measures/training_education/oslo.htm)
- Spilling, O. *Women entrepreneurship, management and ownership in Norway 2004. A statistical update*. NIFU STEP, Oslo, 2005

# The Labour Mobility in the European Union: Economic and Social Determinants

■

**Liana Son**  
**Ioan Talpoş**  
**Ciprian Şipoş**  
West University, Timişoara

***Abstract.** East and Central European countries are, most of them, migration countries for 18 years now and controversies on this subject are constantly emerging in the context of European Union enlargements. This paper aims to analyze some of the determinants of intra-European mobility and which are the interest destination countries for the migrant workers. The analysis is based upon a factorial model which includes variables concerning the differential of labour cost and life and work conditions between European receiving and origin countries, in the decision of moving abroad.*

**Key words:** international mobility; European labour markets; migration determinants.

■

**JEL Codes:** J01, J61.  
**REL Codes:** 12E, 12G.

### 1. Macroeconomic evidences: European mobility and foreign labour force

The evolution of the last wave of the globalization didn't been without contradictions, but contrarely, the process is asymmetric and non-uniform, especially between countries with large development differences. One of the most important paradoxes of globalization process is international migration. As it has been noticed by Faini, even from the end of the last century, "*International migration is the absentee in the current wave of globalisation, particularly in Europe*" (Faini, de Melo, Zimmermman, 1999, p. 1). This tendency is still present nowadays, "international migration seems to be, currently, excluded from the new globalization process" (Tapinos, Delaunay, 2000). In a world where distance and time have reduced (up to the edge in some fields), concerning the geographical mobility, we take part to a reinforcement of territorial dimension of the countries. The opening of frontiers for free passing of individuals wasn't connected with the liberalization of commercial and financial markets, but contrarely, the states imposed sequentially a growing number of barriers for human flows, espacially regarding the labour market access. Far from creating a global market, diversity, segmentation, the surplus or lack of human capital are some specific characteristics of labour markets, in some fields and countries.

Despite the large number of barriers some ways were found in order to force the frontiers, the growth of migratory flow being a reality. From 2002, between 1.5 and 2 milion immigrants set their home on

European territory, but the estimations indicate a decrease of its population with 50 million people by 2060. So, immigration can be a double challenge for the Europe, because it is a key-element in relaunching European demographics and a key-element for the dynamics of the economy (Barrot, 2008). For this reason, Europe must promote the open door policy for foreign labour force, for the immigrants that arrive legally. In a concisely presentation, the situation of the working immigrants in the European Union is the following: on January the 1<sup>st</sup> 2007 on the European territory, EU-27, there were over 27.9 million non-national people, among which 97.5% were on the EU-15 territory (25,823 million people in 2006) and only 7.5% on the territory of the 12 states that acceded the European Union in 2004 and 2007. Moreover, in five member states there was a massive concentration of foreigners, approximately 74.9% (20.897 milion people); for example: 7.3 milion people in Germany; 4 milion in Spain; 3.5 milion in France; over 3.4 milion in United Kingdom; 2.7 milion in Italy. In 2007 the foreign population represented 5.64% form the total population of the EU (non-national population from the EU and from countries outside the EU). This average comprises a large interval of the foreign population in the EU-27, from 38.2% in Luxemburg, to 20% in Latvia and 18% in Estonia, 9.8% in Austria, 9% in Spain, 8.9% in Germany and 8.5% in Belgium, 8% in Greece and 7.3% in Ireland, approximately 5.3-5.6% in Sweden, France, United Kingdom, to 4.5% in Italy, and countries where the presence of foreigners is very low (Slovakia 4.7%), close to 0.0%: Romania 0.12%, Bulgaria 0.34%. (Eurostat, 2008).

Some comparations: population, net migration, GDP level in UE-27

Table 1

Country	Population 01.01.2008	Net migration 2007	GDP/cap, 2007 Current prices	PIB/ cap (PPP) 2007
	thousands	totals	USD	USD
Austria	8331.9	31382	45,181.1	38,398.6
Belgium	10666.8	62.327	42,556.9	35,272.9
Bulgaria	7640.2	-1.397	5,186.4	11,302.5
Cyprus	794.6	12784	27,326.6	46,864.6
Czech Republic	10345924	83.945	17,069.7	24,235.5
Denmark	5475.8	23.071	57,260.9	37,391.8
Estonia	13.409.3	160	15,850.7	21,094.1
Finland	5300.5	13877	46,601.8	35,279.5
France	63753.1	71000	41,511.1	33,187.7
Germany	82201.8	47.802	40,415.4	34,181.1
Greece	11215.0	41000	28,273.2	29,172.1
Hungary	10045.0	14042	13,762.2	19,026.5
Ireland	4419.8	64394	59,924.4	43,143.9
Italy	59618.1	494315	35,872.4	30,448.3
Latvia	2270.9	-642	11,984.7	17,416.0
Lithuania	3366.3	-5244	11,354.3	17,661.1
Luxembourg	483.8	6001	104,673.2	80,457.3
Malta	410.6	2014	18,088.0	53,359.3
Netherlands	16404.3	-1644	46,260.6	38,485.9
Poland	38115.6	-20485	11,041.2	16,310.7
Portugal	10617.6	19500	21,018.8	21,700.8
Romania	21518.6	745	7,697.2	11,386.5
Slovak Republic	5401.0	6793	13,857.4	20,251.1
Slovenia	2025.8	14134	22,932.7	27,204.8
Spain	45283.2	701948	32,066.9	30,120.3
Sweden	9182.9	53978	49,654.8	36,494.3
United Kingdom	61186.0	174603	45,574.7	35,134.3
UE-27	497481.6	1910403		

Source: Eurostat; IMF *World Economic Outlook*. Database for April 2008.

In a large number of the EU countries, the majority of these foreigners have their origin in other EU member states (in 19 from 25 for which there is data, for the beginning of 2006): Latvia 99.4%; Luxemburg 95%, Belgium 77.1%; Slovenia 97.4%, Slovakia 84.1%, Austria 86.8%, Germany 81.1%. In six states (Greece, France, Italy, Portugal, Spain) the percentage of european foreigners ranged between 30.2-47.6%. Even if the number of foreign population on the EU territory is not so big, if we take into consideration the total population of the EU, it is still important because the population growth is due to the migrants and not to natural growth, this being surpassed by the first one.

In 2006 the foreigners represented 6.6% from the total population of the EU-15 and only 2.0% from that of the new member states NM-12. By total EU-27, the proportion of foreigners was very clearly divided on different countries. Analizing the dynamics of the population within EU-27 in the last years, even if there is a tendency for growth in all the old member states (with the exception of Germany) and in some of the new ones (Czech Republic, Slovenia, Slovakia), per total the data indicates a decrease of the population within the EU. So, if on January the 1st 2008, the population of the EU-27 was of 497,482 milion people, for 2050 the demographic

projections display a decrease of approximately 470-480 million persons, after growing until 2025 (Eurostat, 2008).

A simple conclusion leads to the necessity of attracting more foreign labour force. For the Central and Eastern European (CEE) countries, with an important migrant potential, the access to the EU represented the critical point of the human mobility towards the developed poles of the Union. The drawing of labour force outflows from Central and Eastern Europe, generally of all migrants, indicates an intensification of this phenomenon in the period precursory the access to the EU. Moreover, starting with the XX Century, a diversification of the destinations and types of migration can be noticed, prevailing the migration for work or family reunification. Besides the achievement of bigger wages in other place than the origin country, other motivations for migration decision include human-social components: the necessity of having a secure job, improvement in life quality, a larger flexibility to face the requirements of employment, job satisfaction etc. On the other hand, the economic development of the new member states and their recent statute of communitarian states indicate them as potential destinations for immigrants from outside the EU and European continent.

The migration of labour force has become more and more visible during the last ten years, inclusive in the EU, even if

the expectations regarding mobility within the Union suggested a larger amplitude of the phenomenon. Once the restrictions regarding the free movement around the Union were staved off, totally or partially, the phenomenon obtained new valences through different dimensions, motivations, forms and effects on the countries of destination and origin, but also on those only transited and migrants themselves. Have migrated both unskilled workers, especially for the agricultural activity, hard and dangerous jobs, and also highly skilled workers, specialised in IT, medicine, economy etc.

In 2005, in France there were 1456.4 thousand foreign persons, representing 5.3% from the total labour force; in Spain 1688.6 thousand people, representing 8.1% from the total working population; in Germany 3832 thousand persons, representing 9.3% from the total labour force, in UK 1504 thousand people, representing 5.4% from the total working population, in Italy 1479.4% persons, representing 6.0% from the total labour force (in 2003); for Switzerland the statistics show that over 830.1 thousand persons, representing 20.9% from the total labour force. These destination countries for the migrants are also the favourite destination of the workers arriving from the Eastern and Central Europe, like Poland, Romania, viewed as countries of origin, exporting migrants.

## Nationals and foreigners on EU–27 labour market. Employment and unemployment rate

Table 2

Country	Economical active population, 2006 Thousand	Foreign workers in some EU countries, 2005		Employment rate, 2005 (%)		Unemployment rate, 2005 (%)	
		Foreigners Thousand	% foreign labour force	Nationals	Foreigners	Nationals	Foreigners
Austria	4124	418.0	12.0	68.3	61.5	4.5	11.8
Belgium	4686	453.3	9.1	61.9	51.8	7.4	16.0
Bulgaria	3238	..	..	..	..	..	..
Czech Republic	5202	151.7	2.9	68.3	61.5	7.9	6.9
Denmark	2904	109.3	4.0	76.3	55.8	4.7	10.0
Estonia	687	..	..	..	..	..	..
Finland	2673	53.0	2.1	68.8	50.6	8.3	20.5
France	27886	1456.4	5.3	63.5	52.2	8.8	17.8
Germany	41112	3823.0	9.3	66.6	53.5	10.6	19.8
Greece	4880	324.6	6.7	59.8	68.0	9.9	8.1
Hungary	4247	62.9	1.5	56.7	66.2	7.2	..
Ireland	2078	..	..	67.0	68.7	4.1	6.3
Italy	24627	1479.4	6.0	..	..	..	..
Luxembourg	206	196.2	62.6	60.9	67.3	3.3	6.0
Malta	162	..	..	..	..	..	..
Netherlands	8365	287.5	3.4	67.5	71.6	4.5	12.0
Poland	16959	..	..	..	..	..	..
Portugal	5587	271.4	4.9	57.4	59.9	7.5	11.8
Romania	10042	..	..	..	..	..	..
Slovak Rep	2680	6.2	0.2	64.6	72.3	16.4	..
Slovenia	1007	..	..	..	..	..	..
Spain	21586	1688.6	8.1	62.5	69.8	9.1	11.6
Sweden	4602	..	..	73.5	56.9	8.4	16.5
U.K.	29636	1504.0	5.4	72.1	62.3	4.3	8.5

..not available

**Source:** Eurostat “*The Enlarged EU. A Statistical Handbook*”, 2007-2008; OECD “*International Migration Outlook*”, 2007.

The number of foreign workers (from the member states and other countries) in the EU is considered to be approximately 15 millions. According to statistics, in present, even if it exists a general model of migration determined by the necessity of acquiring a good job, better paid, in places with high social and economic standards, behind the phenomenon have appeared strong connections between determinants of different nature: social, educational or regarding working and life conditions. On the other hand, there are many constraints due to numerous accretions and economic and social characteristics, including, and this is very important, a certain educational background.

## 2. Economic and social determinants of intra-european economic mobility

The configuration of new migration flows from Central and Eastern Europe (CEE), towards European destinations, that is, North-Western and South-Western Europe, come as a result of the process of liberalisation initialised by the European Union’s (EU) eastward expansion in 2004 and 2007. The opening of frontiers, albeit gradual, for workers from the 12 new member states has proven to be a contributing factor to the improved operation of European labour markets.

The migratory population is differentiated, based on various objectives: if migration aiming at family reunification is main objectif in an American context, labour migration has increased on the European continent. In this regard, from all immigration flows in some Western European countries (e.g. Austria, Belgium, Denmark, Sweden, the United Kingdom) the data indicates that 30-40% of those who migrate do so in order to find a job, with better pay compared to that in home markets. EU countries have become an important source for migrant workers. Despite some temporary restrictions imposed on labour originating in new EU member states, some 50-75% of mobile workers from these origins benefit from full freedom of movement (OECD, 2007).

Still, differentiated liberalisation of workers' access from new EU member states to old member states shapes new mobility flows, defining a migration from CEE towards two main areas of destination: 1) *North-Western Europe* and 2) *South-Western Europe*.

The methodological issues concerning the analysis stages are:

a) the countries analyzed are the member states of the EU-27,

b) influence variables of migration behaviour include economic determinants and components related to work and living conditions or job satisfaction. The analysis is based on a set of four measurement indicators of the working and family conditions (WCFL), a job content and satisfaction (JCS), the hourly labour force

costs and the dimension of the labour market in the countries receiving working immigrants (active economical population, AEP),

c) the identification of the most powerful correlations between the variables of influence,

d) the cluster type analysis and establishing the starting points and of those of destination for working immigrants,

e) establishing correlations between the stock of foreign labour force (from the ECE countries group on the markets of the two destination groups identified (North – West and South – West Europe) and the main motivational factors identified in the migration behaviour.

So that the influence variables used in the analyse are the following:

a. Composite Index as proxy for work conditions and family life (WCFL);

b. Composite Index as proxy for Job content and satisfaction (JCS);

c. Indicator on labour force hourly cost (LFHC);

d. Active economic population as proxy for labour market dimension (AEP);

e. Stock of the foreign labour force by origin country (FLFS).

Statistical analyse is based upon the standardized values of influence variables in order to establish its factorial values and cluster analysis. The standard values of each influence variable for the country/country-gruping is based on the folowing relation:

$$z_i = \frac{\bar{x}_i - m}{\sigma} \quad (1)$$



where:

$x_i$  is the average value in country  $i$  for each variable considered;

$m$  is the EU–27 average of the variable under consideration;

$\sigma$  the standard deviation.

1) *Factor F1* groups wage costs by hour (LFHC). The costs of labour force represent about 2/3 of the cost of goods and services and has a direct effect upon the enterprise and country's competitiveness, especially upon the unemployment of less qualified labour force. Its structure contains three elements: wages, social dues in employer charge and other costs (training, recruitment etc.). There are huge differences between the UE–27 countries regarding the cost of a working hour: as recent surveys reveal, the cost of a working hour in Romania was of only 2.48 euro whilst in UE–15 it reached over 25 euro. This might prove to be an essential driver in the decision of migrating,

the main reason of the migrant worker being the possibility of better earnings in another country, doing another job.

Nevertheless, it is not the countries that have a high cost per hour are not those ones towards which most Eastern and Central-European workers have headed. Other factors play an important role as well.

There is a growing relationship between the cost per hour and the level of development, the dynamic of this cost being sustained in the euro area but, lately, in the new member states as well. We are regarded the cost per hour as being an indicator directly related to the emigrant worker's potential, as compared to the GDP/capita, even if the actual wage cost of its structure is not equally distributed in all countries, given the fact that the level of protection and the social expenses required differ. Also, labour productivity, exchange rate, qualifications and skills influence the level of this essential element when taking into account the migration option.

**Labour force cost by hour, 2006**

Table 3

	UE15	BE	BG	CZ	DK	DE	EE	EL	IE	ES	FR	IT	CY	LV
€/h	25.1	31.58	1.65	7.14	31.98	27.7	5.5	15.37	21.95	15.77	30.31	23.39	11.98	3.41
	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SV	UK
	4.21	31.98	6.34	8.69	27.41	26.67	6.03	10.97	2.68	11.29	5.33	27.37	32.16	24.47

Source: epp.eurostat.ec.europa.eu

2) *Factor F2* groups living and work conditions (WCFL), along with job content and satisfaction (JCS) in various countries.

Factor 2 can be defined as synthesising the qualitative aspect of labour and working, based on standardized values.

**Working and family life conditions (WCFL)**

The inclusion of an social variable in the analysis in order to quantify the more and more complexe role of life and working conditions in migration decision start up from a composite index as proxy

of these conditions and takes in consideration seven questions of the *Fourth European Working Conditions Survey* (EWCS 2005), such as: usually working days per week or long working days. Also, includes some aspects of life conditions, presented in the table 4:

**Work conditions and family life (WCFL)**

Table 4

Nr. crt.	Nr. survey	Component loadings	Dates for (%s)		
			UE-27	RO	BG
1	Q18.	Working hours fit family/ social commitments well or very well?	79.4	73.8	73.7
2	Q19.	Contacted about work outside normal working hours?	22.1	16.4	11.3
3	Ef4c.	Caring for and educating your children every day for an hour or more?	28.8	38.4	35.6
4	Ef4d.	Cooking and housework	46.4	52.0	46.3
5	Q9a	% this more than one job	6.2	5.8	5.3
6	Q14e_ef	Long working days	16.9	36.3	24.3
7	Q8b	% usually working five days per week	65.1	44.2	63.0

Source: EUROFOUND, EWCS 2005.

According to European Commission data, in EU-15 a proportion of 79.8% of the population enjoys life/work balance, as opposed to 73% of those living in new member states. Concerns for time spent on household chores vary from 30% in the Czech Republic, Greece to 40% in Germany, 50% and over in Belgium (54.4%), Denmark (57%), Ireland (58%), France (51.5%), Slovenia (55.1%), Romania (52%), United Kingdom (57.9%) etc. There are large differences in the time allocated for children’s education (every day an hour and more), a correlation with daily occupations being observed. So, 14.9% percent of people in Spain, 18% in Germany, 20.1% in Czech Republic are citing this as a daily activity, going up to 36.1% in Ireland, or 42% in Hungary, 45% in Netherlands, 34.7% in Poland, 40.6% in Portugal.

The working conditions are extremely different in EU countries. If we take the specific case of Romania, a country which registered large outflows of labour in recent years, work conditions here show that, for example, 36.3% of people in this country work overtime, against an average of just 16.9% in EU-27.

On the other hand, while 65% of those in EU-27 member states reported working five days a week, this percentage was at 44.2% in Romania, given the higher number of those who exceed this number of working days per week in this country.

Thus, in Romania 51% of labour works over 40 weekly hours. One of the main reason for more hours being worked here compared to the average European member state are the number of daily hours, with 36% of Romanians working in excess of 10 hours a day. That compares to a

15-16% doing so in the EU–25, and 20% in new member states. Moreover, EWCS data shows that in the period 2001-2005 the average working week has grown in Romania, from 45.9 to 46.4 hours, while the EU–15 average registered a declining working week, from 38.2 to 37 hours while in the NMS12 the decrease was from 44.4 to 42.8 hours per week. The same situation is reflected in working time distribution: 24.3% of Romanians work night shifts. Then, about 40% work Sundays and 68% on Saturdays, compared to 28%, and 53%,

respectively, for the EU average. However, Romanians appear to benefit from more flexible working hours, as just 46% declare to have a set starting and finishing time for their work programme, as opposed to 61% of the average in EU member states (EWCS 2005).

### Content and job satisfaction (JCS)

To determinate the composite index JCS we are using the data from seven questions from EWCS study:

### JCS Index

Table 5

Nr. crt.	Nr. survey	Component loadings	Dates for (%)		
			UE-27	RO	BG
1	Q36	Satisfied or very satisfied with working conditions	82.3	58.8	66.6
2	Q37a_ef	I might lose my job in the next 6 months	13.7	18.5	22.9
3	Q37b_ef	I am well paid for the work I do	43.2	24.1	28.4
4	Q37c_ef	My job offers good prospects for career advancement	31.0	18.4	25.3
5	Q23a	Meeting precise quality standards	74.2	68.0	60.4
6	Q23b	Assessing quality for own work	71.8	59.8	55.7
7	Q27	Job skills match need more training	13.1	11.5	5.5

Sursa: EUROFOUND, EWCS 2005.

In terms of the perceived work content and satisfaction of European nationals, 82% of all those in EU–27 appear happy with their working conditions, the proportion being higher in the more economically advanced member states. For example, 92.7% of those in the United Kingdom, 89.6% of Austrians, 89.2% of Germans, and 89.5% of Belgian respondents agree with that (EU–15 average is almost 60%). However, a different picture appears at the level of new member states, where just about 60% are satisfied with their work conditions, whilst

in Romania and Bulgaria this percentage drops even lower, to 53% of all respondents. The relatively low satisfaction with working conditions is complemented by the 19.2% of those in new EU members fearing to lose their job, as opposed to the 13% EU average.

The same situation is reflected in the case of the satisfaction with pay for work undertaken: while in the EU–25 almost 45% consider salary to be appropriate, in Romania and Bulgaria only a 24% and 28%, respectively, consider their pay appropriate.

The statistical method conduct to a taxonomy of analysed contries based on the following correlations:

- *Work and life conditions* directly correlated with the answers to questions Q18, Q19, Ef4c, Q9a, Q14e\_ef, Q8b), and
- *Content and job satisfaction* correlated with the answers to questions Q36, Q37a\_ef, Q37b\_ef, Q37c\_ef, Q23a, Q23b, Q27.

The method supposes, like in the case of hourly wage costs, to calculate the standardized values  $z_i$  for the two variables based on the relation 1.

**EU-27 labour market dimension (AEP)**

Labour market capacity must not only to attract but also to integrate in a grater proportion the foreign workers looking for a job. Many countries offer wage conditions, occupational and life standards that could satisfy the needs of labour force. But, the access on the labour markets are limited by the general macroeconomic conditions, such as economic active population. In order to see the labour markets more attractive upon its dimension, we are using an indicator based on economical active population

**Economical active population for some EU countries (AEP, thousand)**

Table 6

BE	BG	CZ	DK	DE	EE	EL	IE	ES	FR	IT	CY	LV	LT
4686	3238	5202	2904	41112	687	4880	2078	21585	27866	24627	378	1167	1593
LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SV	UK	
206	4247	162	8365	4124	16959	5587	10042	1007	2660	2673	4602	29636	

**Source:** Eurostat, “Statistical portrait of the European Union 2008 – European Year of Intercultural Dialogue”, European Commission.

**Correlations matrix of influencing variables**

The correlation matrix between the standardized values of the variables (LFHC, WCFL, JCS, AEP) depicts the stronger correlations that can establish the main motivational determinants of migration process. Using a method like Principal Component Analysis (PCA), that suppose to eliminate the countries with a weak factorial correlation, we obtained a R-square coefficient  $R^2=0.502$  for all the countries in the survey, using the standardized values. The calculation of the correlation matrix for the standardized

values associated with the investigated countries lead to the following values:

**Correlations Matrix**

Table 7

	WCFL	JCS	LFHC	AEP
WCFL	1			
JCS	0,571901912	1		
LFHC	0,42766589	0,74982	1	
AEP	0,005704416	0,196223	0,307106	1

The results in the matrix indicate the existence of certain correlations, namely:

- a strong direct correlation between variables WCFL and JCS ( $R^2 = 0.571$ ), justifying the *Factor 2* (the same

- qualitative nature of both variables)
- a strong direct correlation between variables LFHC and JCS ( $R^2 = 0.749$ ) justifying the taxonomy of countries in report of the two factors: *Factor 1* (quantitative,

hour labour force cost) and *Factor 2* (qualitative, WCFL and JCS)  
 Based on establishing the type of correlation and the hierarchy of correlation coefficient values we identified two essential factors (main components), thus:

**Factor 1 and Factor 2 values**

Table 8

	UE15	BE	BG	CZ	DK	DE	EE	EL	IE	ES	FR	IT	CY	LV
F1	0.432	1.0205	-1.699	-1.200	1.057	0.668	-1.350	-0.453	0.1454	-0.416	0.905	0.276	-0.761	-1.539
F2	0.137	0.316	-0.491	-0.671	0.543	-0.054	-0.334	-1.029	0.144	0.106	0.466	-0.175	0.337	-0.491
	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SV	UK
F1	-1.467	1.057	-1.273	-1.060	0.642	0.574	-1.301	-0.852	-1.606	-0.823	-1.365	0.638	1.073	0.374
F2	-0.539	0.743	-0.381	-0.049	0.238	0.050	-0.511	0.394	-0.857	-0.395	-0.570	0.055	0.164	0.632

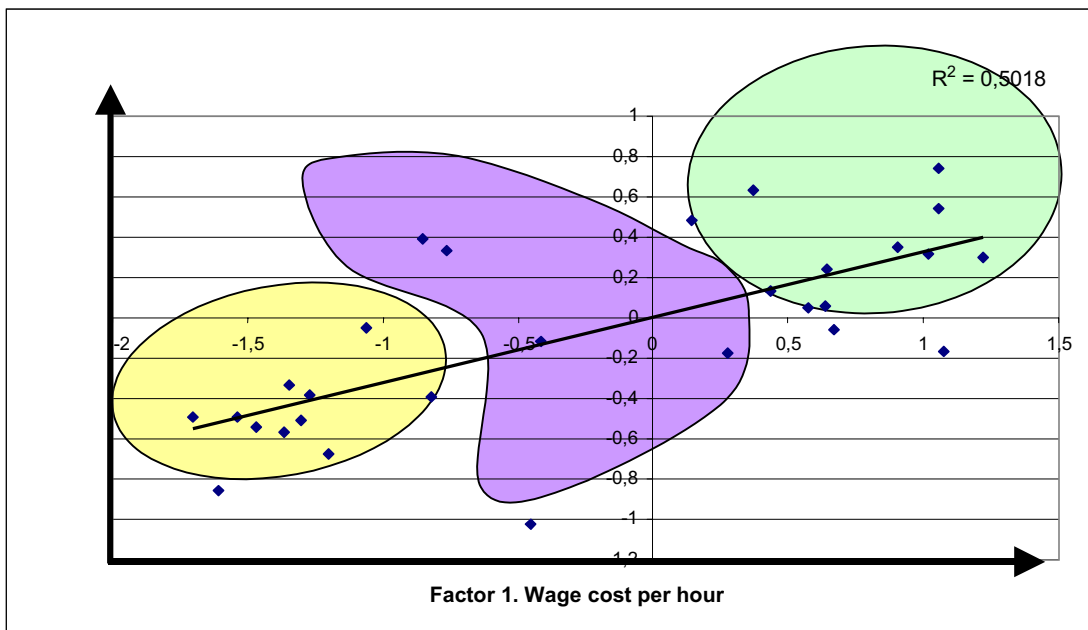
Source: own calculations.

**The correlation between the Factor 1 (LFHC) and the Factor 2 (WCFL+JCS)**

A triad which we have supposed earlier in relation to recent migration flows can be identified, with three poles corresponding to the groupings of countries A, B, and C. The arrows in figure 1 indicate the direction of labour mobility, which can

be seen as a functions of the two factors plotted here (work conditions, family and job satisfaction on one hand, and wage costs on the other hand) (Hiriş, Son, Şipoş, 2008). The graphical representation of grouping the countries is made based on the correlations between essential factors, namely:

**Factor 2. Work conditions, family life and job satisfaction**



**Figure 1.** The migration determinants correlation and countries grouping

The figure depicts the motivational triad of labour mobility within the European Union:

i) Countries in *area C* can be characterized by factors related to relatively low wages, and one related to relatively low satisfaction with the quality of life and work conditions. Countries included here are all the new EU member states in CEE. Their nationals have a propensity to move:

- to countries in area B, on the basis of higher wages and generally stronger work and life satisfaction.
- to countries of area A, offering the potential to improve income even stronger than in area B, whilst at the same time experiencing better living and working conditions compared to home countries (but not necessary compared to area B).

ii) On the same grounds, *group B* is attractive as a destination from those in area C, but countries here could themselves

represent a source for migrants wishing to improve income levels in area A. The EU member states represented here are those of South-Western Europe, and particularly Spain and Italy, which were identified earlier as strong poles of new immigration flows. The potential of onward movement of migrants towards A present, but probably weakened in this instance, as a consequence of comparable levels of satisfaction with work and living conditions in area B and A (with the possible exception of Greece). Indeed, the recent experience of South-North European migration is of low flows, particularly after income disparities between area A and B has passed a ratio of 4:1.

iii) *Area A* represents the EU-15 member states of North-Western Europe, with generally higher income prospects compared to both group B and C, and standards of work and life satisfaction above those in area A, and occasionally,

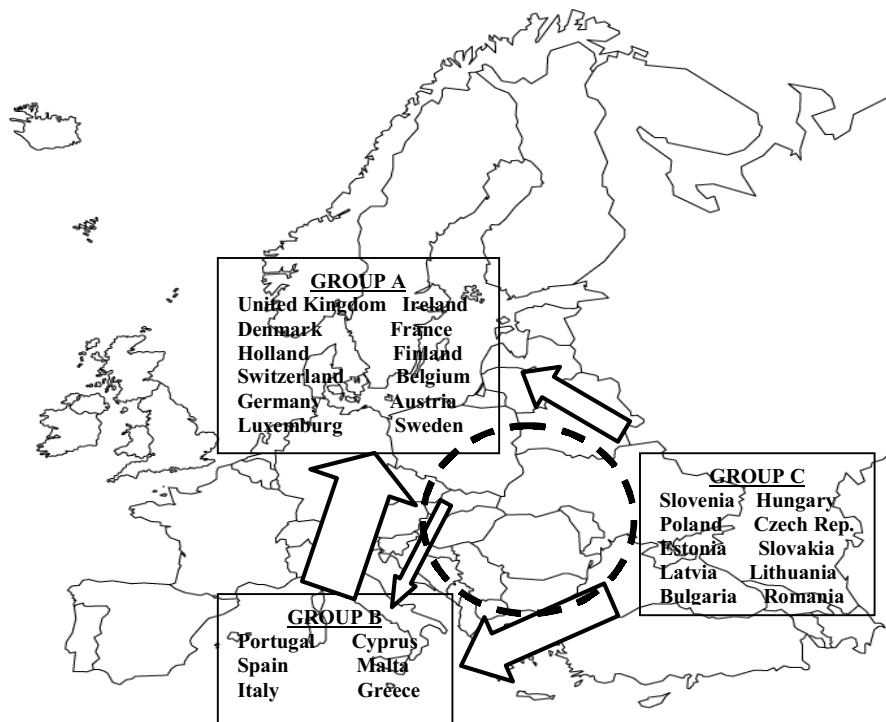


Figure 2. The motivational triad of migration in Europe

above those in area B. It is as such an attractive region to workers in countries of CEE, representing however a weaker pull force for those initially arriving or originating in member states of area B.

In a geographical perspective, the triad identified can be depicted as in figure 2.

Romania and Bulgaria are situated, like other east and central-European countries, in the area from left-down, where are concentrated the countries with a low level of work cost and of life and work conditions. There are an important number of Romanian workers migrating in the same group countries (i.e Hungary), specially neighbouring countries and offering a bigger salary.

Summarizing that there is a clear pole for present and further emigration pressures, in area C, based on

considerations of both low income and general work and life satisfaction. On the other hand, we have two potential poles of immigration attractive to area C nationals, which are driven to countries in group A, and B, respectively. While area B captures migrants wishing to improve their relative income capacity, but also supports immigration on principles of improved life and work satisfaction, wage expectations are still perceptibly lower here than in area A (Hiris, Son, Sipos, 2008). The result of the study confirms the fact that the income differential can be seen as main determinant in decision of a some part of European workers to taking advantage of employment opportunities from other countries, in order to offer them higher incomes in comparison to those obtained in their native countries.

---

## References

---

Barrell, R., Fitzgerald, J., Riley R., „EU enlargement and migration: Assessing the macroeconomic impacts”. *NIESR Discussion Paper 292*, 2007

Barrot J., *Cotidianul*, iunie 2008

Ciuca, V., Pasnicu, D., Son, L., Sipos C., Iordan, M., „The Romanian Flexicurity – A response to the European Labour Market Needs”, in *Romanian Journal of Economic Forecasting*, Vol. X, no. 3, 2008

Faini, R., de Melo, J., Zimmermann, K. (1999). *Trade and Migration: an introduction*, Cambridge University Press

Hiris, L., Son L., Sipos C., „A Triad Configuration of Labour Mobility in the Enlarged European Union. Migration Structure and Developments in the Case of Old and New Member States”, *European Population Conference*, Barcelona, July 2008

Longhi, S., Nijkamp, P., Poot J., „Meta-Analysis of Empirical Evidence on the Labour Market Impacts of Immigration”, *IZA Discussion Paper 3418*, March 2008

Tapinos, G., Delaunay, D., „Can One Really Talk of the Globalisation of Migration Flows?”, in OECD, *Globalisation, Migration And Development*, 2000, Paris



- Venturini, A. (2004). *Postwar Migration in Southern Europe, 1950-2000*, Cambridge University Press, Cambridge
- Eurostat (2008). „Statistical portrait of the European Union 2008 – European Year of Intercultural Dialogue”
- OECD (2006, 2007) „International Migration Outlook”, Paris
- EUROFOUND (2005). „Fourth European Working Conditions Survey”, *Publications.europa.eu, EF/06/78/EN (EWCS 2005)* European Foundation for the Improvement of Living and Working Conditions, Dublin
- European Commission (1996, 2007) „Employment in Europe 2006” and “Employment in Europe 2007”, Brussels
- [www.eurostat](http://www.eurostat)
- [epp.eurostat.ec.europa.eu](http://epp.eurostat.ec.europa.eu)

# The Impact of Trades on Daily Volatility: an Empirical Study for Romanian Financial Investments Funds

■

**Bogdan Negrea**

**Lucian Țătu**

**Andreea Stoian**

Academy of Economic Studies, Bucharest

***Abstract.** The aim of this paper is to investigate the relationship between trade volume, number of transaction and daily volatility for Romanian Financial Investments Funds. There is a large debate on this topic. The empirical results of previous literature showed that there is a strong relationship between these variables. Using OLS regressions we found that trade volume has a larger impact on daily volatility compared to the influence of number of transactions which could be considered as a proxy for liquidity.*

**Key words:** volatility; trade volume; number of transactions; liquidity; capital market.

■

**JEL Codes:** G1, G12.

**REL Codes:** 11B.

## 1. Introduction

There is a large interest in how trading volume and number of transactions influence financial assets' volatility on capital markets. A naive view is that the greater level of volume and number of transaction, the greater the price movement, and, consequently, the stocks volatility. On the other hand, a greater volatility could become attractive for investors which could generate high liquidity on market. In fact, previous literature did not show, clearly, the sense of the relationship between trading volume, number of transaction and volatility.

The aim of this paper is to investigate the impact of trading volume and number of transactions on daily volatility for Romanian capital market.

Taking into account the fact that Romanian capital market could be considered as an emerging market which confronts many difficulties, such as the lack of liquidity, the results of our empirical testing could give some useful insights on this topic.

The paper is structured as follows: in Section 2 will be presented a short literature review. Section 3 will be devoted to the presentation of methodology and database. Empirical results will be presented in Section 4. The last section will consist in concluding remarks.

## 2. Trading volume, number of transaction and volatility – short literature review

Most of the previous studies investigated the relationship between trading volume, number of transactions and price movements, which it was considered as a crude measure of volatility (see in that sense, Kyle, 1985, Karpoff, 1986, 1987, Easley, O'Hara, 1987, Admati, Pfleiderer, 1988, Jain, Joh, 1988, Barclay, Litzenberger, Warner, 1990, Foster, Viswanathan, 1990, Brock, Kleidon, 1992, Barclay, Warner, 1993, Campbell, Grossman, Wang, 1993, Romer, 1993, Gopinath, Krishnamurti, 2001, Bjornes, Rime, Solheim, 2003). The empirical testing mostly rely on a adjusted model proposed by Jain and Joh (1988), which considers trading volume as dependent variable and volatility (measured as stocks' price movements) as independent variable. The inverse relationship between volatility, as dependent variable, and trading volume, as exogenous, is not emphasized by previous study.

Therefore, we will investigate the impact of trading volume and number of transactions on stocks volatility using as example Romanian capital market. Having into consideration the fact that Romanian capital market is a young one and investors confront with many difficulties, such as the lack of liquidity, the empirical results could give some useful insights on this topic.

### 3. Methodology and database

In order to investigate the relation between trading volume, number of transactions and volatility, we will use OLS regression, as follows:

$$V_t = \alpha + \beta \times T_t + \varepsilon_t \quad (1)$$

where:

$V_t$  = daily volatility at moment  $t$ , calculated as standard deviation based on market daily rate of return;

$T_t$  = daily trading volume/number of transactions at moment  $t$ ;

$\alpha, \beta$  = coefficients to be estimated;

$\varepsilon_t$  = error term.

Taking into account the lack of liquidity of Romanian capital market, we will use daily observations for the five Romanian Investments Funds traded on Bucharest Stock Exchange (BSE). Volatility is calculated based on Romanian Investment Funds Index (BET-FI) as a standard deviation of daily rate of return on this market. The data for volatility, trading volume and number of transactions spanned between 2000, October 31<sup>st</sup> – 2008, August 28<sup>th</sup>.

### 4. Empirical results

The estimations for the relation (1) are presented in the table below:

Table 1

Estimated coefficients for OLS regressions based on (1)		
Dependent variable: Volatility	Regression (1) Independent variable: Number of transactions	Regression (2) Independent variable: Trading volume
$\alpha$	0.012472 [6.33] (0.00)	0.010297 [17.95] (0.00)
$\beta$	0.000000235 [16.83] (0.00)	0.000000000114 [11.54] (0.00)
<b>Statistics</b>	R-squared: 0.02 F-stat: 49.69 Prob: 0.00	R-squared: 0.10 F-stat: 207.84 Prob: 0.00
[ ]: t-statistic ( ): probability		

The estimations based on OLS show that number of transactions, as a proxy for market liquidity, and trading volume influence daily volatility, from statistical point of view. But, their impact is very small. In the first case, number of transactions could explain only 2% of daily volatility, and  $\beta$  is almost close to zero, but it is different from zero. In the second case, trading volume could explain 10% of daily volatility, but impact is much smaller than in the first case.

In order to show the small impact of number of transactions and trading volume on daily volatility, we proceeded on

estimating a second regression based on lagged values of daily volatility, as follows:

$$V_t = \delta + \gamma \times \sum_{i=1}^n V_{t-i} + \eta \times T_t + \mu_t \quad (2)$$

where:

$V_t$  = daily volatility at moment  $t$ , calculated as standard deviation based on market daily rate of return;

$V_{t-i}$  = lagged values of daily volatility at moment  $t-i$ ;

$T_t$  = daily trading volume/number of transactions at moment  $t$ ;

$\delta, \gamma, \eta$  = coefficients to be estimated;

$\mu_t$  = error term.

The results of estimation based on OLS are presented in the table below:

Table 2

Estimated coefficients for OLS regressions based on (2)		
Dependent variable: Volatility	Regression (1) Independent variable: Lagged daily volatility, Number of transactions	Regression (2) Independent variable: Lagged daily volatility, Trading volume
$\delta$	0.0093 [11.99] (0.00)	0.0079 [12.24] (0.00)
$\gamma$	0.23 [6.62] (0.00)	0.19 [5.14] (0.00)
$\eta$	0.00000087 [4.88] (0.00)	0.0000000000981 [9.38] (0.00)
<b>Statistics</b>	R-squared: 0.08 F-stat: 80.86 Prob: 0.00	R-squared: 0.13 F-stat: 144.28 Prob: 0.00
[ ]: t-statistic ( ): probability		

As could easily be noticed, by adding lagged values of daily volatility, the regression improved, according to R-squared values. Consequently, it shows that our previous remarks are correct, and number of transactions and trading volume has a small impact on volatility.

The results obtained within this paper, also, reveal some insights related to investors' behavior on Romanian capital market. It seems that liquidity is not an

indicator based on which investors take investment decision. Generally speaking, a rational investor takes into account for his/hers investment the liquidity of financial assets that he is about to trade. In our case, investors' investment decisions are driven by the traded quantity of stocks and not by liquidity.

In fact, trading volume has a significant influence on number of transaction, as could be seen from OLS estimation below:

Table 3

The correlation between number of transactions and trading volume	
Dependent variable: Number of transactions	Independent variable: Trading volume (Tr_vol)
c	921.06 [10.15] (0.00)
Tr_vol	0.000166 [10.08] (0.00)
<b>Statistics</b>	R-squared: 0.45 F-stat: 1497.61 Prob: 0.00
[ ]: t-statistic ( ): probability c: intercept	

The estimations show that trading volume could explain almost 45% of number of transactions. Consequently, liquidity on Romanian capital market could

be influenced by the quantity of stocks traded, and this fact could be considered as a characteristic for Romanian capital market.

## 5. Concluding remarks

The aim of this paper was to investigate if liquidity and trading volume influence daily volatility on Romanian capital market. The previous literature showed that there is a strong relation between those variables, but they used proxy for volatility and considered the correlation only in one sense.

Based on daily observations for Romanian Investments Funds which are very liquid from the stocks traded on Bucharest Stock Exchange, we revealed that number of transactions and trading volume has only a small impact on daily volatility. Moreover, we showed that

trading volume has a significant influence on liquidity. Consequently, these results give insights on investors' behavior on Romanian capital market. It seems that their investment decisions are based on information about stocks quantity traded on BSE and not on liquidity.

## Acknowledgments

This paper is part of research project, no.169/2007, "Measuring The Amplitude of Financial Market Crisis Using An Index Following The Richter Scale From Seismology. An Application Of The Econophysics Principles" financed by Academic Financing Institute (UEFISCSU).

---

## References

---

- Admati, A.R., Pfleiderer, P., „A Theory of Intraday Trading Patterns: Volume and Price Variability”, *Review of Financial Studies*, Vol.1, 1988
- Barclay, M.J., Litzenberger, R.H., Warner, J.B., „Private Information, Trading Volume and Stock Return Variances”, *Review of Financial Studies*, Vol. 3, 1990
- Barclay, M.J., Warner, J.B., „Stealth Trading and Volatility: Which Trades Move Prices?”, *Journal of Financial Economics*, December, Vol. 34, 1993
- Bjornnes, G.H., Rime, D., Solheim, H.O.Aa., „Volume and volatility in the FX market: Does it matter who you are?”, *working paper Norges Bank*, 2003
- Brock, W.A., Kleidon, A.W., „Periodic Market Closure and Trading Volume: A Model of Intraday Bids and Asks”, *Journal of Dynamics and Control*, Vol. 16, 1992
- Campbell, J., Grossman, S., Wang, J., „Trading volume and serial correlation in stocks returns”, *The Quarterly Journal of Economics*, November 1993

- Easley, D., O'Hara, M., „Price, Trade Size and Information in Securities Markets”, *Journal of Financial Economics*, Vol.19, 1987
- Foster, F.D., Viswanathan, S., „A Theory of Interday Variations”, in Volume, „Variance and Trading Costs in Securities Markets”, *Review of Financial Studies*, Vol. 3, 1990
- Gopinath, S., Krishnamurti, C., „Number of transactions and volatility: an empirical study using high-frequency data from Nasdaq stocks”, *The Journal of Financial Research*, vol. XXIV, 2001
- Jain, P., Joh, G. (1988), „The Dependence Between Hourly Prices and Trading Volume”, *Journal of Financial and Quantitative Analysis*, Vol. 23, September 1988
- Karpoff, J.M., „A Theory of Trading Volume”, *Journal of Finance*, Vol. 41, December 1986
- Karpoff, J.M., „The Relation Between Price Changes and Trading Volume”, *Journal of Financial and Quantitative Analysis*, Vol. 22, March 1988
- Kyle, A.S., „Continuous Auctions and Insider Trading”, *Econometrica*, Vol. 53, 1985
- Romer, D., „Rational Asset-Price Movements”, *American Economic Review*, Vol. 83, December 1993



# The Impossibility of a Paretian Libertarian: a Solution through the Imposition of a Rationality Condition on Individual Preferences on Conjunct Alternatives

■

**Mihai Ungureanu**

National School of Political and Administrative Studies, Bucharest

***Abstract.** In this article I present the Impossibility of a Paretian Libertarian theorem (Sen) and I discuss its significance with regard to the problem of externalities. I introduce two conditions for the selection of an “acceptable” solution for this impossibility result: efficacy for real societies and ideological fidelity. I present Hillinger-Lapham, Gibbard, Blau and Saari solutions and I classify them according to the two conditions mentioned above. I extend the social choice literature by introducing a new solution consisting in a reformulation of the libertarian at the minimal-rational libertarian preferences. In this formulation the only relevant kind of preferences are those that are “minimal-rational libertarian”. This solution satisfies both the efficacy for real societies and the ideological fidelity conditions.*

**Key words:** externalities; ideological fidelity; social welfare function; social decision function; minimal-rational libertarian preferences.

■

**JEL Codes:** B41, D63.

**REL Codes:** 2B, 6B.

## 1. Social choice theory (SCT)

In 1951, Kenneth J Arrow has set the foundations of the axiomatic Social Choice Theory<sup>(1)</sup>, through his General Possibility Theorem. This result showed that there is no social welfare function which satisfies a few reasonable conditions: unrestricted domain, independence of irrelevant alternatives, non-dictatorship and weak Pareto principle. The significance of Arrow's theorem was, in a strong interpretation, either the welfare economics is consistent only with dictatorship, either democracy it's not possible. In a weak interpretation one (or more) condition is not necessary and must be weakened or eliminated. Nineteen years after Arrow's paradigmatic result was published, Amartya K. Sen had proposed the impossibility of a paretian liberal theorem. Through this impossibility result, Sen introduced in the social choice theory research the problem of individual rights. This new result appears due to the 1) relaxing the welfare function to a social decision function (from social transitivity to social aciclicity) 2) introducing the individual rights problem in social choice theory's concerns, through a libertarian condition, 3) retaining universal domain and weak pareto conditions, 4) eliminating nondictatorship and independence from irrelevant alternatives conditions. The importance of Sen's theorem is, in a strong interpretation, that the foundations of welfare economics, the paretian principle, is not compatible with individual rights and minimal social rationality. In a weak interpretation, Sen's impossibility result does not express an inconsistency between paretianism and individual rights, but an inconsistency between

paretianism and a certain formulation of individual rights, formulation which may be changed into another that is consistent with minimal rationality and paretian principle. These two impossibility results, Arrow's and Sen's theorems, have generated a vast literature in many different paradigms and disciplines. Alternative demonstrations and solution have been proposed by mathematicians, philosophers, but especially by economists.

In order to consider these solutions as part of Social Choice Theory, in its classic form, a few conditions must be met. I will briefly enounce it. First, all Social Choice Theory approaches are axiomatic, meaning that the heuristic basis, on which the entire system is built, depends on the acceptance of various axioms. Second, all Social Choice Theory approaches are methodological individualistic. This characteristic of *SCT* says that the fundamental research unit is the individual. In order to explain social action or choice we must precede analytically, studying individual action or choice and the ways in which these individual actions or choices are aggregated into social action or social choice. Therefore the only fertile form of social research is that which explains society starting from individuals. Third, all *SCT* approaches are welfarist in nature, meaning that the relevant information set is limited to information about preferences. Starting from these preferences we can define two rather weak forms of individual rationality. An individual is considered rational when his preference relation is reflexive, complete and transitive. In the same way, an individual is considered minimal-rational if his preference relation satisfies reflexivity, completeness and aciclicity. Fourth, all *SCT*

research are a priori in nature. Last, the primitive of arrowian SCT is a binary preference relation, formalized in trivalent logic. This preference relation is denoted by  $R$  and its name is “weak preference relation between alternatives”. I will present now some of the notations, definitions and theorems in a form which resembles that of Sen<sup>(2)</sup> in (1970). The notations are to be read in the following way: *d*=definition, *a*=axiom, *t*=theorem.

*d1 (weak preference relation)*:  $x$  is weakly preferred to  $y$  if and only if either  $x$  is strictly preferred to  $y$ , either  $y$  is strictly preferred to  $x$ :  $xRy \leftrightarrow (xPy \vee xIy)$ ;

*d2 (strict preference)*:  $x$  is strictly preferred to  $y$  if and only if  $x$  is weakly preferred to  $y$  and  $y$  is not weakly preferred to  $x$ :  $xPy \leftrightarrow (xRy) \wedge \neg(yRx)$ ;

*d3 (indifference relation)*:  $x$  is indifferent to  $y$  if and only if  $x$  is weakly preferred to  $y$  and  $y$  is weakly preferred to  $x$ :  $xIy \leftrightarrow (xRy) \wedge (yRx)$ ;

*a1 (reflexivity)*:  $x$  is in relation of weak preference with himself:  $\forall x \in A : xRx$ ;

*a2 (completeness)*: for all different alternatives  $x, y$ , either  $x$  is weakly preferred to  $y$ , either  $y$  is weakly preferred to  $x$ :  $\forall x, y \in A : (x \neq y) \rightarrow (xRy) \vee (yRx)$ ;

*a3 (transitivity)*: for any 3 alternatives, if the first is weakly preferred to the second and the second to the third, then the first must be weakly preferred to the third:  $\forall x, y, z \in A : (xRy) \wedge (yRz) \rightarrow xRz$ ;

*a4 (acyclicity)*: for any finite number of alternatives, if the first is strictly preferred to the second, the second to the third and so on, then the first must be weakly preferred to the last:  $\forall x, y, z, \dots, v \in A : (xPy) \wedge (yPz) \wedge \dots \wedge zPv \rightarrow xRv$ ;

*d4 (collective choice)*: a collective choice rule (CCR) is a functional relation  $f$

such that, for any set of  $n$  individual orderings (transitive, complete and reflexive individual preference relations),  $\mathcal{R}_1, \dots, \mathcal{R}_n$  (one ordering for each individual), one and only one social preference relation  $R$  is determined,  $R_s : f(\mathcal{R}_1, \dots, \mathcal{R}_n)$ ;

*d5 (choice set)*: an alternative  $x$  from  $A$  is the best alternative in  $A$  with regard to a binary weak preference relation, if and only if it is at least as good as any other alternative in  $A$ :  $\forall y : ((y \in A) \rightarrow (yRx))$ . The set of the best alternatives in  $A$  is called choice set of  $A$  and it is denoted with  $C(A, R)$ ;

*d6 (minimal collective rationality)*: a social decision function (SDF) is a collective choice rule  $f$ , the range of which is restricted to those preference relation  $R$ , each of which generates a choice function  $C(S, R)$  over the whole set of alternative  $X$ . i.e. reflexive, complete and acyclic social preference relations;

*d7 (collective rationality)*: a social welfare function (SWF) is a collective choice rule  $f$ , the range of which is restricted to the set of orderings for society. i.e. reflexive, complete and transitive social preference relations;

*t1 (non empty choice set)*:  $C_s(A, R) \neq \emptyset$ , if  $R$  is reflexive, complete and acyclic. *t1* is proved by Sen in (1970a);

*t2*  $FBS \rightarrow FDS$ . i.e. any social welfare function is also a social decision function but not vice versa. From here we must conclude that Sen’s result has also validity for social welfare functions. *t2* is proved by Seidl in (1975).

## 2. The impossibility of a paretian libertarian

In this paper I will analyze Sen’s result<sup>(3)</sup> (1970a, 1970b). Therefore, I will focus my at-

tention on the inconsistency between weak paretianism, individual rights and universal domain. First I will define the conditions and then I will present Sen's demonstration for the theorem.

*Condition L (libertarianism): for each person i, there is at least one pair of distinct alternatives (x,y) such that he is decisive in the social choice between them in either order: if I prefers x to y then society will prefer x to y and if i prefers y to x, then society will prefer y to x:  $D_i(x, y) \wedge (xP_i y) \rightarrow xP_s y$  and  $D_i(x, y) \wedge (yP_i x) \rightarrow yP_s x$ .*

*Condition L\* (minimal libertarianism): ceteris paribus L, but the set of individuals has a cardinality of 2.*

*Condition U (unrestricted domain): a social preference function has an unrestricted domain if it admits all and only individual orderings (reflexive, complete, transitive preference relations).*

*Condition P (weak pareto): for any two alternatives x, y, if all individuals strictly prefer x to y, then x is socially preferred to y:  $(\forall i : xP_i y) \rightarrow xP_s y$ .*

*t3 (the impossibility of a paretian libertarian): Sen, (1970a, 1970b). There is no SDF which satisfy U, P, LL\*, when the number of individuals is at least 2 and the number of alternatives is at least 3.*

*Proof:* from the premises  $N = \{i, j\}$ , and  $A = \{x, y, z, w\}$ . Suppose that there is a SDF which satisfy U, P, L\*. We must check three cases: 1). (x,y) and (z,w) are the same pair. It is obvious, from L\* that we can't give libertarian decisivity for two individuals on the same pair of alternatives, because the choice set would be empty. 2) The pairs have one of the elements in common. Suppose that  $x = z$ ,  $xP_i y \wedge yP_i w$ , and  $wP_j x \wedge yP_j w$ . By condition

$L^*$ ,  $D_i(x, y)$  and  $D_j(x, w)$ , by P, we have  $yP_s w$ , by U, any individual rational preference is relevant, and by aciclicity the social choice set must be non empty. Therefore  $xP_s y \wedge yP_s w \wedge wP_s x$ , but  $wP_s x \leftrightarrow \neg[xRw]$  which means that the aciclicity condition is violated and there is no best alternative. 3) Suppose now that all four alternatives are distinct. Assume that  $wP_i x \wedge xP_i y \wedge yP_i z$  and  $wP_j x \wedge yP_j z \wedge zP_j w$ . By condition  $L^*$ ,  $D_i(x, y)$  and  $D_j(z, w)$ , by P,  $wP_s x \wedge yP_s z$ , by U, any individual rational preference is relevant, and by aciclicity the social choice set must be non empty. But  $xP_s y \wedge yP_s z \wedge zP_s w \wedge wP_s x$ , and  $wP_s x \leftrightarrow \neg[xRw]$ , though by aciclicity  $xRw$ , which means that the aciclicity property is violated and there is no best alternative. The proof works for all cases in which we give one libertarian decisivity to each individual.

Sen (1970a, 1970b) offers an example for his impossibility result.

*Lewd vs. Prude case:* suppose we have two individuals, Prude and Lewd, and they must socially decide the reading of a copy of D.H. Lawrence's, "Lady Chatterly's Lover". The alternatives are:  $x : (1,0)$ , Prude reads the book and Lewd doesn't read it,  $y : (0,1)$ , Prude doesn't read the book and Lewd reads it;  $z : (0,0)$ , nobody reads the book. Suppose  $zP_p x \wedge xP_p y \wedge zP_p y$ ; meaning that Prude prefers most that no one reads the book, next that he reads it, and last that impressionable Lewd be exposed to obscene literature. Suppose also that  $xP_l y \wedge yP_l z \wedge xP_l z$ . i.e. Lewd prefers that either of them should read the book, rather than neither, but further he prefers that prude should read the book rather than himself. By U, all individual orderings are admissible. By condition  $L^*$ ,  $D_p(x, z) \wedge (zP_p x) \rightarrow zP_s x$ . In the

same manner,  $D_l(y, z) \wedge (yP_lz) \rightarrow yP_sz$ ; by  $P$ ,  $xP_p y \wedge xP_l y \rightarrow xP_s y$ ; by  $A$ :  $xPy \wedge yPz \rightarrow xRz$ , deci,  $zPx \leftrightarrow \neg[xRz]$ . Though, from  $P, L^*$  and  $U$  we have

$$D_p(x, z) \wedge (zP_p x) \rightarrow zP_s x,$$

$$D_l(y, z) \wedge (yP_l z) \rightarrow yP_s z \text{ and}$$

$xP_p y \wedge xP_l y \rightarrow xP_s y$ , so  $xPy \wedge xPy \wedge zPx$ ; but from  $A$ ,  $zPx \leftrightarrow \neg[xRz]$ . It is clear that acyclicity is violated and the *Prude vs. Lewd* case is an illustration of the impossibility of a paretian libertarian.

### 3. The problem of externalities and the ideological fidelity criterion

As we can easily see in the *Lewd vs. Prude* case, each individual has strict preferences on the other's behavior. If we assume a stronger meaning of individual rationality, we can understand the problem in the following way: suppose that an individual is rational not just because he has minimal-rational preferences (acyclic) or rational preferences (transitive), but because his preferences have a direction. Therefore, we can assume that an individual will prefer more of a good rather than less and that he will be indifferent between identical quantities of identical goods. From this we can assume that any strict preference for a good (or alternative) shows a difference in the level of satisfaction produced by that good. If we conceive the behaviors of other people as parts of alternatives that may be socially preferred (*standard TAS assumption*), and if we give individuals the right to determine the social preference between some alternatives which are personal to them (the libertarian condition),

then if we observe that the individuals are not indifferent between alternatives which are personal to other individuals, we can deduce that they are, in some way, affected by the behaviors of others. In the terms of consumption and productivity theory, and given the condition mentioned above, the problem is that the outputs of an economic agent are inputs in the productivity or the consume vector of another economic agent. We know that standard SCT doesn't allow negotiations and side payments and given this knowledge we can say that the impossibility of a paretian libertarian may be treated as a problem of externalities. Any time we observe a strict preference of an individual on alternatives which are different regarding the behavior of another individual, we can deduce the existence of externalities<sup>(4)</sup>. This problem shouldn't surprise us too much because in 1962 Buchanan and Tullock offered a proof that any collective decision which is not produced by unanimity rule may produce externalities. Hence, in the impossibility of a paretian libertarian, we do have two rules one of which is subunanimous (the libertarian condition) we have to expect externalities. In other words, if we use a non paretian rule we permit externalities to appear. Also, in 1982, Bernholz<sup>(5)</sup> offered a proof of the fact that externalities are a necessary condition for the apparition of social cyclic preferences. (*more precise, intransitive and cyclic*) in non-dictatorial societies. The same thing may be observed in another way: as long as 1) the individual preferences are, by  $U$ , transitive and complete, 2) the alternatives contain other's actions or behaviors, then, if we

observe any other thing than indifference between those alternatives that varies with respect to another individual's behavior, we can deduce the existence of externalities. The argument is built in the following manner: if the externalities had been absent, then *Lewd* and *Prude* would have been indifferent on any pair of alternatives considered personal to the other. This means that on any pair personal to someone, we would have a weak social preference in the direction of the decisive individual's preference. To clarify this idea: if I have the right to read or not to read a book and there are no externalities, you will be indifferent if I read it or not. From this, the social preference on such pairs will be given by the strong paretian procedure. *i.e.* at least on individual have a strict preference for an alternative, the others being indifferent<sup>(6)</sup>. But in the case of the impossibility of a paretian libertarian theorem we do observe that each individual has strong preferences on alternatives personal to others! This must have the meaning mentioned above: the impossibility of a paretian libertarian is a case in which externalities are present.

Once we understood the problem as one of externalities, we must decide what to do next: 1) are all externalities relevant? 2) What should we do if we consider that there are all relevant? What should we do if we consider that not all externalities are relevant? Regarding the first question, we have either the possibility to consider that the decision to read or not to read a book is absolutely personal to individuals, either to consider that each and every time when an externality is present it must be considered relevant. In the

first case we give priority to individual rights which offers strong protection exclusively on those alternatives that varies regarding one individual's behavior. In the second case we have a choice between reducing to silence the individual rights in some level conditioning them in a way that avoids acyclicity. In this last case we give priority to the paretian criterion which offers a weaker protection than the libertarian condition but the domain of this protection is much bigger – extended to all of the alternatives. In practice, these solutions have either 1) the libertarian form in which the state, either doesn't exist, either it has no right to interfere; 2) the classic form of welfare economics in which the state interfere in order to compensate the loss produced by negative externalities. This problem can not be scientifically solved. The option, which ever would that, be it's in ethics domain. I will assume a libertarian position and I will consider, in a lockean manner, that the individual it's the only owner of his body and of its faculties. From here, we can draw a personal sphere for each individual and this sphere can not be alienated on the base of any externalities based argument. The fact that I am learning hard for an exam may cause insecurity to another competitor less available for making an effort. This feeling is, obviously, an uncompensated loss. However on the basis of self ownership principle nobody can force me to invest my effort in other ways. It is irrelevant that my effort investment makes others to feel threaten. If we consider that this is the foundation for individual rights we are forced to admit the idea of libertarian



partition of which Farrell (1976) talks among others: there is a set of human actions which are considered personal to individuals. The externalities produced by these actions are considered irrelevant. This is what I will call the ideological fidelity criterion. As long as we wish to formalize a libertarian condition, we must make an ethical hierarchy: the libertarian condition must be considered more important than any other condition we use. Starting from this idea, we must impose this criterion to any solution for the inconsistency discovered by Sen. Next to this criterion I will enounce another one the scope of which is the elimination of inconsistencies for real societies.

#### 4. Efficacy condition

Sen's formulation of the libertarian condition is ambiguous, giving libertarian decisivity for "at least one pair" of alternatives which vary in what concerns the behavior of only one individual. It is not told what "at least means", although Sen gave a decisivity for each person. In 1977 Breyer and Heidelberg named this condition "issue liberalism" and they eliminated the ambiguity, giving exactly one decisivity for each individual. In 1976, Sen gives the impression that he assimilates this idea of defining on issues although he doesn't formalize it. For a better understanding I will introduce and define the notion  $x$ -aspect and reengage the definition given by Gibbard (1974) and Breyer (1977) to the notion of  $x$ -variant (the formalization in mine):

*d8* ( $x$ -aspect's set):  $\forall x, y, z \in A, \forall i, j \in N, x = (x_i, x_j), y = (y_i, y_j), z = (z_i, z_j)$ , then  $X_a = X_{ai} \cup X_{aj}$  is the set of the  $x$ -aspect's

of  $A$ , regarding the individuals  $i$  and  $j$ , where  $X_{ai} = \{x_i, y_i, z_i\}$  and  $X_{aj} = \{x_j, y_j, z_j\}$ .

*d9* ( $x$ -variant's set): for  $\forall x, y \in A, \forall i, j \in N, x = (x_i, x_j), y = (y_i, y_j)$ , if,  $(x_i \neq y_i) \wedge (x_j = y_j)$  then  $x$  and  $y$  are  $i$ -variants; in the same way, if  $(x_i = y_i) \wedge (x_j \neq y_j)$ , then  $x$  and  $y$  are  $j$ -variants. The set of  $x$ -variants equals the set of  $x$ -aspects of  $A$  from which we subtract the set of  $x$ -aspects which doesn't vary in the way previously defined:  $X_v = X_a \setminus X_{nv}$ . Where  $X_{nv}$  is the set of  $x$ -aspects which are not  $x$ -variants.

In Sen (1970a, 1970b), Breyer (1977), Gibbard (1974), Gaertner and Kruger (1981), (1983), Blau (1975), Suzumura (1978), Austeen-Smith (1982) consider that decisivities are not granted on all  $x$ -variants but just on one pair for each individual. In 1989, Gardenfors and Pettit gave an example in which the number of decisivities equals the number of  $x$ -variants, but they didn't propose this as a general rule of granting decisivities. The problem is that there is no ethical reason to justify limiting the number of decisivities to one for each of individuals. As long as we accept that it is in the libertarian spirit to grant individual rights on the basis of  $x$ -variants, there is no reason to use this on any pairs of. If we use this on one pair of alternatives, we can't give a good reason not to extend this on all pairs which have the property of being  $x$ -variants. For these reasons the rule for granting individual rights must be the following:

*d10* (*Rdl: the rule for granting libertarian decisivities*):  $\#D_x = \#X_v$ . In words: the cardinality of the set of libertarian decisivities equals the cardinality of the set of  $x$ -variants.



The consequence of this rule is that when we want to give a solution for Sen's impossibility result, we must keep in mind that it must resolve all the cases in which  $\#D_x = \#X_v$ . Next to this rule all solutions of the inconsistency must solve the problem for real societies i.e. societies with any finite number of individuals and alternatives. This is the efficacy criterion. In the following line I will present four solutions for Sen's result and I will analyze them with the tools of the two criteria already stated in sections 3 and 4: ideological fidelity and efficacy for real societies.

### 5. Solutions for the impossibility of a paretian libertarian theorem

In 1984, Sen showed that if we want to solve the inconsistency between minimal rationality, weak pareto condition, unrestricted domain and libertarianism, there are at least two ways: either we give up to one of the conditions; either we choose to weaken one of them in a substantial way. Regarding the unrestricted domain, Sen adds that any weakening of this condition implies the elimination of some individual preference profiles. In 1976, 1983, Sen argued against this kind of solution because restricting the unrestricted domain is a recognition of defeat. I will assume this position and I will present three restrictions of the libertarian condition and one of the weak pareto condition.

When the problem of altering one of the conditions which produced the libertarian inconsistency was addressed, the libertarian condition was, usually, the first target of SCT researchers. I will present only three of such

solutions. The first was proposed by Hillinger and Lapham (1971). Their solution is a strong weakening of the libertarian condition which makes individual rights to be a form of paretianism. An individual is decisive on a pair of alternatives if and only if there is nobody who opposes his preference on that pair:

*Condition  $L_{hp}$ :*

$$\forall(x, y), x \neq y, \exists i \in N : \exists D_i(x, y) \leftrightarrow [(xP_i y) \wedge \neg[yR_{N-i}x]] \vee [(yP_i x) \wedge \neg[xR_{N-i}y]]$$

Another solution of Sen's result is the alienable rights solution introduced by Gibbard in 1974. *Condition  $L_{al}$ :* for all individuals  $i$ , if  $i$  is decisive on a pair of  $x$  - variants  $(x, y)$  and  $i$  prefers  $x$  to  $y$ , then, usually,  $x$  will be socially preferred to  $y$ . But if there is an alternative  $z$ , and  $i$  prefers  $y$  to  $z$ , and there is an individual  $j$  who is decisive on the pair of  $x$  - variants  $(z, x)$  and  $j$  prefers  $z$  to  $x$ , the right of  $i$  on  $(x, y)$  is waived:  $L_{al} : \forall x, y, \forall i, j, D_i(x, y) : A_i(D_i(x, y)) \leftrightarrow \exists z, yR_i z \mid D_j(z, x) \wedge zR_j x$ , where  $A_i(D_i(x, y))$  must be read in the following manner: "the right of individual  $i$  on the pair  $(x, y)$  it is waived". This solution generates a social preference equivalent to weak pareto preference. An approach similar to Gibbard's, is that formulated by Blau in 1975. His solution consist in modifying the libertarian condition in order to eliminate a certain kind of preference, intrusive preferences. These are defined in the following way: "an individual  $i$  is intrusive if he is not indifferent between the alternatives from his own personal sphere  $D_p$  and, for some  $j$ , his opposition against  $j$ 's preference on  $D_j$  is stronger than his own preference on  $D_i$ . From this definition Blau defines three libertarian

conditions: Condition  $L_{ni1}$ : if all individuals have intrusive preferences then all decisivities are waived. Condition  $L_{ni2}$ : if some individuals have intrusive preferences then all decisivities are waived. Condition  $L_{ni3}$ : all decisivities of those individuals with intrusive preferences are waived.

I will now present Saari's (1997) solution by restricting the pareto condition. His argument has two parts: First, there is an incompatibility between the separability dimension between pairs of the libertarian condition and the connectivity between them presented by the pareto condition. Second, in Saari's own words, "if society grants me the right to choose my shirt, why are others comparing one of my alternatives with other alternatives?" (Saari, 1997, p. 92). This suggests relaxing weak pareto condition to: "if an individual is given decisive rights over a pair  $(x,y)$ , then the pareto condition P does not apply to any pair including either x or y" (Saari, 1997, p. 92).

I will analyze now, briefly, all four solutions on the basis of the ideological fidelity criterion and on the efficacy for real societies criterion. The Hillinger-Lapham solution satisfy the efficacy condition through the transitivity of the strong pareto condition, but doesn't satisfy the ideological fidelity criterion because it silent the libertarian condition. The Gibbard solution doesn't grant the libertarian decisivities according to rule. The same problem is present in the case of Blau's solution. Another problem of this last solution is that its works only for two individuals and two alternatives. Neither of these two solutions satisfy the ideological fidelity criterion

because they waive the individual rights and not the pareto condition. Finally Saari's condition satisfies both criterions. Since the space is limited I will ask the reader to check these results.

## 6. Minimal-rational libertarian preferences

I introduce a new solution for Sen's inconsistency. This solution satisfies the ideological fidelity and the efficacy criterions. *i.e.* it works for the *Rdl* rule and it operates an ethical hierarchy in favor of individual rights. I will give now some definitions.

*d11 (simple alternatives): a simple alternative refers to the action of a single individual. e.g. x: "I read the book" (1); y: "I don't read the book" (0).*

*d12 (conjoint alternatives): a conjoint alternative refers to the action of two or more individuals. e.g. x: "I read the book and you don't read it" (1,0), y: "I don't read the book and you read it" (0,1), z: "I don't read the book and you don't read it" (0,0).*

*d13 (choice dimension): a choice dimension regarding an individual i is a list of simple alternatives:  $\Delta_i = \langle x, y, \dots, n \rangle | \Delta_i \geq 2 < \infty$ . e.g. for any two simple alternatives "I read the book" (1) and "I don't read the book" (0), together forms the choice dimension of reading the book regarding individual i.*

*d14 (conjoint alternatives set<sup>(7)</sup>):  $\#A_c = n^k$ , where  $A_c$  is the set of conjoint alternatives, n is the number of simple alternatives and k is the number of individuals.*

*d15: the preferences of an individual i are libertarian minimal-rational if and only*

if  $\forall i, j, (i \neq j), \forall A, A = \{x, y, z, \dots, n'\}$ , with  $x$ -aspects:  $x = (x_i, x_j), y = (y_i, y_j), z = (z_i, z_j), n' = (n'_i, n'_j)$ , then  $C(\{x_i, y_i, z_i, \dots, n'_i\}R) \neq \emptyset$  for any  $x_j, y_j, z_j, \dots, n'_j$ . i.e.  $i$  must have an unempty choice set on the set of his  $x$ -aspects.

From  $t1$  we know that if aciclicity and completeness are sufficient and necessary for having an unempty choice set. From here,  $d12$  says that all individuals must have a complete and acyclic preference on his own  $x$ -aspects.

*Condition  $L_{mr}$  (minimal rational libertarianism): for any finite number of individuals, the libertarian decisivity is granted on the basis of Rdl:  $\#D_x = \#X_v$  rule, only to the individuals who have libertarian minimal-rational preferences.*

$t4$  (the possibility theorem of minimal rational libertarianism) for any  $n \geq 2$  individuals, and for any dimension (with one or more simple alternatives), there is a SDF defined over  $U$  which satisfies  $P$  and  $L_{mr}$ .

*Proof:* in order to prove this theorem it must be shown that: 1)  $L_{mr}$  works for two individuals and two dimensions (one for each individual), each containing two simple alternatives; 2)  $L_{mr}$  works for two individuals, two dimensions with three or a higher number of simple alternatives for each individual; 3)  $L_{mr}$  works for three or a higher number of individuals and for two dimensions with two simple alternatives and 4)  $L_{mr}$  works for three or a higher number of individuals and for two dimensions with two or a higher number of simple alternatives.

*Case 1:* suppose there are two individuals  $i, j$  and two dimensions denoted here by  $(0, 1)$ , for simplicity. We have, therefore,  $\Delta_i = \langle 1, 0 \rangle$  and

$\Delta_j = \langle 1, 0 \rangle$ . From  $d11$ ,  $\#A_c = 4$  and  $A_c = \{(1, 1), (1, 0), (0, 1), (0, 0)\}$ . We denote by  $x = (x_i, x_j), y = (y_i, y_j), z = (z_i, z_j), w = (w_i, w_j)$ , where  $X_{ai} = \{1, 1, 0, 0\}$ , and  $X_{aj} = \{1, 0, 1, 0\}$ . Suppose now that  $i$  and  $j$  have minimal rational libertarian preferences over  $A$ . By aciclicity and by completeness of his preference relation, each individual has an unempty personal choice set. We must verify now if there is an unempty choice set. In order to succeed, we must determine all individual decisivities with the help of  $L_{mr}$  condition. Therefore, we have  $D_i(y, w) \wedge D_i(x, z)$  and  $D_j(x, y) \wedge D_j(z, w)$ . We have to verify four cases:  $0P_i 1 \wedge 0P_j 1, 0P_i 1 \wedge 1P_j 0, 1P_i 0 \wedge 1P_j 0, 1P_i 0 \wedge 0P_j 1$ . Suppose that  $0P_i 1 \wedge 0P_j 1$ ; in this case  $(z_i I w_i)P_i(y_i I x_i)$  and  $(y_j I w_j)P_j(x_j I z_j)$ , but, by  $L_{mr}$ ,

$$\begin{aligned} (w_i P_i y_i) \wedge D_i(y, w) &\rightarrow w P_s y, \\ (z_i P_i x_i) \wedge D_i(x, z) &\rightarrow z P_s x, \\ (y_j P_j x_j) \wedge D_j(x, y) &\rightarrow y P_s x, \\ (w_j P_j z_j) \wedge D_j(z, w) &\rightarrow w P_s z. \end{aligned}$$

By  $P$ ,  $(w_i P_i x_i) \wedge (w_j P_j x_j) \rightarrow w P_s x$ , therefore,  $(w P_s y) \wedge (y P_s x) \wedge (w P_s z) \wedge (z P_s x) \wedge (w P_s x)$ . From here,  $M_s(\{x, y, z, w\}, R) = \{w\}$ , i.e. everybody gets what they wanted  $(0, 0)$ . For the case in which both prefer 1 to 0 the situation is the same. I will address now the second case:  $0P_i 1 \wedge 1P_j 0$ , therefore  $(z_i I w_i)P_i(y_i I x_i)$  and  $(x_j I z_j)P_j(y_j I w_j)$ . By

$$\begin{aligned} L_{mr}: (w_i P_i y_i) \wedge D_i(y, w) &\rightarrow w P_s y, \\ (z_i P_i x_i) \wedge D_i(x, z) &\rightarrow z P_s x \text{ and }, \\ (x_j P_j y_j) \wedge D_j(x, y) &\rightarrow x P_s y, \\ (z_j P_j w_j) \wedge D_j(z, w) &\rightarrow z P_s w. \end{aligned}$$

By  $P$ :  $(z_i P_i y_i) \wedge (z_j P_j y_j) \rightarrow z P_s y$ , so we have:  $(z P_s w) \wedge (z P_s y) \wedge (z P_s x) \wedge (w P_s y) \wedge (x P_s y)$ . From here,  $M_s(\{x, y, z, w\}, R) = \{z\}$ , i.e. everybody gets what they wanted  $(0, 1)$ . The other case is the same as this one.

Case 2: suppose there are two individuals  $i, j$  and two dimensions with three simple alternatives for each individual  $\Delta_i = \langle 1, 0, 5, 0 \rangle$ , and  $\Delta_j = \langle 1, 0, 5, 0 \rangle$ . From  $dII$ :  $\#A_c = 3^2$ , i.e.  $A_c = \{p, q, r, s, t, u, v, x, y\}$ . For simplicity i will use the following table:

Alternatives, x-variantes, decisivities

Table 1

A	cod.	i-asp.	j-asp.	D <sub>i</sub>	D <sub>j</sub>
p	(0.5, 0)	p <sub>i</sub> =0.5	p <sub>j</sub> =0	(p, v)	(p, s)
q	(1, 0.5)	q <sub>i</sub> =1	q <sub>j</sub> =0.5	(p, x)	(p, t)
r	(0, 0.5)	r <sub>i</sub> =0	r <sub>j</sub> =0.5	(v, x)	(s, t)
s	(0.5, 1)	s <sub>i</sub> =0.5	s <sub>j</sub> =1	(q, r)	(r, u)
t	(0.5, 0.5)	t <sub>i</sub> =0.5	t <sub>j</sub> =0.5	(q, t)	(r, x)
u	(0, 1)	u <sub>i</sub> =0	u <sub>j</sub> =1	(r, t)	(u, x)
v	(1, 0)	v <sub>i</sub> =0.5	v <sub>j</sub> =0	(s, u)	(q, v)
x	(0, 0)	x <sub>i</sub> =0	x <sub>j</sub> =0	(s, y)	(q, y)
y	(1, 1)	y <sub>i</sub> =1	y <sub>j</sub> =1	(u, y)	(v, y)

Table 1 is to be read in the following way: A is the set of alternatives on the second column. The codification (cod.) is useful in order to distinguish between  $x$ -variants, and can be exemplified as: (p<sub>i</sub>=0) “i doesn’t read the book”; (q<sub>i</sub>=1) “i reads the book” and (s<sub>i</sub>=0.5) “i reads half of the book”. Moving on  $i$ -aspects ( $i$ -asp.) represents the aspects of individual  $i$ , and  $j$ -aspects represents those parts of the conjoint alternatives which express individual  $j$ ’s behavior.  $D_i$  is the set of libertarian decisivities of individual  $i$ , and  $D_j$  is the set of libertarian decisivities of individual  $j$ . We can see in the table the following equivalences: for  $i$ : p<sub>i</sub>, s<sub>i</sub>, t<sub>i</sub> have all (0.5); r<sub>i</sub>, u<sub>i</sub>, x<sub>i</sub>, have all (0); q<sub>i</sub>, v<sub>i</sub>, y<sub>i</sub>, have all (1); for  $j$ : q<sub>j</sub>, r<sub>j</sub>, t<sub>j</sub> have all (0.5); p<sub>j</sub>, v<sub>j</sub>, x<sub>j</sub>, have all (0); s<sub>j</sub>, u<sub>j</sub>, y<sub>j</sub>, have all (1). Since each of these equivalences shows the same individual

behavior, if we ignore the problem of externalities, we can consider that our individuals must be indifferent between the following alternatives: p<sub>i</sub>Is<sub>i</sub>It<sub>i</sub>(0.5), q<sub>i</sub>Iv<sub>i</sub>Iy<sub>i</sub>(1), r<sub>i</sub>Iu<sub>i</sub>Ix<sub>i</sub>(0), p<sub>j</sub>Iv<sub>j</sub>Ix<sub>j</sub>(0), q<sub>j</sub>Ir<sub>j</sub>It<sub>j</sub>(0.5), s<sub>j</sub>Iu<sub>j</sub>Iy<sub>j</sub>(1). If this doesn’t happen, then they don’t have minimal rational libertarian preferences. We are interested only in the cases in where one of the real alternatives dominates the other two; we have, therefore, 9 possible: 0.5P<sub>i</sub>(0,1) ∧ 0.5P<sub>j</sub>(0,1), 0.5P<sub>i</sub>(0,1) ∧ 0P<sub>j</sub>(0.5,1), 0.5P<sub>i</sub>(0,1) ∧ 1P<sub>j</sub>(0.5,0), 1P<sub>i</sub>(0.5,0) ∧ 1P<sub>j</sub>(0.5,0), 0P<sub>i</sub>(0.5,1) ∧ 0P<sub>j</sub>(0.5,1), 1P<sub>i</sub>(0.5,0) ∧ 0.5P<sub>j</sub>(0,1), 1P<sub>i</sub>(0.5,0) ∧ 0P<sub>j</sub>(0.5,1), 0P<sub>i</sub>(0.5,1) ∧ 0.5P<sub>j</sub>(0,1), 0P<sub>i</sub>(0.5,1) ∧ 1P<sub>j</sub>(0.5,0). All these cases must be discussed starting from an observation: all decisivities of one individual are in the equivalence sets of the other. In other words, each individual will be indifferent between all the alternatives from the personal spheres of all others. Suppose we have a set of four alternatives:  $A = \{a_1, a_2, a_3, a_4\}$ .  $\forall D_i(a_1, a_2) : a_1 I_j a_2$  and  $\forall D_j(a_3, a_4) : a_3 I_i a_4$ .

From here, the social preference will be equivalent to the set of each individual’s personal choice set. This observation is true for all pairs. The cases 3 and 4 are to be discussed in the same way: personal choice sets are combined and we obtain the socially proffered alternative, because there can’t be any opposition (all individuals are indifferent on the decisivities of all others). The theorem is proved: if each individual has a preference relation which generates a non empty choice set on his  $x$  – aspects set, then we will have a non-empty social choice set. *q.e.d.*

## 7. Conclusions

This article aimed had two goals: first, I have created two acceptability criteria for solutions of Sen's theorem; second, I have introduced a new solution for the inconsistency problem. Concerning my first objective, I have formulated the efficacy criterion and the ideological fidelity criterion. The first is a hard to reject condition because it represents a reasonable request that our solutions for Sen's result must work for societies with more than two individuals, with agendas containing any number of alternatives, and rights systems in which individuals have more than one right for each. I've named this condition "*efficacy for real societies*". The second criterion, the

ideological fidelity, is easier to be opposed, but there is a good argument which favors it. As long as we want to give formal representation to a libertarian condition, and to introduce it into social choice research domain, we must retain the essence of libertarianism: in libertarian thought, the libertarian principle dominates all other principles or decision rules. In other words, if we retain a notion of rights and we pretend that it is a libertarian notion, then we must make an ethical hierarchy. The consequence of this hierarchy is to consider irrelevant some sorts of externalities. Concerning my second objective, my solution meets both criteria and offers an elegant answer to the impossibility of a paretian libertarian theorem.

---

### Notes

---

<sup>(1)</sup> Social Choice Theory research does not have a clear beginning in Arrow's "Social choice and Individual Values". Before Arrow's work we can identify the works of Ramon Lull, Nicolas Cusanus, Jean-Charles de Borda, Marie Jean Antoine Nicolas Caritat de Condorcet, Lewis Carroll. For more details on SCT history, see Urken (1991) and McLean and Hewitt (1994).

<sup>(2)</sup> The alternatives will be combined with the operators of propositional logic, but I will use quantifiers from second order logic.

<sup>(3)</sup> Initially (1970a, 1970b), Sen names his theorem as "*the impossibility of a paretian liberal theorem*". In 1976, he renamed his result as "*the impossibility of a paretian libertarian theorem*". The justification of this new name is, in Sen's words, that of giving up to the less clear term of liberalism.

- <sup>(4)</sup> An externality exists, in Holtermann's terms, „*whenever an output of one economic agent appears as an input in the consumption or production vector of another economic agent without compensation being paid by either party, except as a result of government intervention*” (Holtermann, 1972, p. 79).
- <sup>(5)</sup> For a deeper discussion of the externalities problem in the libertarian inconsistency, see Bernholz (1974, 1975), Campbell and Kelly (1997), Saari (2006).
- <sup>(6)</sup> In the classical form, this principle states that a policy is admissible if and only if at least an individual gains something and nobody loses.
- <sup>(7)</sup> d11 is general and works for any number of individuals and simple alternatives.

## References

- Austen-Smith, D., „Restricted Pareto and Rights”, *Journal of Economic Theory*, vol. 26, 1982, pp. 89-99
- Blau, J.H., „Liberal Values and Independence”, *The Review of Economic Studies*, vol. 42, no. 3, 1975, pp. 395-401
- Breyer, F. H., „The Liberal Paradox, Decisiveness over Issues, and Domain Restrictions”, *Zeitschrift für Nationalökonomie, Journal of Economics*, vol. 37, no.1-2, 1977, pp. 45-60
- Bernholz, P., „Externalities as a Necessary Conditions for Cyclical Social Preferences”, *The Quarterly Journal of Economics*, vol. 97, no. 4, 1982, pp. 699-705
- Bernholz, P., „Is a Paretian Liberal Really Impossible?”, *Public Choice*, vol. 23, no. 1, 1974, pp. 99-107
- Bernholz, P., „Is a Paretian Liberal Really Impossible? – a Rejoinder”, *Public Choice*, vol. 20, no. 1, 1975, pp. 99-73
- Buchanan, J.M., „An Ambiguity in Sen's Alleged Proof of the Impossibility of a Pareto Libertarian”, *Analyse & Kritik*, vol. 18, 1996, pp. 118-125
- Campbell, D.E., Kelly, J.S., „Sen's Theorem and Externalities”, *Economica*, New Series, vol. 64, no. 255, 1997, pp. 375-386
- Gaertner, W, Krüger, L., „Self-Supporting Preferences and Individual Rights: The Possibility of Paretian Libertarianism”, *Economica*, New Series, vol. 48, no. 189, 1981, pp. 17-28
- Gaertner, W, Krüger, L., „Alternative Libertarian Claims and Sen's Paradox”, *Theory and Decision*, vol. 15, 1983, pp. 211-229
- Gärdenfors, P, Pettit, P., „The Impossibility of a Paretian Loyalist”, *Theory and Decision*, vol. 27, 1989, pp. 207-216
- Gibbard, A., „A Pareto-Consistent Libertarian Claim”, *Journal of Economic Theory*, vol. 7, 1974, pp. 388-410
- Hillinger, C., Lapham, V., „The Impossibility of a Paretian Liberal: Comment by Two Who Are Unreconstructed”, *The Journal of Political Economy*, vol. 79, no. 6, 1971, pp. 1403-1405

- Holtermann, S.E., „Externalities and Public Goods”, *Economica*, New Series, vol. 39, no. 153, 1972, pp. 78-87
- McLean I., Hewitt F. (1994). *Condorcet - Foundations of Social Choice and Political Theory*, Edward Elgar
- Nagel, E., „Assumptions in Economic Theory”, *American Economic Review Papers and Proceedings*, vol. 53, no. 21, 1963, pp. 1-19
- Saari, D.G., „Are Individual Rights Possible?”, *Mathematics Magazine*, vol. 70, no. 2, 1997, pp. 83-92
- Saari, D.G., „Negative Externalities and Sen’s Liberalism Theorem“, *Economic Theory*, vol. 28, 2006, pp. 265-281
- Seidl, C., „On Liberal Values”, *Zeitschrift für Nationalökonomie*, vol. 35, 1975, pp. 257-292
- Sen, A.K. (1970a). *Collective Choice and Social Welfare*, Oxford University Press
- Sen, A.K., „The Impossibility of a Paretian Liberal”, *The Journal of Political Economy*, vol. 78, no. 1, 1970b, pp. 152-157
- Sen, A.K., „Liberty, Unanimity and Rights“, *Economica*, New Series, vol. 43, no. 171, 1976, pp. 217-245
- Sen, A.K., „Liberty and Social Choice”, *The Journal of Philosophy*, vol. 80, no. 1, 1983, pp. 5-28
- Sen, A.K., „The Possibility of Social Choice”, *The American Economic Review*, vol. 89, no. 3, 1996, pp. 349-378
- Suzumura, K., „On the Consistency of Libertarian Claims”, *The Review of Economic Studies*, vol. 45, no. 2, 1978, pp. 329-342
- Urken, A.B. (1991). *The Condorcet-Jefferson Connection and the Origins of Social Choice Theory*, Public Choice 72: 213-236



# Application of Discriminant Analysis on Romanian Insurance Market

■

**Constantin Anghelache**

**Dan Armeanu**

Academy of Economic Studies, Bucharest

***Abstract.** Discriminant analysis is a supervised learning technique that can be used in order to determine which variables are the best predictors of the classification of objects belonging to a population into predetermined classes. At the same time, discriminant analysis provides a powerful tool that enables researchers to make predictions regarding the classification of new objects into predefined classes. The main goal of discriminant analysis is to determine which of the  $N$  descriptive variables have the most discriminatory power, that is, which of them are the most relevant for the classification of objects into classes. In order to classify objects, we need a mathematical model that provides the rules for optimal allocation. This is the classifier. In this paper we will discuss three of the most important models of classification: the Bayesian criterion, the Mahalanobis criterion and the Fisher criterion. In this paper, we will use discriminant analysis to classify the insurance companies that operated on the Romanian market in 2006. We have selected a number of eight (8) relevant variables: gross written premium ( $GR\_WRI\_PRE$ ), net mathematical reserves ( $NET\_M\_PES$ ), gross claims paid ( $GR\_CL\_PAID$ ), net premium reserves ( $NET\_PRE\_RES$ ), net claim reserves ( $NET\_CL\_RES$ ), net income ( $NET\_INCOME$ ), share capital ( $SHARE\_CAP$ ) and gross written premium ceded in Re-insurance ( $GR\_WRI\_PRE\_CED$ ). Before proceeding to discriminant analysis, we performed cluster analysis on the initial data in order to identify classes (clusters) that emerge from the data.*

**Key words:** discriminant analysis; classifier; classification cost; prediction Fisher classifier; Bayesian classifier; Mahalanobis classifier; insurance.

■

**JEL Codes:** G22.

**REL Codes:** 11B, 11C.

In order to understand how discriminant analysis operates, first we must state the classification problem. Consider a finite population  $P$  whose objects are described by  $N$  variables. The finite population is called training set (or learning set) and the variables are called descriptive variables. These variables are called predictive variables. Let  $v_1, v_2, \dots, v_N$  be the descriptive variables and  $v'_1, v'_2, \dots, v'_n$  be the predictive variables. Therefore we have

$$\{v'_1, v'_2, \dots, v'_n\} \subseteq \{v_1, v_2, \dots, v_N\} \quad (1)$$

Generally speaking, the classification problem requires an algorithm to identify the criteria according to which objects are assigned to classes. Recall the population  $P$  we defined earlier. Let us now consider that  $P$  is partitioned into  $T$  classes  $p_1, p_2, \dots, p_T$  called initial classes. The initial classes satisfy the properties:

$$p_i \subset P \quad i = 1, 2, \dots, T \quad (2)$$

$$\bigcup_{i=1}^T p_i = P \quad (3)$$

It is important to note that we do not require the initial classes to be disjoint subsets of  $P$ :

$$p_i \cap p_j \neq \Phi \quad i \neq j \quad (4)$$

As mentioned previously, discriminant analysis is a prediction tool. The core of this technique consists of determining an efficient way of partitioning the training set  $P$  into  $T$  disjoint classes (subsets) called predictive classes. Let  $\tilde{p}_1, \tilde{p}_2, \dots, \tilde{p}_T$  be the predictive classes. We have

$$\tilde{p}_i \subseteq P \quad i = 1, 2, \dots, T \quad (5)$$

$$\bigcup_{i=1}^T \tilde{p}_i = P \quad (6)$$

$$\tilde{p}_i \cap \tilde{p}_j = \Phi \quad i \neq j \quad (7)$$

It follows immediately from (7) that, in general, the predictive class  $\tilde{p}_i$  and the initial class  $p_i$  are different:

$$\tilde{p}_i \neq p_i \quad (8)$$

This happens because the predictive classes result from the truncation of the initial classes. As such, the predictive class  $\tilde{p}_i$  represents a subset of the corresponding initial class  $p_i$ :

$$\tilde{p}_i \subseteq p_i \quad i = 1, 2, \dots, T \quad (9)$$

Of course, perfect classification requires that

$$\tilde{p}_i = p_i \quad i = 1, 2, \dots, T \quad (10)$$

In order to classify objects, we need a mathematical model that provides the rules for optimal allocation. This is the classifier. In this paper we will discuss three of the most important models of classification:

- the Bayesian criterion;
- the Mahalanobis criterion;
- the Fisher criterion.

The Bayesian criterion is based on the minimization of classification costs. A correct classification has cost zero and an incorrect classification has cost  $c$ :

$$C(\tilde{p}_j, p_i) = \begin{cases} 0, & \tilde{p}_j = p_i \\ c, & \tilde{p}_j \neq p_i \end{cases} \quad (11)$$

where  $C(\tilde{p}_j, p_i)$  is the cost generated by the classification into class  $\tilde{p}_j$  of an object actually belonging to class  $p_i$  and  $c$  is a positive constant. Obviously, the perfect classification requires that the predictive and the initial classes be identical.

For ease of computation we will make the following notations:

- $P(\tilde{p}_j, p_i)$  = the probability of classification into class  $\tilde{p}_j$  of an object actually belonging to class  $p_i$ ;

- $f_{p_i}(x)$  = the probability density of objects belonging to class  $p_i$ <sup>(1)</sup>.  $x$  denotes a vector of  $m$  values of variables that define the objects in the population;
- $R_i$  = the subset of  $R^m$  in which the vectors that define objects belonging to class  $p_i$  take values;
- $f(x)$  = the unconditional probability density of objects.

According to probability theory, can be computed using the formula:

$$P(\tilde{p}_j, p_i) = \int_{R_j} f_{p_i}(x) dx \quad (12)$$

For each class  $p_i$  we define the cost of classification ( $C(p_i)$ ) as follows:

$$C(p_i) = \sum_{j=1}^T C(\tilde{p}_j, p_i) \times P(\tilde{p}_j, p_i) \quad (13)$$

The expected total cost of classification ( $C$ ) is:

$$C = \sum_{i=1}^T \sum_{j=1}^T C(\tilde{p}_j, p_i) \times P(\tilde{p}_j, p_i) \times P(p_i) \quad (14)$$

where  $P(p_i)$  is the *a priori* probability of occurrence for class  $p_i$ . Unless further information is provided, we can consider

$$P(p_1) = P(p_2) = \dots = P(p_i) = \dots = P(p_T) = \frac{1}{T},$$

which means that all classes have equal probabilities of occurrence.

We can rewrite (14) as

$$C = \sum_{i=1}^T P(p_i) \times \left[ \sum_{j=1}^T C(\tilde{p}_j, p_i) \times P(\tilde{p}_j, p_i) \right] \quad (15)$$

Taking into account (12), (15) becomes:

$$C = \sum_{i=1}^T P(p_i) \times \left[ \sum_{j=1}^T C(\tilde{p}_j, p_i) \times \int_{R_j} f_{p_i}(x) dx \right] \quad (16)$$

which can be written as

$$C = \sum_{j=1}^T \int_{R_j} \left[ \sum_{i=1}^T P(p_i) \times C(\tilde{p}_j, p_i) \times f_{p_i}(x) \right] dx \quad (17)$$

where  $\int_{R_j} \left[ \sum_{i=1}^T P(p_i) \times C(\tilde{p}_j, p_i) \times f_{p_i}(x) \right] dx$  denotes

the cost of classification into class  $\tilde{p}_j$  of all the objects actually belonging to class  $p_i$ .

Now define

$$S_j(x) = \sum_{i=1}^T P(p_i) \times C(\tilde{p}_j, p_i) \times f_{p_i}(x).$$

Therefore, we have:

$$C = \sum_{j=1}^T \int_{R_j} S_j(x) dx \quad (18)$$

As stated before, the classification rule is given by the minimum cost principle. Given the definition of  $S_j(x)$ ,  $R_j$  can be expressed as

$$R_j = \{x \in R_p \mid S_j(x) - S_i(x) < 0, (\forall) j \neq i\} \quad (19)$$

where  $S_j(x) - S_i(x)$  represents the equation of the separation surface between classes  $p_i$  and  $\tilde{p}_j$ .

It can be shown that the minimization of classification costs is achieved when each object from the initial population is allocated to the class which has the greatest *a posteriori* probability of occurrence. The *a posteriori* probabilities are computed using Bayes' theorem:

$$P(p_i | x) = \frac{f_{p_i}(x) \times P(p_i)}{f(x)} \quad (20)$$

where  $P(p_i | x)$  is the *a posteriori* probability of occurrence for class  $p_i$  given  $x$ .

Let us consider again a finite population  $P$  which is partitioned into  $T$  classes. The main idea underlying the Mahalanobis classifier is the distance between the centroids of the classes and the objects subject to classification. The Mahalanobis criterion requires that each class comprise the objects

that are closest to the centroid of the class in terms of Mahalanobis distance. More formally, the algorithm of the Mahalanobis classifier consists of five steps:

STEP 1. Estimate the centroids of the T classes:  $\hat{\mu}_1, \hat{\mu}_2, \dots, \hat{\mu}_T$ .

STEP 2. Estimate the covariance matrix  $\hat{\Sigma}$ .

STEP 3. Evaluate the Mahalanobis distance ( $d(x, \hat{\mu}_i)$ ) between every object and the T centroids. This is done using the following formula:

$$d(x, \hat{\mu}_i) = (x - \hat{\mu}_i)^t \times \hat{\Sigma}^{-1} \times (x - \hat{\mu}_i), \quad (21)$$

$i = 1, 2, \dots, T$

STEP 4. Classify the objects according to the minimum distance principle.

STEP 5. Re-compute the centroids and repeat the algorithm until all objects will have been classified. It is important to note that step 2 is not necessary anymore.

The Fisher classifier is a simple, yet robust discrimination method based on the analysis of variance. It is well known that the main purpose of pattern recognition is the classification of objects into classes so that the between-class variance is maximized and the within-class variance is minimized. Fisher (1933) addresses this issue using linear classification functions:

$$d_i = \alpha_0^{(i)} + \alpha_1^{(i)}x_1 + \alpha_2^{(i)}x_2 + \dots + \alpha_m^{(i)}x_m \quad (22)$$

where  $d_i$  is discriminant function  $i$  and

$\alpha_j^{(i)}, j=1, 2, \dots, m$  represent the coefficients of linear combination  $i$ .

Considering  $\alpha^{(i)} = (\alpha_0^{(i)} \quad \alpha_1^{(i)} \quad \dots \quad \alpha_m^{(i)})^t$  and  $x = (1 \quad x_1 \quad \dots \quad x_m)^t$ , relation (22) can be rewritten as

$$d_i = (\alpha^{(i)})^t \times x \quad (23)$$

The coefficients of the linear combinations will be determined bearing in mind that we have to maximize the between-class variance while minimizing the within-class variance. The covariance matrix  $\Sigma$  can be written as sum between the between-class covariance matrix ( $\Sigma_b$ ) and the within-class covariance matrix ( $\Sigma_w$ ):

$$\Sigma = \Sigma_b + \Sigma_w \quad (24)$$

Now consider a discriminant function (or discriminant variable)  $d$  and a vector of coefficients  $\alpha$ . Assuming all discriminant variables are centered, it follows immediately from (23) that the variance of variable  $d$  is:

$$\begin{aligned} VAR(d) &= E\left[(\alpha^t \times x) \times (\alpha^t \times x)^t\right] = \\ &= \alpha^t \times E(x \times x^t) \times \alpha = \alpha^t \times \Sigma \times \alpha = \\ &= \alpha^t \times \Sigma_b \times \alpha + \alpha^t \times \Sigma_w \times \alpha \end{aligned} \quad (25)$$

The coefficients of the linear combination will be determined so that the following condition is satisfied:

$$\max_{\alpha} \psi = \frac{\alpha^t \times \Sigma_b \times \alpha}{\alpha^t \times \Sigma_w \times \alpha} \quad (26)$$

Differentiating with respect to  $\alpha$ , we have:

$$\frac{\partial \psi}{\partial \alpha} = \frac{2 \times (\Sigma_b \times \alpha) \times (\alpha^t \times \Sigma_w \times \alpha) - 2 \times (\Sigma_w \times \alpha) \times (\alpha^t \times \Sigma_b \times \alpha)}{(\alpha^t \times \Sigma_w \times \alpha)^2} \quad (27)$$

The condition  $\frac{\partial \psi}{\partial \alpha} = 0$  leads to

$$\frac{(\Sigma_b \times \alpha) \times (\alpha^t \times \Sigma_w \times \alpha) - (\Sigma_w \times \alpha) \times (\alpha^t \times \Sigma_b \times \alpha)}{(\alpha^t \times \Sigma_w \times \alpha)^2} = 0 \quad (28)$$

Multiplying by  $\alpha^t \times \Sigma_w \times \alpha$ , we get:

$$\Sigma_b \times \alpha - (\Sigma_w \times \alpha) \times \psi = 0 \quad (29)$$

It follows immediately that must satisfy:

$$(\Sigma_b - \Sigma_w \times \psi) \times \alpha = 0 \quad (30)$$

or

$$(\Sigma_w^{-1} \times \Sigma_b - I_m \times \psi) \times \alpha = 0 \quad (31)$$

where  $I_m$  is the identity matrix.

Equation (31) shows that  $\alpha$  is an eigenvector of matrix  $\Sigma_w^{-1} \times \Sigma_b$ . In order for  $\alpha$  to be a non-zero vector,  $\psi$  must satisfy the characteristic equation:

$$|\Sigma_w^{-1} \times \Sigma_b - I_m \times \psi| = 0 \quad (32)$$

The maximum number of eigenvalues of matrix  $\Sigma_w^{-1} \times \Sigma_b$  is  $m$  (provided the matrix is non-singular<sup>(2)</sup>). Let  $\lambda_1, \lambda_2, \dots, \lambda_m$  be the  $m$  eigenvalues and assume further that

$$\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_m \quad (33)$$

It can be easily proven that, for each eigenvalue  $\lambda$ , we have:

$$\psi = \lambda \quad (34)$$

Therefore, the maximum value of  $\psi$  (the between-class variance to within-class variance ratio) corresponds to the greatest

eigenvalue of matrix  $\Sigma_w^{-1} \times \Sigma_b$ , which is  $\lambda_1$ . As such, eigenvector  $\alpha^{(1)}$  (corresponding to eigenvalue  $\lambda_1$ ) defines discriminant function  $d_1$ , which has the greatest discriminatory power. Eigenvector  $\alpha^{(2)}$  (corresponding to eigenvalue  $\lambda_2$ ) defines discriminant function  $d_2$ , which has less discriminatory power than  $d_1$ , and so on.

In this paper, we will use discriminant analysis to classify the insurance companies that operated on the Romanian market in 2006. We have selected a number of eight (8) relevant variables: gross written premium (GR\_WRI\_PRE), net mathematical reserves (NET\_M\_PES), gross claims paid (GR\_CL\_PAID), net premium reserves (NET\_PRE\_RES), net claim reserves (NET\_CL\_RES), net income (NET\_INCOME), share capital (SHARE\_CAP) and gross written premium ceded in Reinsurance (GR\_WRI\_PRE\_CED).

Before proceeding to discriminant analysis, we performed cluster analysis on the initial data in order to identify classes (clusters) that emerge from the data. The results are displayed in the table below:

Class	Class members
PREMIUM	ASIROM, ALLIANZ-TIRIAC, ING ASIGURARI DE VIATA
A	BCR ASIGURARI, OMNIASIG, ASIBAN
B	GENERALI, UNITA, BT ASIGURARI TRANSILVANIA, ASTRA, ARDAF
C	GARANTA, CARPATICA ASIG, ASITRANS, AIG ROMANIA
D	INTERAMERICAN, OMNIASIG VIATA, GRAWE, BCR ASIGURARI DE VIATA, AVIVA, AIG LIFE
E	THE REST OF THE COMPANIES

As we can see, we have six classes of insurance companies. PREMIUM class includes the largest and most profitable companies on the market (ALLIANZ-TIRIAC, ASIROM, ING ASIGURARI DE

VIATA). Class A comprises companies with important market share and good levels of profitability (BCR ASIGURARI, OMNIASIG, ASIBAN). Class B includes companies with significant market share but

weak profitability (ASTRA) or companies that incur substantial losses (GENERALI, UNITA and especially ARDAF). Class C groups companies with average market share and variable return on capital (CARPATICA ASIG, ASITRANS, GARANTA, AIG ROMANIA). Class D consists of small companies which are in the life insurance business (OMNIASIG VIATA, GRAWE, BCR ASIGURARIDE VIATA, AVIVA, AIG LIFE). Finally, class E includes small companies with weak financial performances (the rest of the companies).

The table below summarizes the role of the descriptive variables in the discriminant analysis performed:

Discriminant analysis summary		
Wilks' Lambda: 0.00015	F-test: 19.605	p-value < 0.0000
	Wilks' Lambda	Partial Lambda
GR_WRI_PRE	0.000505	0.302171
NET_M_RES	0.000413	0.369350
GR_CL_PAID	0.000769	0.198484
NET_PRE_RES	0.000587	0.260160
NET_CL_RES	0.000715	0.213281
NET_INCOME	0.000510	0.299359
SHARE_CAP	0.000735	0.207650
GR_WRI_PR_CED	0.000793	0.192521

As we can see in the header, Wilks' Lambda<sup>3</sup> is only 0.00015, which means that the model has significant discriminatory power. The test-statistic F is 19.605 and the p-value is below 10<sup>-4</sup>, thus assuring the goodness of the model.

The second column of the table contains the Wilks' Lambda statistic computed for each descriptive variable and it shows that all variables included in the model have important discriminatory power.

The Partial Lambda statistic (computed in the third column of the table) illustrates the contribution of the variables to the classification and, in this respect, it is clear that the descriptive variables aren't very different one from another.

The Fisher discriminant functions are:

	d1	d2	d3	d4	d5
GR_WRI_PRE	-0.000000073293551	0.000000037616167	0.000000035455884	-0.000000021791953	-0.000000027802918
NET_M_RES	-0.000000026315923	-0.000000007664877	-0.000000008638985	0.000000007265270	0.000000010319762
GR_CL_PAID	-0.000000102115120	0.000000019705988	-0.000000005064990	0.000000009658398	0.000000042580728
NET_PRE_RES	0.000000087054118	-0.000000076412717	-0.000000032406245	0.000000084062284	0.000000005330565
NET_CL_RES	0.000000303233204	-0.000000129275626	-0.000000164373520	-0.000000159754400	-0.000000006432826
NET_INCOME	0.000000101887694	-0.000000016161207	-0.000000100967733	-0.000000059705624	-0.000000009966636
SHARE_CAP	0.000000067035005	-0.000000052824959	0.000000011426392	0.000000016347683	0.000000010384906
GR_WRI_PR_CED	0.000000083852117	-0.000000039164855	-0.000000019043765	0.000000019130481	0.000000003542834
Constant	5.098413743419430	1.885731801860240	-0.454078109241892	-0.294166354414800	0.127152340049423
Eigenval	164.986328649779000	5.695449444939720	2.102466164517110	0.789207162386037	0.062290267356944
Cum.Prop	0.950186448048853	0.982987583284832	0.995096070535591	0.999641258955379	1.000000000000000

As the previous table demonstrates, matrix  $\Sigma_w^{-1} \times \Sigma_b$  has only five positive eigenvalues. The first discriminant function (corresponding to the first and greatest eigenvalue) is, by far, the most important, as it accounts for over 95% of total discrimination.

The next table contains the means of the previously defined discriminant variables:

Means of discriminant variables					
Class	d1	d2	d3	d4	d5
E	5.4680	1.38377	-0.25422	-0.173957	0.148278
D	3.4618	-0.71992	0.42856	1.831199	-0.140463
C	4.3425	0.99157	-0.35342	-0.925392	-0.622381
PREMIUM	-39.7480	2.16861	0.39354	0.078882	0.002275
B	-0.2577	-3.47241	2.56004	-0.715147	0.064743
A	-7.1665	-5.02740	-3.43611	-0.213782	0.061490

The first discriminant function distinguishes PREMIUM class from the other classes of insurance companies, the second discriminant functions distinguishes companies pertaining to class A and the third discriminant function distinguishes class B companies from the others. The fourth and fifth functions have very little discriminatory power. This is normal considering the eigenvalues determined earlier.

The discriminant scores are:

Insurance company	Class	d1	d2	d3	d4	d5
ALLIANZ-TIRIAC	PREMIUM	-39.9280	0.56399	-0.01384	-1.34926	-2.12665
ASIROM	PREMIUM	-39.6342	3.25933	0.32720	0.52237	3.16470
ING ASIGURARI DE VIATA	PREMIUM	-39.6819	2.68250	0.86725	1.06353	-1.03122
ASIBAN	A	-6.8393	-6.60250	-3.92334	0.96281	0.52981
BCR ASIGURARI	A	-7.7692	-1.36025	-2.56639	-0.97737	0.29722
OMNIASIG	A	-6.8910	-7.11944	-3.81862	-0.62678	-0.64256
ARDAF	B	-0.2911	-4.47046	4.01559	-3.04192	1.42167
ASTRA	B	-0.8659	-3.72637	4.56805	-1.84197	-0.87956
BT ASIGURARI TRANSILVANIA	B	1.5743	-2.55761	0.02579	-0.36178	-0.33126
GENERALI	B	-0.3632	-2.33102	3.38964	1.98220	-2.13192
UNITA	B	-1.3426	-4.27661	0.80113	-0.31227	2.24478
AIG ROMANIA	C	6.3841	1.23344	0.50994	-0.65662	-1.52766
ASITRANS	C	4.8983	0.85383	-0.25421	-0.60909	-0.47031
CARPATICA ASIG	C	2.3389	1.26386	-1.03491	-2.85404	-0.67614
GARANTA	C	3.7485	0.61518	-0.63451	0.41819	0.18458
AIG LIFE	D	0.5759	-1.14606	-1.17700	2.40960	-1.41603
AVIVA	D	3.5399	-2.01577	3.12010	2.57199	0.62727
BCR ASIGURARI DE VIATA	D	4.8550	0.38203	-0.39716	0.23042	-0.46659
GRAWE	D	3.9777	0.06726	0.12905	0.99363	-0.60267
INTERAMERICAN	D	4.5128	-0.79149	1.10791	1.49238	0.49555
OMNIASIG VIATA	D	3.3092	-0.81549	-0.21153	3.28918	0.51968
ABC ASIGURARI	E	5.4765	1.33486	-0.14938	-0.10738	0.15478
AGRAS	E	4.8886	1.39471	-0.41105	-0.40577	0.02500
ASIMED	E	5.1375	1.80852	-0.43160	-0.26843	0.14603



Insurance company	Class	d1	d2	d3	d4	d5
ASIROM CONCORDIA	E	5.7092	1.39201	-0.39602	-0.08419	0.21027
ASITO KAPITAL	E	4.8505	1.59226	-0.23307	-0.60552	-0.01944
ATE INSURANCE	E	6.3424	0.83535	-0.11121	0.10185	0.34666
CERTASIG	E	5.2772	1.63414	-0.24463	-0.14182	0.14778
CITY INSURANCE	E	5.3289	1.57219	-0.19398	-0.19527	0.13260
CLAL ROMANIA	E	5.1891	1.37690	0.36534	0.30644	0.31293
DELTA	E	7.6640	0.77592	-1.74619	-1.10241	0.00394
DELTA ADDENDUM	E	5.5204	1.40654	-0.30207	-0.10285	0.16955
EUROASIG	E	5.2987	1.52207	-0.16043	-0.08560	0.15016
FATA ASIGURARI AGRICOLE	E	5.5884	1.39372	-0.21785	0.01291	0.09965
GERROMA	E	5.3770	1.67182	-0.40018	-0.35734	0.09080
IRASIG	E	5.2940	1.62531	-0.24090	-0.11468	0.17971
KD LIFE ASIGURARI	E	5.7951	0.99354	0.21822	0.34225	0.30791
NBG INSURANCE	E	5.0743	1.37045	-0.04783	0.02069	0.18842
OTP GARANCIA ASIGURARI	E	5.6130	0.79942	0.29161	0.23553	0.31975
R.A.I.	E	4.4668	1.79196	-0.41897	-0.75360	-0.14920

Even though all five discriminant functions could be used in our analysis, we are going to use only the first two of them, because of the following reasons:

- together they account for over 98% of the total discrimination

- they enable us to plot the discriminant scores and thus emphasize the grouping of the objects in the reduced discriminant space. The chart is shown below:

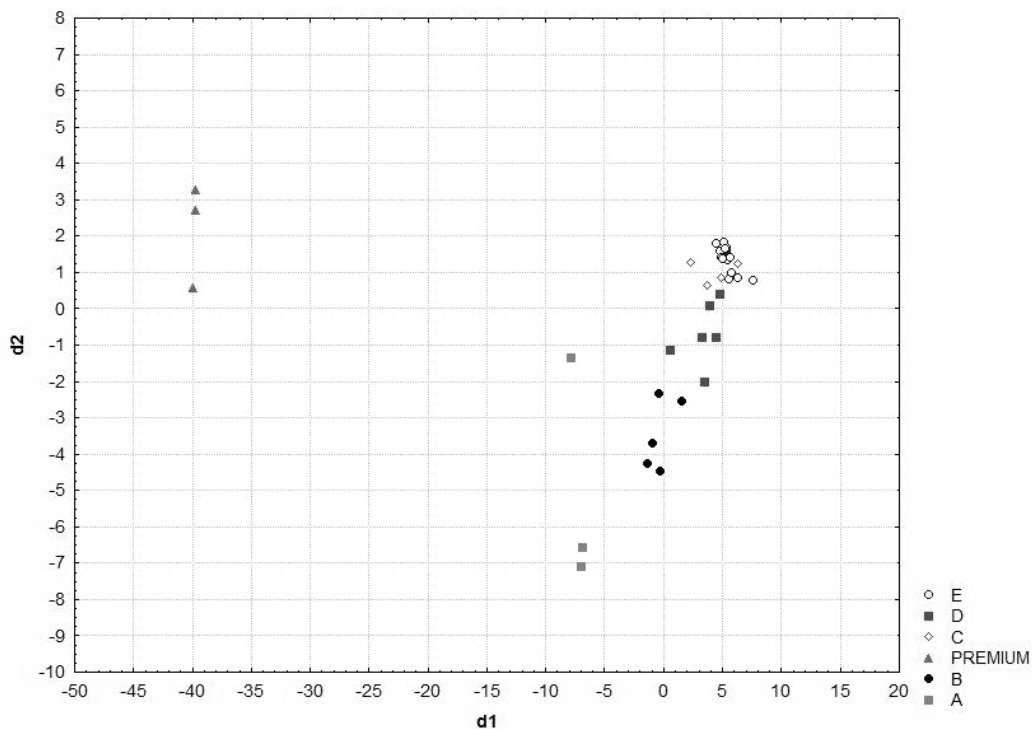


Figure 1. Plot of discriminant scores

The plot shows that a clear distinction can be made only between PREMIUM and A classes and the others. At the same time, it is difficult to distinguish between classes C and E; once again, we have clear proof that the first two discriminant functions are the most significant. Discriminant variable  $d_1$  is negatively correlated with predictive variables *gross written premium*, *net mathematical reserves* and *gross claims paid*, indicating that companies with low  $d_1$  values have a good chance of being included in the PREMIUM category. Discriminant variable  $d_2$  is positively correlated with *gross written premium* and *gross claims paid* and negatively correlated with the other six predictive variables. Companies with negative  $d_2$  are very likely to be allocated to class A, but they can also be classified in class B. As for classes C, D and E, they are all characterised by similar  $d_1$  and  $d_2$  scores, making it very difficult to distinguish between them.

As mentioned previously, discriminant analysis is also an important prediction tool: based on the data in the training set, it produces a model that can be used to classify new objects. The quality of classification can be assessed using the classification matrix:

Rows: observed classifications							
Columns: predicted classifications							
	% correct	E	D	C	PREMIUM	B	A
E	94.7368	18	0	1	0	0	0
D	83.3333	1	5	0	0	0	0
C	75.0000	1	0	3	0	0	0
PREMIUM	100.0000	0	0	0	3	0	0
B	100.0000	0	0	0	0	5	0
A	100.0000	0	0	0	0	0	3
Total	92.5000	20	5	4	3	5	3

As we can see, the total percentage of correct classification is 92.5%, which can be considered excellent. The application of the model resulted in perfect classification for objects in classes PREMIUM, A and B. The percentage of correct classification for objects in classes C, D and E is not 100% because, as explained in the previous section, it is difficult to distinguish between companies belonging to these classes. Still, over 75% of objects have been classified correctly, which proves that we developed a robust prediction tool.

The Bayesian criterion produces exactly the same classification as the Fisher linear discriminant functions. The *a posteriori* probabilities of classification are presented in the table below:

A posteriori probabilities							
Incorrect classifications are marked with *							
	Observed	E	D	C	PREMIUM	B	A
1	E	0.792934	0.001575	0.205490	0.000000	0.000000	0.000000
2	E	0.588580	0.001601	0.409820	0.000000	0.000000	0.000000
3	D	0.000001	0.999808	0.000115	0.000000	0.000076	0.000000
* 4	C	0.665418	0.000225	0.334357	0.000000	0.000000	0.000000
5	PREMIUM	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000
6	B	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000
7	A	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000
8	E	0.730372	0.000633	0.268995	0.000000	0.000000	0.000000

A posteriori probabilities							
Incorrect classifications are marked with *							
	Observed	E	D	C	PREMIUM	B	A
9	PREMIUM	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000
10	E	0.840944	0.000809	0.158247	0.000000	0.000000	0.000000
11	E	0.556741	0.000827	0.442432	0.000000	0.000000	0.000000
12	C	0.410196	0.002916	0.586888	0.000000	0.000000	0.000000
13	B	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000
14	E	0.918427	0.001357	0.080216	0.000000	0.000000	0.000000
15	D	0.000005	0.999863	0.000003	0.000000	0.000129	0.000000
16	A	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000
* 17	D	0.481964	0.049176	0.468860	0.000000	0.000000	0.000000
18	B	0.000026	0.369984	0.004412	0.000000	0.625578	0.000000
19	C	0.006686	0.000024	0.993291	0.000000	0.000000	0.000000
20	E	0.768181	0.001063	0.230757	0.000000	0.000000	0.000000
21	E	0.765919	0.001016	0.233064	0.000000	0.000000	0.000000
22	E	0.814868	0.008210	0.176922	0.000000	0.000000	0.000000
23	E	0.928964	0.000004	0.071033	0.000000	0.000000	0.000000
24	E	0.805603	0.001141	0.193256	0.000000	0.000000	0.000000
25	E	0.773573	0.001537	0.224890	0.000000	0.000000	0.000000
26	E	0.822372	0.001423	0.176205	0.000000	0.000000	0.000000
27	C	0.307588	0.181682	0.510730	0.000000	0.000000	0.000000
28	B	0.000000	0.000356	0.000000	0.000000	0.999644	0.000000
29	E	0.751512	0.000466	0.248022	0.000000	0.000000	0.000000
30	D	0.093725	0.741787	0.164488	0.000000	0.000000	0.000000
31	PREMIUM	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000
32	D	0.015387	0.979071	0.005542	0.000000	0.000000	0.000000
33	E	0.778769	0.001113	0.220118	0.000000	0.000000	0.000000
34	E	0.882592	0.005748	0.111660	0.000000	0.000000	0.000000
35	E	0.736508	0.004175	0.259317	0.000000	0.000000	0.000000
36	A	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000
37	D	0.000090	0.999873	0.000037	0.000000	0.000000	0.000000
38	E	0.839954	0.010030	0.150016	0.000000	0.000000	0.000000
* 39	E	0.412300	0.000590	0.587110	0.000000	0.000000	0.000000
40	B	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000

It is important to mention that the a priori probabilities of occurrence for each class have been chosen equal to  $\frac{1}{6}$ .

Finally, we get the same results using the Mahalanobis classifier:

Squared Mahalanobis distances from group centroids							
Incorrect classifications are marked with *							
Case	Observed	E	D	C	PREMIUM	B	A
1	E	0.019	12.461	2.719	2046.305	63.710	211.146
2	E	0.504	12.318	1.228	1993.989	59.173	195.833
3	D	41.249	13.993	32.130	1647.860	32.972	90.121
* 4	C	4.565	20.553	5.941	2132.020	73.078	241.186
5	PREMIUM	2080.620	1911.114	1975.152	21.885	1614.391	1134.908
6	B	109.730	81.418	93.262	1640.010	24.583	127.170
7	A	231.027	161.736	201.215	1180.493	99.058	5.307
8	E	0.368	14.470	2.366	2015.705	66.191	207.194
9	PREMIUM	2057.613	1895.710	1965.956	21.368	1621.917	1157.123
10	E	0.094	13.987	3.435	2067.657	68.428	216.276
11	E	0.685	13.710	1.145	1990.265	59.610	198.692
12	C	1.244	11.137	0.527	1996.207	53.585	190.778
13	B	108.339	73.956	89.528	1583.482	21.643	124.009
14	E	1.353	14.388	6.229	2126.631	70.153	228.250
15	D	36.137	11.775	37.254	1907.099	29.686	176.467
16	A	193.624	148.451	162.826	1049.921	92.144	20.064
* 17	D	2.068	6.633	2.123	1993.619	51.045	183.617
18	B	31.254	12.163	21.021	1730.525	11.112	94.877
19	C	19.404	30.703	9.402	1784.362	48.349	144.341
20	E	0.130	13.296	2.535	2028.061	64.943	209.448
21	E	0.070	13.320	2.450	2032.735	64.529	210.217
22	E	0.789	9.984	3.844	2020.194	59.175	208.531
23	E	9.519	34.471	14.661	2257.034	100.718	258.489
24	E	0.019	13.139	2.874	2050.368	65.777	212.208
25	E	0.079	12.521	2.550	2029.999	63.638	209.046
26	E	0.070	12.789	3.151	2056.400	66.122	214.346
27	C	5.661	6.714	4.647	1897.181	45.879	160.855
28	B	75.392	34.446	62.389	1593.027	18.566	114.242
29	E	0.170	14.939	2.387	2037.368	67.126	211.478
30	D	6.314	2.176	5.189	1917.917	40.029	165.044
31	PREMIUM	2064.088	1894.236	1966.324	22.241	1619.088	1157.748
32	D	10.731	2.424	12.773	1970.870	37.447	178.430
33	E	0.119	13.220	2.646	2029.580	65.054	209.782
34	E	0.805	10.873	4.940	2075.779	63.273	218.008
35	E	0.254	10.600	2.342	2009.928	59.258	202.337
36	A	240.991	174.872	206.483	1186.913	100.903	7.671
37	D	22.532	3.906	24.322	1874.675	44.608	151.262
38	E	0.913	9.768	4.358	2059.692	58.884	211.488
*39	E	1.881	14.980	1.175	1956.726	59.217	191.536
40	B	92.415	54.617	78.466	1530.325	18.295	65.674

To sum up, discriminant analysis provides an important classification tool. Regardless of the method used, the application of the model produced 92.5% correct classification, which underlines the

robustness of the analytical approach. It is also worth mentioning that discriminant analysis offers a powerful predictive tool which can be used to describe future developments in the Romanian insurance market.

---

## Notes

---

- (1) We can also write  $f_{p_i}(x) = f(x|x \in p_i)$ .  $f_{p_i}(x)$  is a conditional probability density.
- (2) Recall that is a positively defined and symmetrical matrix.
- (3) Computed as sum

$$\frac{\text{sum of squares of errors between classes}}{\text{total sum of squares of errors}}$$

The closer its value is to zero, the more discriminatory power the model has; the closer its value is to one, the less discriminatory power the model has.

---

## References

---

- Armeanu, D. (2006). *Managementul riscului în asigurări*, seria business, Editura Universității Romano-Britanice, București
- Discriminant Function Analysis*, <http://www2.chass.ncsu.edu/garson/pa765/discrim.htm>
- Poulsen, J., French, A., *Discriminant Function Analysis*”, <http://userwww.sfsu.edu/~efc/classes/biol710/discrim/discrim.pdf>
- Ruxanda, Gh., *Analiza multidimensională a datelor*, Master Baze de Date – Suport pentru Afaceri
- Ruxanda, Gh. (2001). *Analiza Datelor*, Editura ASE, București
- Simar, L. (2004). *Applied Multivariate Statistical Analysis*, Springer
- Spircu, Liliana (2006). *Analiza Datelor: Aplicații Economice*, Editura ASE, București
- Welling, Max, *Fisher Linear Discriminant Analysis*”, <http://www.cs.huji.ac.il/~csip/Fisher-LDA.pdf>

# Environment Protection and Implementation of its Policies in Romania

■

**Marieta Stanciu**  
**Carmen Puiu**  
University of Craiova

***Abstract.** In its step European Union Starts from the idea there is no contradiction between economic growth and maintaining an acceptable qualitative level of environment. That's whip the measures of environment integration among the economic and politic activities must action together in order to reduce pollution and improve economy's function.*

*In conclusion, the best strategy for environment integration in to the economic policy must be the creation on improvement of environment goods market function.*

**Key words:** environment risk; air quality; storage of waste; environment goods market; implementation of environment policies.

■

**JEL Codes:** Q56, Q58.  
**REL Codes:** 15C, 15G.

By joining the European Union, Romania made an important step to its integration in the European structures and international standards. Legislative basis of Romanian environment policy is constituted, mainly, by the implementation of environment acquis – more precisely of the horizontal and sector legislation which organizes the European Union's environment policy.

Acquis has over 200 legislative acts that covers horizontal legislation, environment and water pollution, administrating waste products and chemicals, bio-technology, protecting nature, industrial pollution and risk management, noise and protection against radiations. In order to apply the environment acquis it is absolutely necessary to have a strong and well-equipped administration on a national, regional and local level<sup>(1)</sup>. Transposing the acquis that refers to the environment protection in national legislation and its application represents major tasks, the list of priorities includes:

- Frame legislation of European Union (including information access and evaluating environment impact);
- Measures deriving from international conventions from which the Union is part of;
- Reducing global and trans-boarder pollution;
- Legislation regarding nature protection (which pursues the bio-diversity conservation);
- Measures that can assure the intern market function (for example, product standards).

European Union's directives were assimilated in Romanian legislation but they were not implemented yet. Applying and respecting the acquis from the environment protection needs a strong and well-equipped administrative structure, the continue consolidation of consultative role of the Minister and National Agency of environment regarding local and regional agency is also necessary<sup>(2)</sup>.

Romanian alignment to European Union's standards of protecting the environment became an important priority, which includes two components:

- Legislative approximation (harmonizing Romanian legislation with EU acquis<sup>(3)</sup>);
- Institutional reform that needs the development of a correspondent institutional mechanism capable to apply and monitor the aquis implementation.

Environment protection must be integrated in defining and implementing other sector policies, which are inter-connecting and have an impact on the environment, as agriculture, energy, industry and transports, to contribute to a durable development.

The alignment to the standards of European quality mean very big costs, financial evaluation for communitarian environment acquis implementation, in the period 2004-2018 being almost 29,3 billion dollars. It is pursued the improvement of environment infrastructure<sup>(4)</sup>, fact that means stations for treating water, stations of purifying used waters, deposits that were



not corresponding to European requests must be gradually closed and ecologic warehouses must be built that will correspond to the requests of European Union, as for the standards, but also from the point of its placement; rehabilitating big burning installations, thermo power stations, and reducing emissions that come from them.

In the year 2007, the activity of the Environment and Waters Minister was based on the continuation of implementing arrangements that Romania has assumed regarding chapter 22 for the integration to the European Union, diminishing the risks that were associated to extreme events, generated by climatic changes and perfecting the institutional instruments that should contribute to the use and protection of resources based on durable development principles and reducing pollution<sup>(5)</sup>:

- Integrating environment policy in elaborating and applying sector and regional policies;
- Evaluating the actual state of the ecologic factors and grounding a long-term development strategy in the environment domain and that of regenerable and non-regenerable resources;
- Strengthening the institutional capacity in the environment domain;
- Improving the quality of environment factors in urban and rural areas;
- Extending the national network of protected areas and natural reservations, rehabilitating coast infrastructure of the Romanian littoral, ecologic and economic re-

dimensioning of the Danube Delta;

- Strengthening the trans-boarder and international partnership with similar institutions from other countries having the purpose of monitoring implementation degree of international agreements;
- Protecting the citizens against floods and dangerous meteorological phenomena;
- Strengthening the partnership with non-governmental organizations in the process of elaborating and applying public policies in that domain.

In the horizontal legislation<sup>(6)</sup> domain the alignment regarding juridical and public participation was finalized, the implementation will be accomplished according to the aquis.

The objectives of horizontal legislations are:

- Evaluating the impact on the environment of public and private projects;
- Public participation in taking decisions;
- Guarantying the right to access environment information that is in the possession of the public authorities and establishing terms, practical conditions in order to exert this order;
- Assuring that the environment information is put at public disposal by promoting utility, especially, computerized telecommunication and/or electronic technology;
- Monitoring and reporting kerosene emissions with green house effect in order to accomplish assumed

engagements by the Kyoto Protocol in the frame – Convention of United Nations on the climateric changes and achieving national and regional plans or programs in the domain of kerosene emissions with green house effect and to achieve adapting measures to the climateric changes.

During the Government Program 2005-2008, Romanian Government wants to strengthen the partnership with non-governmental organizations in the elaboration and application process of public policies<sup>(7)</sup>, by:

- Giving a priority attention to population ecological education by conceiving and implementing a national plan of actions to sensitize and making the public aware of environment protection problem;
- Implementing the requirements of Aarhus Convention concerning information access, public participation in taking decisions and access to justice for environment problems, by defining legislative frame, introducing an automatic system at central, regional and local level regarding the administration of environment information;
- Realizing an annual campaign of making the public aware about public participation in taking environment decisions, especially concerning public role in evaluation processes of the impact on environment for projects with significant impact, authorization, environment evaluation for plans and programs;

- Making public some punctual problems of environment protection: genetic modified organisms, persistent organic pollutants, polychlorinated biphenyls, climateric changes in order to protect not only the environment but also human health of their damaging effect.

In the air quality domain it is considered that legislation is transposed in conformity with the *acquis*; necessary administrative structures being established and functional.

Romanian government has adopted<sup>(8)</sup>, in July 2005, the first National Strategy regarding Climatic Changes, in this way it directed itself to a concentrated and coordinated national effort to implement policies from this domain for limitation of kerosene emissions with green house effect and preparing adaptation measures for possible effects of climatic changes until 2013.

The twining project with Germany is on its way to being implemented “*Implementation and Application of Environment Acquis, Emphasizing the Domain of Air Quality*”, inside which there were selected 11 Agencies for Environment Protection (Iasi, Galati, Constanta, Craiova, Brasov, Ploiesti, Alba Iulia, Timisoara, Cluj-Napoca, Baia Mare, Bucuresti), to these calibration units will be built, necessary for the implementation of Quality Insuring Procedure and Quality Data Control of Air.

In the air quality domain, Environment and Water Minister followed:

- Operating the National System of Monitoring Air Quality resulted from

the endowment with monitoring stations to 34 APM and area lists will be established for every region and district;

- In noise domain PHARE project will be implemented: “Strengthening institutional capacity for implementation and application of directives that refer to noise”.

In the waste product management domain, the acquis transpose was finalized. A series of important measures were taken in the direction of implementation directives regarding waste product warehouses, packing waste products and waste products coming from electric and electronic equipments. Still, it is necessary an improvement of assistance and consultancy functions at a national level.

In what concerns the implementation of the Directive regarding the storage of waste<sup>(9)</sup> products until July 2009, all warehouses with non-dangerous waste products will have to conform themselves to European Union’s requirements. To respect the requirements of the Directive, Romania obtained the following transitions periods<sup>(10)</sup>, as follows:

- Gradual closing of 101 invalid district warehouses (from 256 registered) until the 16<sup>th</sup> of July 2017, their monitoring for 30 years, as well as assuring conform warehouses capacities;
- A transition period until 1 January 2007 until 31 December 2009, for temporary storage of dangerous industrial waste products;

- Transition period, until 31 December 2013, in order to forbid the storage of liquid waste products, the interdiction to storage waste products with certain properties (corrosives and oxidant) and regarding the prevention of water infiltration in waste products warehouses (only surface water).

Until 2017 the solution for housekeeping waste products is storage and starting with 2017, when the prognosis regarding features and caloric powers of housekeeping waste products will justify the endorsement of this solution, the incineration of housekeeping waste products will be realized with energy recuperation.

In this sector a transition period was obtained until 31 December 2011 for:

- Reaching global objective of valorizing 50% and the recycling objective of 15% for plastic, stipulated in Directive 94/62 regarding packaging and packing waste products;
- Reaching the recycling objective of 15% for wood stipulated in the Directive that refers to the same thing.

Through the Directive regarding packing and waste products a transition period was obtained until 31 December 2013 for:

- Reaching the global objective of valorizing of 60%;
- Reaching the global objective of recycling of 55%;
- Reaching the recycling objective of 60% for glass and 22,5% for plastic.

It is absolutely necessary to reduce the growth of waste products quantity by introducing separate systems of gathering and some treatment operations: re – utilization, recycling (paper, cardboard, glass, textile, plastic, metal), valorizing operations and eliminating these, only in the conditions in which the environment is protected, as well as in what concerns water management, the acquis transpose was finished, monitoring water quality being established according to parameters and frequencies regulated by the acquis. A series of important implementation measures were taken regarding the identification of water capturing areas and elaborating a new register of collecting and treatment systems of water. A series of investments in infrastructure were continued, being elaborated a new financial strategy<sup>(11)</sup>.

Water quality is the most expensive sector (65% from the total of implementation costs), representing a special importance for local authorities. Significant sums must be invested in realizing the infrastructure or rebuilding specific infrastructure: in purification and treatment stations, in water alimentation and sewerage networks. The longest period of transition, in tight connection with this financial evaluation necessary to the Directive implementation, is that of purifying used urban waters and it was obtained a period until the end of 2018.

The directive regarding the quality of water destined to human consume is that which has as main objective assuring and complying with the value of quality

parameters for water destined to human use, of all installations, monitoring the function of water alimentation networks and distribution of drinkable water. This way, for all connected areas to a centralized system of water alimentation, it was requested and obtained a period of phased transition, in the first phase until 31 December 2010, with a prolongation until 31 December 2015, for a series of specific parameters: oxidability, turbidity, aluminum, iron, pesticides, maganese, lead, cadmium.

Total costs of implementation were estimated to 5, 6 billion euros, and these must materialize in exonerating treatment installations, changing interior installations, exonerating networks of water alimentation and monitoring drinkable water quality.

The impact of communitarian acquis application can present the following positive and negative aspects:

- Costs will affect state budget as well as local and economic agents' budgets. Negative effects of implementing communitarian environment norms can materialize in bigger costs at the final consumer level concerning utilities price, loosing jobs caused by re-organization, re-technologization or bankruptcy of certain economic agents;

- The costs in environment protection domain are costs that should be realized even in the case in which we didn't join the European Union. We can say that investments for environment are made for better health and cleaner environment for each of us.

Integrating environment policies in sector policies (agriculture, transport, industry, health etc.), preoccupations for promoting economic instruments in administrating the environment, the

relationship environment – privatization constitute priorities in society building, having as purpose improving environment quality and transition to a durable development.

---

## Notes

---

- <sup>(1)</sup> European Commission – “The Comprehensive Rapport of Monitoring Concerning Romania“, Bruxelles, 2005, pp. 63-65.
- <sup>(2)</sup> European Commission, “Monitoring Rapport of Romania and Bulgaria Preparing Stage for the Status of EU Member“, Bruxelles, 2006, pp. 26-27.
- <sup>(3)</sup> EU Acquis = legislative and institutional frame specific to each sector – here we speak about the sector of environment protection.
- <sup>(4)</sup> <http://www.MinisterulMediuluisiGospodariiiApelor> (The environment status 2000 -2005, Legislation, U.E. Integration, Rapport for deployment activity of Ministry of Environment and Menage of water in 2007).
- <sup>(5)</sup> The Priorities of Environment and Water Minister for the Year 2007, [www.mmediu.ro](http://www.mmediu.ro)
- <sup>(6)</sup> The Directive 85/337/CEE, modified by the directive 97/11/CE, was transposed by HG no.918/2002 (M.Of. no. 686/17.09.2002) concerning the establishment of frame- evaluation procedure of the impact on environment and to approve to the list of public or private projects that are under these procedure, modified by HG no. 1705/2005 (M. Of no. 970/22.10.2004); the directive 90/313/CEE was transposed by HG no.1115/2002 (M.Of. 781/ 28.10.2002) regarding free access to information concerning environment; Decision 93/389/CEE and Decision 280/2004/CE concerning monitoring and reporting CO2 emissions and other gases with green house effect do not transpose in national legislation, they remain implemented as they are.
- <sup>(7)</sup> Post-adhesion strategy 2007-2013, Romanian Government, Bucharest 2006.
- <sup>(8)</sup> Government Decision no.645/2005 for approving Romanian National Strategy regarding climacteric changes 2005/2007.
- <sup>(9)</sup> Council Directive no.99/31/CE regarding waste products deposit.
- <sup>(10)</sup> Transition periods are presented in the Treaty of Romanian Joining the European Union signed on 25 of April 2005 in Luxemburg.
- <sup>(11)</sup> See European Commission, *op. cit.*, 2006, p. 27.

---

## References

---

- Comisia Europeană – “Raportul Comprehensiv de Monitorizare privind România” , Bruxelles, 2005, pp. 63-65
- Comisia Europeană, *Raport de monitorizare a stadiului pregătirii României și Bulgariei pentru statutul de membru UE*, Bruxelles, 2006, pp. 26-27
- Prioritățile Ministerului Mediului și Gospodării Apelor pentru anul 2007, [www.mmediu.ro](http://www.mmediu.ro)
- Hotărârea Guvernului nr. 645/2005 pentru aprobarea Strategiei Naționale a României privind schimbările climatice 2005/2007
- Tuttle, C.A. „The Fundamental Economic Principle”, *Quarterly Journal of Economics*, 1901
- <http://eurostat.ec.europa.eu> –Statistical Office of the European Commission (Environment and energy)
- <http://www.MinisterulMediuluișiGospodăriiApelor.ro> (Starea mediului 2000-2005, Legislație, Integrare UE, Raport privind activitatea desfășurată de Ministerul Mediului și Gospodării Apelor în anul 2006; Prioritățile Ministrului Mediului și Gospodării Apelor pentru anul 2007)
- <http://europa.eu.int>. Comunitatea Economică Europeană (Directoratul General pentru Mediu, Legislație Comunitară de mediu, Politici, Integrare, Resurse) Strategia postaderare 2007-2013, Guvernul României, București, 2006
- Bran, Florina (2002). *Relația economie-mediul la începutul mileniului al III-lea*, Editura ASE, București

# An Analysis of the Romanian General Accounting Plan. Opportunities for Adaptation to the Activity-Based Costing (ABC) Method

■

**Sorinel Căpușneanu**

Artifex University, Bucharest

**Irina-Alina Preda**

Tzar Metalcom SRL, Bucharest

***Abstract.** In this article, we analyze the causes that have led to the improvement of the Romanian general accounting plan according to the Activity-Based Costing (ABC) method. We explain the advantages presented by the dissociated organization of management accounting, in contrast with the tabular-statistical form. The article also describes the methodological steps to be taken in the process of recording book entries, according to the Activity-Based Costing (ABC) method in Romania.*

**Key words:** Activity-Based Costing (ABC); general accounting plan; cost accounting; methodological steps; dissociated organization.

■

**JEL Codes:** M41.

**REL Codes:** 14I, 14K.



## The limits of the Romanian general accounting plan

The structure of management accounts – as stipulated in the general accounting plan of Romania – reveals the absence of a large number of groups of accounts, with different uses and accounting functions. The current accounting system does not offer the picture of a complete costing – which is necessary for the determination of product unit cost – but rather of an overall collection of expenses. The analytical accounts contained in the general accounting plan are still informationally limited. It is precisely for this reason that the Public Finance Ministry specifies that they are non-compulsory. The enforcement rules for the accounting law in Romania allow companies to introduce further accounts or to detail analytically the existing accounts, according to the necessities and goals of every company.

The economic content and accounting correlations between the accounts of class 9 “Management Accounts” (standardized by the Romanian accounting regulations) can only meet the structural requirements of the full costing methods – and less the practical demands of partial costing methods.

*What organizational structure do we opt for in cost accounting?*

This is a question we will try to answer, starting from the existing cost accounting structural forms. During their evolution, management and cost accounting methods have taken different forms and structures, being shaped by the specific technological process and manufacturing type. The general accounting plan only came to simplify the

recording technique and the mode of establishing costs for products, works and services. The main problem remains the correct representation of economic and financial operations within the company flows. Consequently, we argue for a dissociated organization of the Activity-Based Costing (ABC) method.

*Why did we choose the dissociated organization of the ABC (Activity-Based Costing) method?*

The double flow accounting system represents the organization form that allows a split between financial accounting – which is liable to normalization – and management accounting, for which the basic rule is “no admittance except on business”, but which is also liable to accounting normalization. The dissociation (splitting) process is based on the informational pluralism, according to which accounting information is directed towards several users, such as: the state, the company management, investors, etc. Internal informational needs are fulfilled by management accounting, whose main objective is the internal analysis of the results (according to organizational structures).

The selection of the dissociate organization in management accounting (through the use of accounts) allows us to structurally join the French accounting system. At the same time, it manages to capture its specific economic and financial flows, enables us to follow the entire operational process at company level. The use of accounts makes it possible to notice much more concrete aspects related to the material and cash flows. It also enables us to detect some deviations and to easily establish their causes.

*Why did we not use the tabular-statistical form specific to German accounting system?*

Unlike the tabular form, the dualist form ensures the identification, recording, allocation and highlighting of indirect product costs (such as prime costs, direct costs or overheads) according to activities. In order to emphasize them, we use the accounting system specific to the 9<sup>th</sup> class (“Management accounts”). This way, we can have a much clearer picture of the manner in which the manufacturing costs of products, works and services are structured and recorded in the accounting system. By means of the accounts used, we can also get a better idea of the cost flow process.

Both the tabular and the dualist organizational forms of cost accounting require the determination of the allocation quota and offset of activity costs<sup>(1)</sup>, according to cost bearers and depending on the cost drivers used, which express a causality relation between expenses to be allocated and their allocation bases.

According to the tabular form, some costs cannot be separated from the start, (according to the documents), into processes or activities, because they are indirect with respect to both the products (cost bearers) and the processes and activities involved. To this end, it is necessary to use some conventional techniques and procedures. The tabular form offers the example of cost allocation over products by means of tables or other tabular-statistical types of reports. We can safely say that there is a similarity between the two organizational forms, with the mention that the dualist form uses the system of accounts to distinguish among

these techniques. The same thing can be noticed in establishing the deviations for products (cost bearers) or activities.

*What are the main arguments for choosing the dissociated organization of the ABC method?*

In conclusion, the main arguments for choosing to introduce the system of accounts as a way to use and implement the Activity-Based Costing (ABC) method refer to the fact that the dualist system in management accounting has had a long tradition in Romania: it was used both during the centralized economy and it has also been used after 1994, when the general accounting plan was adjusted to the French model. This tradition has since continued in two directions:

1. *The use of double entry accounts.* Most of the accountants have been accustomed to an accounting system based on an accounting plan and so they continued to use it, because of the multiple advantages it offers (as previously shown).

2. *The use of software based on the double entry accounting.* In order to simplify accountants’ work, IT specialists have created software based on the double entry accounting – instead of mathematical spread sheets, as it is the case of the cost offset tabular sheets. This type of software is easy to use, especially because of the large volume of data that can be computer-processed in this way.

Considering the deficiencies of the Romanian accounting system and their analyzed causes, as well as the main arguments that favor the dissociated structure of the Activity-Based Costing (ABC)

method, we opt for the developed version of double entry management accounting, as emphasized by Professors Klaus Ebbeken, Ladislau Possler and Mihai Ristea in their seminal work “*Cost Calculation and Management*”<sup>(2)</sup>.

Given the proposed version for calculating the analytical result and the alterations adopted according to the specifics of the ABC method, the new accounting plan will have the following structure:

*90 Group “Internal offset”*

- 901 “Internal offset for expenses”
- 902 “Internal offset for manufactured output”
- 903 “Internal offset for cost differences”
- 904 “Internal offset for sales”

*92 Group “Calculation accounts”*

- 921 “Main activity expenses”
- 923 “Indirect expenses/Overheads”
- 924 “General management expenses”
- 925 “Marketing and sale expenses”

*93 Group “Production cost”*

- 931 “Finite production cost”
- 933 “Work- in-progress cost”
- 935 “Sold output cost”

*95 Group “Analytical result accounts”*

- 951 “Analytical result”.

Before beginning the general presentation of the 9<sup>th</sup> class (“Management accounts”), we should mention that the symbols and names used for the following accounts: 904 “Internal offset for sales”, 935 “Sold production cost” and 951 “Analytical result” belong to the authors of the above-mentioned work. In order to determine the costs and results for products and/or activities, accounts 921, 931, 902,

903, 904, 951 will be analytically structured according to products (cost bearers), while accounts 923, 924, 925, according to processes and activities. Account 901 is run according to cost types.

*A general overview of the 9<sup>th</sup> class of accounts (“Management accounts”)*

*Group 90 “Internal offset”* is one of the most important group of the 9<sup>th</sup> class (“Management accounts”). Besides the accounts receivable and payable, we also have bi-functional accounts. The adjustment to the specific of the ABC method have required changing the names of some of the accounts, precisely to make them more flexible in pinpointing, on the one hand, the recorded expenses and on the other hand, the obtained earnings.

*901 “Internal offset for expenses”* is a bi-functional account, but it functions as an account payable. In this account, we record the offsets related to direct expenses (main activities) and activity-based expenses (production overheads, general management expenses and sale expenses). These outgoings (expenses) are taken over (according to the expense transposition chart) from financial accounting (6<sup>th</sup> class) and transposed into management accounting (9<sup>th</sup> class). They ensure the interface between the two types of accounting, by emphasizing the actual cost of the finite manufactured output.

It is credited during the month, when we offset the running expenses according to destinations (products or activities) through the debit of the following accounts: 921 (“Main activity expenses”), 923 (“Indirect expenses/Overheads”), 924 (“General

management expenses”, 925 (“Marketing and sale expenses”). It is debited at the end of the month by the actual cost of the finite production, through the credit of account: 935 (“Sold production cost”). It has no balance.

902 “*Internal offset for manufactured output*” is a bi-functional account. It is used for recording:

- internal offset of the manufactured output cost during the month, at record price;
- internal offset of the manufactured output cost at the end of the month, at actual cost.

When the actual cost is higher than the pre-calculated cost, the difference is unfavorable, signifying a negative deviation (exceeding) from standard costs. When the actual cost is lower than the pre-calculated cost, the difference signifies a positive deviation (savings) from standard costs.

It is credited during the month by the record price of the finite manufactured output through the debit of account 931 (“Finite production cost”) and, at the end of the month, by the cost differences (actual cost – pre-calculated cost) corresponding to the manufactured output and represented in the debit of account 903 (“Internal offset for cost differences”).

It is debited, at the end of the month, by the actual cost of the manufactured output, through the credit of account 921 (“Main activity expenses”).

It has no balance. Analytically, this account details calculation objects (orders, products, works, services etc.).

903 “*Internal offset for cost differences*” is an account receivable and it records the

cost differences (calculated at the end of the month) between the actual and the standard cost of the manufactured output.

It is debited at the end of the month, when (favorable or unfavorable) cost differences are established and recorded, through the credit of account: 902 (“Internal offset for manufactured output”).

It is credited at the end of the month, when (favorable or unfavorable) cost differences are offset through the debit of account 931 (“Finite production cost”).

It has no balance. Analytically, this account details calculation objects (orders, products, works, services, etc.).

904 “*Internal offset for sales*” is an account payable. It is used to record (at the end of the month):

- earnings obtained from selling the finite products at sale price;
- the offset of the actual cost and the result obtained after selling the finite production.

It is credited at the end of the month, when we offset the actual cost of manufactured and sold output and the result obtained after selling the finite production, through the debit of account 951 (“Analytical result”).

It is debited at the end of the month by the value of earnings resulted from selling the finite products, through the credit of the (same) account 951 (“Analytical result”).

It has no balance. Analytically, this account details calculation objects (orders, products, works, services, etc.).

#### *Group 92 “Calculation accounts”*

This group is homogeneous from the point of view of the economic contents and accounting function. It is worth noticing the

absence of account 922 (“Auxiliary activity expenses”), which, according to the principles of the ABC method, is not to be found at the level of activities.

921 “Main activity expenses” is an account receivable. It is used for keeping record of the company’s main activity expenses. It is debited:

- during the month, when we collect the direct expenses resulted from the main activity, through the credit of account 901 (“Internal offset for expenses”);
- at the end of the month, when we allocate the shares of overheads (taking into account the activity-specific cost drivers), through the credit of accounts: 923 (“Indirect expenses/Overheads”), 924 (“General management expenses”) and 925 (“Marketing and sale expenses”).

It is credited at the end of the month by the actual cost of the manufactured output, through the debit of account 902 (“Internal offset for manufactured output”).

It has no balance. Analytically, this account details calculation objects (orders,

products, works, services, etc.), calculation items (raw materials and direct salaries, including direct labor accessories). It may also be analytically detailed at section level, depending on the manner in which we identify finite cost bearers.

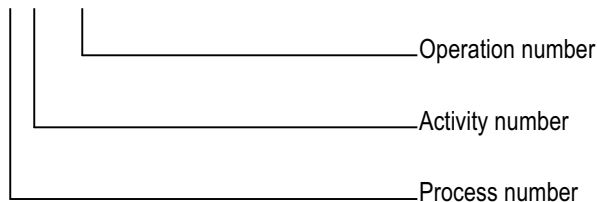
923 “Indirect expenses/overheads” is an account receivable. It is used for keeping record of activity-centered expenses (production overheads).

It is debited during the month, when we collect production overheads, through the credit of account 901 (“Internal offset for expenses”).

It is credited at the end of the month, when we allocate the shares of expenses resulting from the main activities (production overheads), based on specific cost drivers, through the debit of account 921 (“Main activity expenses”).

It has no balance. Analytically, this account details processes, (production) activities and operations. Account 923 can be analytically and digitally coded in the following manner:

923. XX..XX..XX



Example: 923.01.1 „Indirect expenses/Overheads” – Supply Raw material supplying

924 “General management expenses” is an account receivable. It is used to record expenses resulting from management activities.

It is debited during the month, when general management expenses are collected, through the credit of account 901 (“Internal offset for expenses”).

It is credited at the end of the month, when we allocate the shares of the main activity expenses (general management overheads), based on specific cost drivers, through the debit of account 921 (“Main activity expenses”).

It has no balance. Analytically, it details processes, (general management) activities and operations. The same rules apply for the analytical digital coding of account 924 as in the case of account 923 above.

925 “*Marketing and sale expenses*” is an account receivable. It is used to record expenses resulting from commercial activities (it contains marketing and sale expenses, packing expenses, etc.).

It is debited during the month, when commercial activity expenses are collected, through the credit of account 901 (“Internal offset for expenses”).

It is credited at the end of the month, when we allocate the shares of expenses resulting from the main activities (indirect marketing and sale expenses), based on specific cost drivers, through the debit of account 921 (“Main activity expenses”).

It has no balance. Analytically, this account details processes, (marketing and sale) activities and operations. The same rules apply for the analytical digital coding of account 925 as in the case of accounts 923 and 924 above.

*Group 93 (“Production cost”)* is the group that distinguishes the aspects of production cost from two points of view: the finite production and the sold production. The accounts described below are both accounts receivable and accounts payable.

931 “*Manufactured output cost*” is an account receivable. It is used to record finite

production, consisting of finished products, work performed and services provided to third parties, own investments or other activities.

It is debited during the month, by the record price of manufactured output, through the credit of account 902 (“Internal offset for manufactured output”) and at the end of the month by the difference between the actual cost and the record cost of finite products, through the credit of account 903 (“Internal offset for cost differences”).

It is credited at the end of the month, by offsetting the actual cost of finite production, through the debit of account 935 (“Sold production cost”).

It has no balance. Analytically, this account details calculation objects (orders, products, works, services, etc.).

935 “*Sold production cost*” is an account receivable and it keeps record of the finite production to be sold (orders, products, works and services for third parties, own investments or other activities), at sale price.

It is debited at the end of the month, by the finite production entry at the actual cost, through the credit of account 931 (“Finite production cost”).

It is credited at the end of the month, by offsetting the actual cost of manufactured output on the account 901 (“Internal offset for expenses”).

It has no balance. Analytically, this account (just like the previous one) details calculation objects (orders, products, works, services provided, etc.).

*Group 95 “Analytical result accounts”* is the group that contains result accounts, which represent the difference between earnings and outgoings/expenses (resulting from the finite production of a company).



951 “Analytical result” is a bi-functional account. It is used to record the analytical result obtained from selling the finite products.

It is credited at the end of the month by the (sale price) value of sold production, through the debit of account 904 (“Internal offset for sales”).

It is debited at the end of the month by the actual cost of finite manufactured output

and by the result obtained as the difference between recorded earnings (at sale price) and the actual cost of sold production, through the credit of (the same) account 904 (“Internal offset for sales”).

It has no balance. Analytically, this account details calculation objects (orders, products, works, services, etc). It can also detail analytical results referring to customers or categories of customers.

---

## Notes

---

- <sup>(1)</sup> Cost driver – repartition base.
- <sup>(2)</sup> According to Ebbeken, K., Possler, L., Ristea, M., (2000). *Calculația și managementul costurilor*, Editura Teora, București, pp. 159-162

---

## References

---

- Căpușeanu, S., „Adaptarea planului de conturi general la metoda ABC (Activity-Based Costing)”, *Gestiunea și contabilitatea firmei, Tribuna Economică*, nr. 22/2005, pp. 11-14
- Căpușeanu, S., „Organizarea disociată a contabilității de gestiune și calculației costurilor prin metoda ABC (Activity-Based Costing)”, *Economie teoretică și aplicată - Economistul* nr. 434/2005, p. 1 și p. 4
- Căpușeanu, S. (2006). *Contabilitate de gestiune. Studii aplicative și teste-grilă*, Editura Economică, București



# Productivity and Performance through Marketing Planning

■

**Elena Enache**  
**Cristian Moroza**

„Constantin Brâncoveanu” University, Pitești

***Abstract.** In the marketing area, planning might be defined as an anticipation process of those changes that affect the market and as an elaboration process of the corresponding action means. It will result in a marketing plan, which might be tactical (short-term period), spread on a period of time that might vary from six months to one year, or a strategic (long-term), spread on a period of time of three to ten years.*

*Planning means building action programs in which the objectives, the set financing method or the steps of achieving it should be clearly defined. Marketing planning also proves to be important for its liaison between what the company can offer and the consumers' needs and expectations.*

**Key words:** planning; marketing strategy; strategy; strategic objectives; SWOT analysis.

■

**JEL Codes:** M31.  
**REL Codes:** 14G.

## I. Considerations regarding the marketing planning

The advantages of a marketing planned activity lead to developing some more realistic objectives taken out from the organization's general objectives and a more elevated managerial motivation, towards a superior cooperation between the organization's components (sectors, services, departments etc), towards an easier personnel coordination and efficiency in resources allocation.

As huge corporations within modern economy are structured on four levels (central, directional, business and product), the settlement and fortification of a viable position on the market in an environment situated in a continuous evolution, demands the existence of a strategic planning approach at the central level and, at the directional one, an activities planning tactic at the business level and a marketing plan at the product level.

It is therefore obvious that strategic planning efficiency might be obtained through its assurance on each level (superior organizational level, that of strategic business unity and the functional one) and through the interaction between them.

Strategic planning defines the firm's mission, identifies the strategic activity domains, and plans the new domains where investments could be made. This planning sets the general direction and the important headings that define the company's activity.

Following the General Electric matrix, the strategic activity domains should have the subsequent criteria:

- To correspond to some function that could represent an autonomous planning strategy and it exists

independent from the rest of the company;

- To have its own competitive structure.

After deciding on the activity domain, analyses and evaluations will be made in order to identify those aspects that need development, maintenance, exploitation or quitting.

The Boston matrix, realized by Boston Consulting Group, represents an useful tool for companies, used for the product portfolio's analysis by highlighting the financial and marketing implications. The matrix proposes the positioning of different activity domains within a picture split in four pieces, depending on the marketing growth rate and the relative market value.

Activity planning can be realized at the level of operational superiors. Thus, each activity domain should set a specific mission – component part of the company's global mission and it helps identify its environment.

Another used matrix, General Electric Business Planning Grid, is meant to improve the BCG estimates, forcing the planners to quantify and test their presumptions.

It is difficult to formulate a planned activity where there is not an organizational culture and professional personnel. Their lack can lead to confusions or mingling elements such as political, strategic, tactical and objectives.

The planning objectives in marketing must be defined at all planning process's levels, for the company as a whole, and for each target-element. The objectives' settlement process is usually of a descendent nature but, it can also be ascending when the objectives' correction needs to be done. What do the objectives pursue? Most often the sales' volume on different components (categories, clients, time-periods, etc.), the

market value, research-development, product innovation, product-line extension, aspects concerning efficiency, profit, the organization's relation to the surrounding environment concerning ecological and social issues, the promotion of a favorable image, etc.

Fixing marketing objectives will allow those in charge on each activity field to control obtained results' efficiency annually or at the end of each commercialized cycle by understanding the connection between obtained and expected results.

Moreover, these objectives will serve to define activity plans, will help put dimensions and structure to commercial activities (technical services, commercial services, administrative services, logistics and sales services etc.).

The procedure of objectives' formulation is specific for each level of responsibility and it contains:

- a. the evaluation phase (internal/external);
- b. the prediction phase;
- c. the resources allocation phase.

#### *The evaluation phase*

This phase wants to set:

a) the internal evaluation: study on the potential that highlights the strong and weak aspects and the level at which they are situated. For instance: the company that has to evaluate its competences and the means of action before deciding on the means of action and development;

b) the external evaluation: study on the environment that seeks to identify the threats and opportunities. This evaluation can be flexible or adaptable to diverse factors such as: the evolution of the economical situation, the emergence of a new legislation, the appearance of the new distribution circuits, the producers' political change. Their ability

to observe revolves in noticing those opportunities generated by the environment, in reducing risks by supporting those forces that they have and by taking into consideration the weaknesses in order to improve them.

The evaluation has as its basis two logical ideas: one that leads to determining possible solutions, the other that leads to fixing the objectives. In a decisional view when many solutions are possible (marketing studies, advertising campaigns, sale-forces recruitment), these two logical ideas that are complementary need to be taken into consideration: choosing the right solution by standing on some objectively beforehand defined criteria. That is why such an intervention might be useful when defining the mix between marketing and its component politics.

#### *The prediction phase*

In order to define the objectives and find the means to apply them so as to achieve the desired results, the company needs to use the prediction methods, classified in two different manners:

- For the strategic planning:
  - Either a horizon function, which allows the distinction between the prediction methods on a long-term basis from those on a middle of short-term;
  - Either a function of the information nature and of the continuous development, fact that will lead to separating qualitative and quantitative methods;
- For a marketing planning:
  - Prediction methods for choosing activity strategies, such as those qualitative: the method of expert consulting the method of crossed impact, systems analysis, structural analysis and qualitative methods;

– Prediction methods for marketing planning (for a market, a part, a product).

Therefore, marketing planning methods, which undoubtedly turn to analytical methods, focus on a great market closure. Moreover, they are closer to the marketing strategies.

*The resources allocation phase*

It is the moment when a budget is being developed that needs to correspond to each objective. The document that reflects all the abovementioned is the marketing plan. This represents the manifestation of the planning process and is part of the business plan. Its importance could not be doubted because experince has shown that it is the key to success.

**II. Content of a marketing plan**

The marketing plan is situated at the product level. This plan benefits of a certain flexibility that allows the adaptation to the company’s organizational culture and presumes the approach of some delicate strategies, forcing the company to analyze periodically the situation of some products on the market and predict the evolution

simultaneously with anticipating the competing companies’ actions.

This plan especially allows the antagonist evaluation of the advantages of some product and periodic revising taking into consideration the obtained results. At the same time, the marketing plan involves efforts coordination and individual action control. Hence it also has a control role when the management wants to evaluate the stage of the actions.

Achieving the marketing plan allows the company’s better adaptation to the market demands. The company is forces to examine the new product and market developmental possibilities, to admit the changes and moves that intervene at the middle level creating an advantage for the appropriate use of financial, human and material resources. The marketing plan is, therefore, the indispensable planning tool of every company.

For every activity level (product, range, label) such a plan needs to be elaborated. At the company level, several marketing plans embodying themselves of some sort act in different areas. There is not a standard structure for this document, but, additionally, we will present a possible model and the absolutely necessary chapters.

**Content of a marketing plan**

Table 1

Chapters	The chapter’s content
Managerial summary	Summarizes the main suggestions provided for the general manager’s approval.
The marketing situation analysis	Summarizes the essential data in rapport to the company’s environment, product, demand, competition, intermediates
SWOT analysis	Presents the main opportunities and threats, strong and weak aspects.
Objectives	Specifies the means that the company is trying to achieve accordingly to the business volume, market parts and profit.
Marketing strategy	Identifies the fundamental directions chosen in the marketing area for the desired targets
Action methods	For each action it is indicated what should be done, when, why and by what means, and the given budget
Budget	A quantitative and a financial prediction of desired results are being set.
Evaluation and control systems	It is indicated the method of following and evaluating the plan.

**Source:** Enache, E. et al. (2006). *Marketing*, “Independența Economică” Publishing House, Pitești.

## **1. Managerial summary and the plan's content**

A marketing plan should begin with one or two pages summary that has essential elements, purposes and the main recommendations. This summary is meant to provide the general manager with the global appreciation elements of each plan as well as providing some key values.

## **2. The marketing situation analysis**

Those who elaborate the plan successively analyze: the macro-environment, the product demand, the competition, and the intermediates. These data are typed down and centralized.

- The macro-environment. The tendencies in the demographic, technological, economical, political, judicial and socio-cultural evolution are identified as parts of this plan;

- The demand. The essential data relative to the market to which the company is addressing is presented: dimension (value/ volume), evolution, segment restoration. Another part is dedicated to the client's needs, perceptions and images as well as the evolution tendencies of the buying process.
- The products. The commercial results are indicated, the contributions and benefits obtained on each product line in the last years or, in the new products' case, the probable repartition on the great consumer categories.
- The competition. The main competitors are identified and studied as concerns size, objectives, results, marketing strategies, partnerships and other relevant characteristics for their

intentions and behavior.

In this picture a PEST analysis can be included dealing with those elements that affect the organization, but cannot be controlled: political factors (national and international improvements, taxes, normative acts, general constrains or those of the local authorities, conflict behaviors); economic factors (inflation, recession, costs, the evolution of the rate exchange, credit access); socio-cultural factors (age, sex, lifestyle, health level, culture and education, the impact of problems on the surrounding environment and the level of comprehension); technological factors (inventions, innovations, management systems).

## **3. SWOT analysis**

Starting from the given data on the commercial environment, the marketing supervisor announces the opportunities and threats, strengths, weaknesses and major direction reflections that characterize the company's situation or some specific entities regarding the plan.

- Opportunities and threats correspond to those external susceptible elements so as to affect the firm's evolution.

An opportunity's value is linked to its attraction level and its success probability, fact that depends on the distinctive company's competences, on the activities that the company does in its special way and the performance towards the success key factors, the conditions of opportunity value. What can an opportunity constitute? For instance: opening new markets, extending the existent one, recreating the market after a period of fall or recession, creating a new brand, legislative advantages etc.

Threats are an issue resulted from an unfavorable tendency or environment disruption that, in the absence of an useful marketing activity, leads to the company's position deterioration. A threat is dangerous when it profoundly affects the company's advantages and when it drives apart the firm's chances of development. For example: some new and strong competitors' entering the market, consumers' drop of interest for a certain product, legislative disadvantages.

- Strengths and weaknesses are determined by an internal evaluation. Therefore, all activity areas need periodical evaluation. For this, it is frequently being used an analysis matrix and a periodical reexamination of different sectors' competences is done (marketing, finance, production and human resources). Forces can be identified in the company's positive image and in the products, the good market position being reflected in the increased market value, professional and experimented personnel, activity done according to plans and clear schedules. Weaknesses do not have the same consequences, very disturbing being those that affect the high sensitivity activity fields. We enumerate: high activity costs, dropping sales so low profit, unqualified personnel in an inefficient working environment, etc.

#### 4. Objectives

This part describes the company's decision as concerns objectives and marketing strategy for a given period of planning and it represents the most important part of the program.

Financial objectives expressed by the advantage rate on medium term will be

shown, the company's capability of self-funding and annual benefits, as well as marketing objectives, meaning that, we can say, that translating financial objectives into specific indicators: the business cipher, sales volume or market value. Talking about the market value, we extend as objectives notoriety, enlarging the distribution line, creating favorable images etc.

Rarely does the company settle one sole objective. Traditionally, these refer to improving the advantages, raising the business cipher, gaining some new markets segments, diminishing risks and innovation. These objectives can happen directly from the firm's mission and can represent developing criteria. They can be integrated in a keeping by objectives system in which they are hierarchical placed, quantified and analyzed as concerns realism and coherence.

- Hierarchical: Different objectives that we struggle to achieve in a certain activity field do not have the same importance. This means that they need to be ranked according to priorities. For example, an advantageous objective can be reached enlarging the benefit or reducing the invested capital. The profit results from the business cipher and from costs. The business cipher can be obtained by multiplying a volume with a price. Acting this way, we can specify, in more detail, the global objectives.

- Quantitative: Objectives need to be quantified as much as possible. Deciding that "the advantage needs to be enlarged" is not sufficient enough, but predicting that "the advantage will rise from 9 to 12% in the future two years" constitutes a significant improvement.

- **Realistic:** Realism in choosing the objectives is very important for a company. Deciding on an advantageous plan, impossible to achieve might create uproar. That is why the final choice needs to be done starting from the market opportunities' analysis and the internal company's resources.

- **Coherent:** The company cannot optimize all of a sudden all objectives. It needs to find equilibrium between the already made production and the market terms, the penetration of the existing markets and the development of new markets. The financial and the non-lucrative objectives (for example, the social and the security ones) need to be equally correlated.

### 5. Marketing strategy

In this part of the plan, the marketing supervisor outlines the strategy's essential traits that will be applied. A marketing strategy does not constitute a collection of isolated acts, but rather a general orientation of the overall efforts needed to achieve the desired objectives. This strategy needs to be described in a clear and yet concise manner.

Elaborating the strategy, the marketing supervisor will try to benefit from the help of other functions and that of the partners involved in applying the plan: production, purchase (acquisitions), finance, human resources etc. He will contact the production and acquisitions compartments in order to verify whether sufficient quantity of raw materials was ordered and if the production programs are compatible with the commercial ones; he will also discuss with those in charge of the distribution area so as to fortify the bilateral cooperation and so on.

So, strategy formulation is strongly inspired by the information resulted from the situation. It is important to remember that strategies always need to be coherent and convergent with the objectives. Below, we shall enumerate the marketing strategies that the company is having:

- **Growth strategies:** applied when a progressive development is anticipated. The expected results are, in general, the market sector growth, the business ciper's growth and the sales volume.
- **Stability strategies:** could be applied when the sold product is at the maturity stage, when the clients are already decided, the annual sales ciper is going through a constant growth and certain environmental changes take place slowly.
- **Withdrawn strategies:** concern cost reduction, the number of sold products or the offered services, the association with another company, etc.
- **Differential marketing strategies:** they have as target the satisfaction of a larger part of the total market sector and offer numerous products adapted to different market segments.
- **Concentrated marketing strategies:** the company is focusing all efforts to satisfy a very precise market segment.

### 6. Action methods

The strategy identifies the route to be followed in order to reach the already set objectives, but for each decision answers to a series of questions concerning the specific action taken into consideration should be found, the time in which it the strategy will



be applied, the resources, means, necessary costs, this being the action plan's purpose.

In this section references concerning each person's responsibilities as well as the stages' deadlines are made.

### 7. Budget

The action plan allows the marketing supervisor to prepare a budget, most frequently, under the form of a predicting calculus result. Besides the products that are about to be made, it is also mentioned the quantity needed to be sold and the sale price.

Sometimes several budgets are prepared corresponding to some optimistic or pessimistic hypotheses. Once approved, with or without modification, the budget becomes the orientation document for buying raw materials and scheduling the production, preparing and recruiting workforce and actions in the commercial sector.

### 8. Control

The control process involves one or more objectives, a restore information system that compares the results with the initial objectives and a system that allows readjusting the activities so as to make them compatible with the objectives.

The necessity of a control system is meant to:

- Assure that the company's objectives and those of the marketing sector will be reached and that the company is heading towards the right direction;
- Guarantee the efficiency of using marketing resources;
- Put in equilibrium the marketing forces between different services;

- Reevaluate the purposes and marketing performance norms.

Control cannot be occasional being a continuous process and its results should bring about all the knowledge that will become part and parcel of the future planning incomes to the person in charge of the marketing sector.

A good control system predicts the elaboration of several plans, alternatives for the changes that occur in the company and the arousal of some specific hindrances, as well as a prices battle or a supply break.

The elaboration of alternative plans obliges the person in charge of the marketing sector to anticipate difficulties that could disturb applying and achieving the objectives.

## III. A marketing plan creating model

It's generally better to study the others' experience and to take over it. But taking into account the fact that the activities and organizations are never identical and have no the same directions of development, the taking over must be accompanied by adapting, correlation to the own problems and improved by own competence.

The model we'll present you has been drawn up after we have examined the following five stages:

*Stage 1 – the position of the product/ service*, which is very necessary because we can really speak about success when the client benefits by the proper product or service and a proper price.

*Stage 2 – the exploration of the creative potentiality*. We try to find out answers to some questions, such as: Whom do you offer to? What are the clients' needs? Why would they

choose our offer instead of the others' one? What are the efforts and marketing techniques which make our product being remarkable? How much does the effort cost? We can find out the answer to these questions from our confidential consultants during the brainstorming meetings: the attendants, specialists, friends, family. They aren't to be neglected as they can have excellent opinions. It's not enough just one meeting; we need more because in this way we get the best suggestions, we have the possibility to distinguish from the best ones.

*Stage 3 – listening to the clients' opinion.* They'll decide if the buy or not and the answer to the question "Why do they buy?" is essential. Someone looks image and brand, someone else looks for additional services or for a good price, for quality. Their thoughts and opinions can be found by means of classical questionnaires, e-mails, telephone calls, direct discussions which can be stimulated with gifts, samples or prices cutting.

*Stage 4 – sketching of the plan.* It becomes possible after we acquire a general image about the conditions of the external environment and of the clients'. According to the structure we've presented, the plan will include:

- a summary of the organization's position in the market and of its dims;
- a clearing up of the expectations ("We'll stage two new plays, a comedy and a drama"; "We'll sell 3,500 insurance policies till the end of the first semester", etc.);
- the list of the markets we take aim at;
- the strategy for each aim or groups of similar aims;

- charges, resources and the way they'll be allocated;
- marketing canals – what type of distributions and forms of promotion are chosen? For example: folders, books, postcards, e-mails, news lists, web-sites, vehicles, etc.;
- competitive strategies. How can we reply to a competitor if he reduces the prices? How can you convince a person to choose you?

*Stage 5 – aiming at results.* It's necessary to stipulate evaluation methods for proposed marketing plan. Thus, we'll find out if our effort yields results or we have to think of a new approach. The marketing calendar is also very important, with its fixed dates and responsible persons.

#### **IV. Case study: marketing plan for the performances rising applied by the "Maria Filotti" theatre from Brăila**

We've worked out this plan at a theatre because we find in culture as well as in other branch of activity the same obsessing questions: "*What are the mechanisms we have to use to be aware of need culture?; What are the moral supports that make a person be a consumer of culture in conditions given by the social, economic and political factors?*".

In other words, what must managers do that the theatrical institutions to be up to the superiority of our new millennium?

This question concerns as from 1990. Using an example, we'll try to prove that the marketing is universal, that a good marketing plan represents the key of the success and the

respective institution has already got a great experience which can be extended. We speak about the “Maria Filotti” Theatre from Brăila, which is the standard of national spiritual life and that celebrated 155 years of theatrical activity and 55 years of permanent activity in 2004. We use this example because the managers of this theatre have already understood the important role of the marketing, what useful instrument can be if it is well-used. Thus they’ve already used it, providing through all means of knowledge and communication the activity and future of this theatre.

Some remarkable results of this theatre that we can mention are:

- The Project of the International Theatre Festival – “Days and nights of European Theatre in Brăila”, its aim being the presentation of the values of the national and European dramaturgy, the invitation of some impressive European theatrical teams, the promotion of some great plays in theatres as well as in non-conventional places, the organization of some theatrical workshops, meetings with personalities of the European theatre, the exhibitions of scenography and photography, etc.;
- The International Competition of Vocal Music “Hariclea Darclée”, a great step to European cultural integration;
- The PHARE Project – “Therapy through theatre”, for the social integration of the young people who have health problems;
- The school theatre festival, organized together with the School Inspectorate

from Brăila, which from 2001 gets new dimensions and value through the number and quality of the teams;

- The endowment with modern means of transport which allow traveling in places that have no such institutions necessary for education and culture;
- Changes of performances, actors and stage managers with similar institutions etc.

In spite of its achievements, the theatre had difficult moments on its contact with the audience which – known fact – keeps it alive. The influence towards the audience represents the main indicator of the activity and that’s why the idea of a marketing plan is so important. Being concerned with this indicator and new forms of relations with the audience, the managers used first the market study, the instrument which reveals certain “anonymous truths”.

There were realized three surveys among students, citizens of the town and local businessmen, to find out their opinion regarding to the “Maria Filotti” Theatre. Beyond the technical details about the stages of the study (sample, questionnaire, collective and processing information), the conclusions were relevant. In our opinion, they are applicable to many theaters from Romania and they are the basis of some managerial strategies.

*What did we hear from the young people, this target group being one of the theatre’s favorites? They don’t go to the theatre as before (1989) because the television is the “enemy” number one now. In this way it’s necessary that something better to attract them than an armchair and a bowl of popcorn in*

front of the TV-set or a channel which broadcasts only music. There aren't broadcasted plays on the most channels we have access to and thus this kind of program can't influence the young people's opinion regarding to watching plays.

Sometimes the pupils and students go to the theatre because the school or other organizers carry on an activity there. Another hidden reason for what the young people didn't go to the theatre is the fact that most of them work many hours a day and, at the same time, they have to learn and thus, they don't benefit by enough spare time. If they don't get information about performances, they'll be pleased with the cultural relaxation and entertainment offered by television. If they saw more posters and will be convinced by a theatric agent, if the theatre were as a library where you stay for a while to borrow or return a book, if the plays weren't performed on Saturday or Sunday evenings when a date is more romantic, if the actors were more mediated and people looked at them in the street, then the chances of the theatre would increase. The study also reveals that if more comedies or plays about the young people's life problems were performed, if the plays weren't too long and during the break between the acts the audience talked to the actors, the chances that the young people to come to the theatre would be bigger.

*What we've heard from the citizens* confirms the idea that in our contemporary society people would like to dedicate more time to the art and culture, but they work too much or not at all and tiredness and routine are hard to overcome. Television represents

the same main rival of the theatre; in this case we can say a greater extent than in the case of the young people. As options, the comedies remains on the first place, but the favorite authors are different: the old people prefer classical authors and young people prefer contemporary authors (But do they really know the classics?). We can also establish a parallel between the preferences regarding to the authors and those regarding to the hours. Even most of the institutions where work the interviewed people don't organize cultural shows, they concern themselves with this aspect.

The conclusions of *the third survey, which of the businessmen*, are interesting: many businessmen consider that the employees have to be rewarded, so they organize different shows for them; but most of the employers choose the relaxant open air activities etc. The employers would like to enter into relations, partnership, to support the theatre, to be closer by it, but all these of the own accord of the theatre.

Here are, in short, the most relevant conclusions of our study which were analyzed during more meetings of the Artistic Council and those of the Board of Directors and then they took decisions which being used in a marketing plan, conducted to changes. At present, the theatre has a repertory for all ages and preferences; it has an excellent co-operation with schools, secondary schools, universities, administrative and business environment, it has got many shows with full halls, more and more invitations in our country and in abroad. At the same time, the theatre succeeded in using of own funds and to increase them.

Being aware of the advantages of the planned activities, on the basis of realities and information, the “Maria Filotti” Theatre proposes itself that, from time to time, to take again the study of the audience’s opinions, considering it an advantage for a short, middle and long term.

### Conclusion

Planning in the marketing field signifies the combination of all marketing decisions according to the common objectives with the purpose of exploiting to the maximum the synergy effect of the placed effort. Planning means building action programs in which the objectives, the set financing method or the

steps of achieving it should be clearly defined.

Marketing planning also proves to be important for its liaison between what the company can offer and the consumers’ needs and expectations.

The marketing plan represents in fact a map and the organization will take its cue from it in the whole activity. To be efficient this plan has to be applicable, clear, complete, flexible, useful and simple. In other words, the efficiency will be guaranteed if the marketing plan is well-understood and applied, adaptable to the possible changes, if the aims and methods are realistic and if the plan is adaptable to all key-factors of the market.

---

### References

---

- Amerien, P. et al. (2002). *Manual de marketing strategic și operațional*, Editura Teora, București
- Danciu, V. (2002). *Planificarea strategică de marketing internațional*, Editura ASE, București
- Danciu, V. (2005). *Strategii moderne de marketing*, Editura Independența Economică, Pitești
- Enache, E. et al. (2006). *Marketing*, Editura „Independența Economică”, Pitești
- Gilligan, C., Wilson, R. (2003). *Strategic Marketing Planning*, Butterworth-Heinemann, Oxford (UK)
- Kotler, Ph. (2004), *Marketing de la A la Z – 80 de concepte pe care trebuie să le cunoască orice manager*, Editura Codecs, București
- Moldoveanu, M., Ioan-Franc, V. (1997). *Marketing și cultură*, Editura Expert, București