ROMANIAN ECONOMIC AND BUSINESS REVIEW

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Subscription rates:
Institutions - $100/year
Individuals - $30/year

ROMANIAN ECONOMIC AND BUSINESS REVIEW

SUMMER 2008 VOLUME 3 NUMBER 2

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PUBLISHED BY THE SCIENTIFIC RESEARCH DEPARTMENT OF THE ROMANIAN-AMERICAN UNIVERSITY

ISSN 1842 – 2497

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KYOTO PROTOCOL - A MILESTONE ON THE ROAD TO A LOW CARBON ECONOMY

Florin Bonciu and Lorena Poenaru*

Abstract

Human activities have had an impact on environment since immemorial times but significant effects could be traced since about 500 years. The world is getting rapidly warmer, and there is an overwhelming consensus among the leading climate scientists that this is being caused mainly by carbon dioxide and other 'greenhouse gases' emitted by human activities. the responsibility of various countries vis-à-vis environment pollution is not equal. At the same time, neither the resources and scientific capabilities of various countries which can be used for the control of pollution are not equal. The need for international cooperation and coordination is self-evident because less developed countries cannot by themselves find solutions to environment pollution and at the same time they cannot be condemned to underdevelopment.

Keywords: environment, global warming, pollution, ecological footprint

The impact of human activities on the environment

Human activities have had an impact on environment since immemorial times but significant effects could be traced since about 500 years. The Industrial Revolution and the large scale use of coal started to determine considerable effects which steadily increased every year.

The world is getting rapidly warmer, and there is an overwhelming consensus among the leading climate scientists that this is being caused mainly by carbon dioxide and other 'greenhouse gases' emitted by human activities, chiefly the combustion of fossil fuels and deforestation. These gases remain in the atmosphere for many decades and trap heat from the sun in the same way as the glass of a greenhouse.

Global warming is already causing changes in the world's climate and these will become increasingly severe unless urgent action is taken to reduce emissions.

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This year's Fourth Assessment Report from the UN Intergovernmental Panel on Climate Change (IPCC), which represents the most authoritative and up-to-date global scientific consensus on climate change, concludes that the warming of the global climate system is "unequivocal" and accelerating. It points to a greater than 90% probability that increases in man-made emissions of greenhouse gases have caused most of the temperature increase seen since the middle of the 20th century.

The global average temperature has risen by 0.76°C since 1850, with Europe warming faster than the average, by almost 1°C. The past 12 years (1995-2006) have included 11 of the 12 warmest years on record. The rate of sea level rise has almost doubled from 18 cm per century between 1961 and 2003 to 31 cm per century in 1993-2003.

The IPCC projects that temperatures and sea levels will continue rising without action to limit greenhouse gas emissions.

Its best estimate is an additional temperature rise over the course of the 21st century of between 1.8° and 4.0°C, but in a worst case scenario the increase could reach 6.4°C. In historical terms, these are enormously rapid changes. Our civilization has never been faced with a change in climate of anything like this magnitude. Even the lowest likely increase projected by the IPCC would push the world's temperature more than 2ºC above the pre-industrial level by the end of the century. This would take temperatures into the danger zone where irreversible and potentially catastrophic changes to the global environment become far more likely.

A further rise in average sea level of between 18 and 59 mm is anticipated this century. However, this range may be underestimated as the projections do not include the full effects of changes in ice flows.

The economic developments of the 20th century regarding both developed and developing countries have added new dimensions to the impact on environment and that is why nowadays several types of pollution can be enlisted:

Air Pollution which refers to the introduction into the atmosphere of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damage the environment. This form of pollution is often generated by major stationary sources, like industrial factories but the greatest source of emissions today is represented by mobile sources, mainly automobiles. As part of air pollution gases such as carbon dioxide contribute to global warming and represent a major source of concern among scientists, politicians and general public. It is worth mentioning that carbon dioxide is essential for plant life through photosynthesis, but modern economy is unfortunately characterized by the drastic reduction of surface covered by plants (forests or otherwise) and simultaneously by a huge increase in the quantity of carbon dioxide released in the atmosphere.

Water pollution refers to the contamination of water represented by lakes, rivers , oceans and groundwater. Alteration of the ecological status of water can

be caused by natural phenomena such as volcanoes, algae blooms, storms, and earthquakes but such causes have been so far limited in their impact. It is human activities that can determine large scale, dangerous pollution of water either from industrial activities or from residential areas.

Soil contamination refers to the increase of the presence of man-made chemicals or other alteration in the natural soil environment. This type of contamination can be determined by: accidents related to underground storage tanks, use of pesticides, contamination through soil from waste deposits, direct discharge of industrial wastes to the soil. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals.

Radioactive contamination may occur from radioactive gases, liquids or particles which are accidentally discharged from industrial activities.

Although these forms of pollution are the most debated, there are also other types of contamination affecting human life, particularly in urban areas:

- Light pollution;
- Noise pollution;
- Radio spectrum pollution;
- Visual pollution.

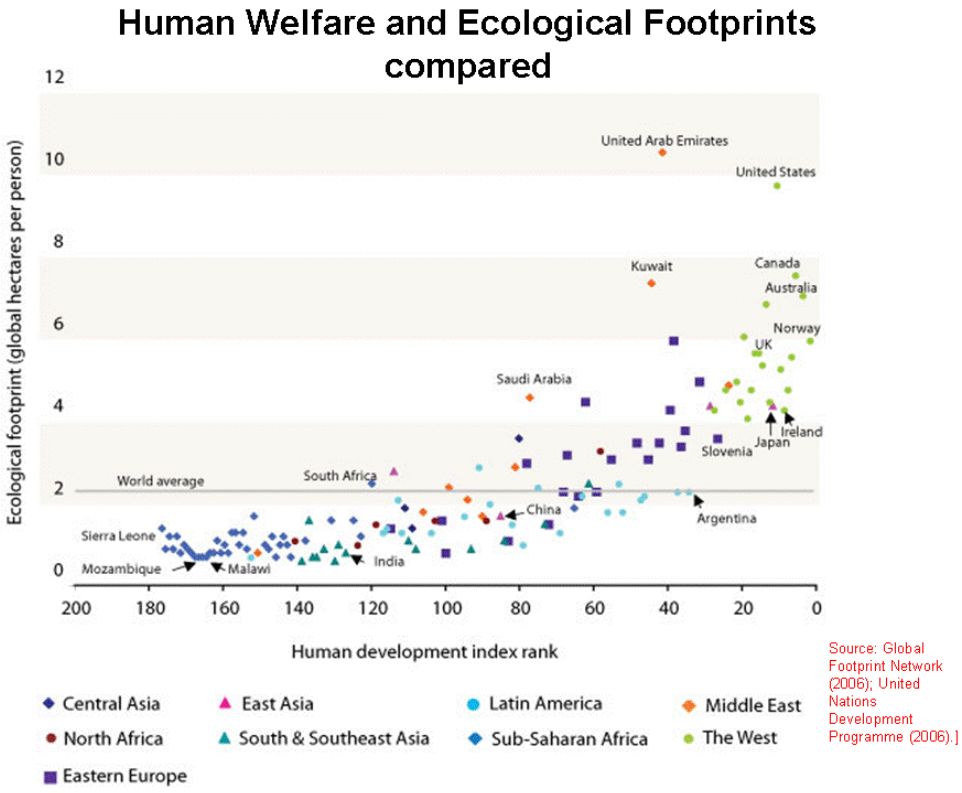
The impact of economic activity on environment is perceived by every citizen of the planet both through direct experience in daily activities but also through the raising awareness regarding long term effects and sustainability of the situation. From this latter perspective, an interesting concept is that of ecological footprint. This concept, developed during the period 1990 – 1994, has in view the comparison between human demand on nature and the biosphere's ability to regenerate resources and provide services.

The concept is based on the assessment of the biologically productive land and marine area required to produce the resources a population consumes and absorb the corresponding waste, using prevailing technology. This resource accounting is similar to life cycle analysis wherein the consumption of energy, biomass (food, fiber), building material, water and other resources are converted into a normalized measure of land area called 'global hectares' (*gha*).

Per capita ecological footprint (EF) is a means of comparing consumption and lifestyles, and checking this against nature's ability to provide for this consumption.

In 2003, the average biologically productive area per person worldwide was approximately 1.8 global hectares (gha) per capita. The U.S. footprint per capita was 9.6 gha, and that of Switzerland was 5.1 gha per person, while China's was 1.6 gha per person. The WWF claims that the human footprint has exceeded the biocapacity (the available supply of natural resources) of the planet by 20%.

A conclusion from the above figures is that the responsibility of various countries vis-à-vis environment pollution is not equal. At the same time, neither the resources and scientific capabilities of various countries which can be used for the control of pollution are not equal. The need for international cooperation and coordination is self-evident because less developed countries cannot by themselves find solutions to environment pollution and at the same time they cannot be condemned to underdevelopment.



Towards a low-carbon economy

A Low-Carbon Economy (LCE) is a concept that refers to an economy which has a minimal output of greenhouse gas (GHG) emissions into the biosphere, but specifically refers to the greenhouse gas carbon dioxide. Recently, it became evident that over-concentrations of these gases will fundamentally change our climate dangerously in the foreseeable future.

The aim of a LCE is to integrate all aspects of human activities (manufacturing, agriculture, transportation and power-generation etc.) around technologies that produce energy and materials with little GHG emission. As result of LCE implementation population, buildings, machines and devices will

use energies and materials efficiently and will dispose of or recycle its wastes so as to have a minimal output of GHGs.

Furthermore, it has been proposed that to make the transition to an LCE economically viable we would have to attribute a cost (per unit output) to GHGs through means such as emissions trading and/or a carbon tax.

Concerning practical solutions for the transition to LCE we can indentify two approaches:

a) the use of renewable energy as the main basis of a LCE. This solution is still associated with problems of high-cost and inefficiency but the situation is changing since investment and production have been growing significantly in recent times. Furthermore, regardless of the effect to the biosphere by GHG emissions, the growing issue of oil and energy prices may also be reason enough for a transition to an LCE.

b) the increase in use of nuclear power or of technologies for carbon capture and storage (CCS) as the primary means to achieve a LCE while continuing to exploit non-renewable resources. This approach raises concerns with the matter of spent-nuclear-fuel storage, and the uncertainty of costs and time needed to successfully implement CCS worldwide and with guarantees that the stored emissions will not leak into the biosphere.

Beyond LCE

A zero-carbon (also called non-carbon or post-carbon or post-fossil fuel economy) is a step beyond a low-carbon economy. This type of economy may include the complete elimination of the use of fossil fuels and will be based on renewable alternative energy sources.

As of 2007, Iceland and Sweden have been making big progresses in this direction, with a lot of organizations in the rest of countries, promoting also zero-carbon.

Inter-governmental treaties dealing with pollution control

As result of the general concern regarding pollution, especially through consequences related to climate change, there are several initiatives that proved to be active in the past two decades.

The Montreal Protocol on Substances That Deplete the Ozone Layer is an international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion. The treaty entered into force on January 1, 1989. Since then, it has undergone seven revisions, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), and 1999 (Beijing). Due to its widespread adoption and implementation it has been hailed

as an example of exceptional international co-operation with Kofi Annan quoted as saying it is "Perhaps the single most successful international agreement to date...".

Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes entered into force on 14 February 1991, was to provide for the control or reduction of nitrogen oxides and their transboundary fluxes.

The signatory parties: Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States. Countries that have signed, but not yet ratified: Poland.

Anyway, among these international agreements the most prominent is **The United Nations Framework Convention on Climate Change (UNFCCC or FCCC)** which is an international environmental treaty established on the occasion of the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992.

The FCCC was opened for signature on May 9, 1992 and it entered into force on March 21, 1994. Its stated objective is "'to achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system"'[1].

One of its first achievements was to establish a national greenhouse gas inventory, as a count of greenhouse gas (GHG) emissions and removals. Accounts must be regularly submitted by signatories of the United Nations Framework Convention on Climate Change.

This treaty is aimed at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Initially the treaty set no mandatory limits on greenhouse gas emissions for individual nations and contained no enforcement provisions; **it is therefore considered legally non-binding.** Rather, the treaty included provisions for updates (called "protocols") that would set mandatory emission limits.

The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

The Kyoto Protocol

The Kyoto Protocol is a protocol to the international Framework Convention on Climate Change with the objective of reducing greenhouse gases that cause climate change. The Kyoto Protocol is an amendment to the United Nations Framework Convention on Climate Change.

It was agreed on 11 December 1997 at the 3rd Conference of the Parties to the treaty when they met in Kyoto, and entered into force on 16 February 2005. As of November 2007, 178 parties have ratified the protocol.

Of these, 36 developed countries (plus the EU as a party in its own right) are required to reduce greenhouse gas emissions to the levels specified for each of them in the treaty with three more countries intending to participate.

One hundred and thirty-seven developing countries have ratified the protocol, including Brazil, China and India, but have no obligation beyond monitoring and reporting emissions. The United States has not ratified the treaty.

Among various experts, scientists, and critics, there is debate about the usefulness of the protocol, and there have been cost-benefit studies performed on its usefulness.

Functioning mechanism of the Kyoto Protocol

The major distinction between the Protocol and the Convention is that while the Convention **encouraged** industrialized countries to stabilize GHG emissions, the Protocol **commits** them to do so.

The Protocol places a heavier burden on developed nations under the principle of "common but differentiated **responsibilities"**. The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the "Marrakesh Accords." Under the Treaty, countries must meet their targets primarily through national measures. However, the Kyoto Protocol offers them an additional means of meeting their targets by way of three market-based mechanisms.

The Kyoto **mechanisms** are:

- Emissions trading – known as "the carbon market" - the clean development mechanism (CDM) and joint implementation (JI).
- Stimulate sustainable development through technology transfer and investment
- Help countries with Kyoto commitments to meet their targets by reducing emissions or removing carbon from the atmosphere in other countries in a cost-effective way
- Encourage the private sector and developing countries to contribute to emission reduction efforts

To participate in the mechanisms, Annex I Parties must meet, among others, the following eligibility **requirements**:

- They must have ratified the Kyoto Protocol.
- They must have calculated their assigned amount in terms of tons of CO2-equivalent emissions.
- They must have in place a national system for estimating emissions and removals of greenhouse gases within their territory.

- They must have in place a national registry to record and track the creation and movement of ERUs, CERs, AAUs and RMUs and must annually report such information to the secretariat.
- They must annually report information on emissions and removals to the secretariat.

The mechanisms help stimulate green investment and help Parties meet their emission targets in a cost-effective way. The UN Climate Change Secretariat, based in Bonn, Germany, keeps an international transaction log to verify that transactions are consistent with the rules of the Protocol. Reporting is done by Parties by way of submitting annual emission inventories and national reports under the Protocol at regular intervals. A compliance system ensures that Parties are meeting their commitments and helps them to meet their commitments if they have problems doing so.

The Kyoto Protocol, like the Convention, is also designed **to assist** countries in adapting to the adverse effects of climate change. It facilitates the development and deployment of techniques that can help increase resilience to the impacts of climate change. The Adaptation Fund was established to finance adaptation projects and programmes in developing countries that are Parties to the Kyoto Protocol. The Fund is financed mainly with a share of proceeds from CDM project activities.

The Conference of the Parties (COP) serves as the meeting of the Parties to the Kyoto Protocol. This is referred to as the **Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP)**. The CMP meets annually during the same period as the COP. Parties to the Convention that are not Parties to the Protocol are able to participate in the CMP as observers, but without the right to take decisions. The functions of the CMP relating to the Protocol are similar to those carried out by the COP for the Convention. The first meeting of the Parties to the Kyoto Protocol was held in Montreal, Canada in December 2005, in conjunction with the eleventh session of the Conference of the Parties (COP 11). Decisions were adopted that outline the path to future international action on climate change. The Parties to the Kyoto Protocol also formally adopted the "rulebook" of the 1997 Kyoto Protocol, the so-called 'Marrakesh accords', which sets the framework for implementation of the Protocol.

The **Subsidiary Body for Scientific and Technological Advice (SBSTA)** and the **Subsidiary Body for Implementation (SBI)** These two permanent subsidiary bodies established under the Convention also serve the CMP.

The **Bureau** The Bureau of the COP also serves the CMP. However, any member of the COP Bureau representing a non-Party to the Kyoto Protocol has to be replaced by a member representing a Kyoto Protocol Party.

Clean Development Mechanism (CDM) Executive Board The CDM Executive Board supervises the CDM under the Kyoto Protocol and prepares

decisions for the CMP. It undertakes a variety of tasks relating to the day-to-day operation of the CDM, including the accreditation of operational entities.

Joint Implementation Supervisory Committee The Joint Implementation Supervisory Committee (JISC), under the authority and guidance of the CMP, inter alia, supervises the verification of emission reduction units (ERUs) generated by JI projects following the verification procedure under the JISC.

Compliance Committee The compliance regime consists of a Compliance Committee made up of two branches: a Facilitative Branch and an Enforcement Branch.

Post-Kyoto Protocol negotiations on greenhouse gas emissions

In the non-binding 'Washington Declaration' agreed on February 16, 2007, Heads of governments from Canada, France, Germany, Italy, Japan, Russia, United Kingdom, the United States, Brazil, China, India, Mexico and South Africa agreed in principle on the outline of a successor to the Kyoto Protocol. They envisaged a global cap-and-trade system that would apply to both industrialized nations and developing countries, and hoped that this would be in place by 2009.

On June 7, 2007, leaders at the 33rd G8 summit agreed that the G8 nations would aim to at least halve global CO2 emissions by 2050. The details enabling this to be achieved would be negotiated by environment ministers within the United Nations Framework Convention on Climate Change in a process that would also include the major emerging economies.

A round of climate change talks under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) (Vienna Climate Change Talks 2007) concluded in 31 August 2007 with agreement on key elements for an effective international response to climate change.

A key feature of the talks was a United Nations report that showed how energy efficiency could yield significant cuts in emissions at low cost.

Position of the European Union on Kyoto Protocol

The EU has been one of the major supporters of the Kyoto Protocol. On May 31, 2002, the fifteen then-members of the European Union deposited the relevant ratification paperwork at the UN. Nowadays, after the enlargements of 2004 and 2007 both the EU (as the European Community) and its member states are signatories to the Kyoto treaty.

The EU produces around 22% of global greenhouse gas emissions, and has agreed to a cut, on average, by 8% from 1990 emission levels. On 10 January

2007, the European Commission announced plans for a European Union energy policy that included a unilateral 20% reduction in GHG emissions by 2020.

In December 2002, the EU created an emissions trading system in an effort to meet these tough targets. Quotas were introduced in six key industries: energy, steel, cement, glass, brick making, and paper/cardboard.

There are also fines for member nations that fail to meet their obligations, starting at €40/ton of carbon dioxide in 2005, and rising to €100/ton in 2008. Current EU projections suggest that by 2008 the EU will be at 4.7% below 1990 levels.

Transport CO2 emissions in the EU grew by 32% between 1990 and 2004. The share of transport in CO2 emissions was 21% in 1990, but by 2004 this had grown to 28%.

The position of the EU is not without controversy in Protocol negotiations, however. One criticism is that, rather than reducing 8%, all the EU member countries should cut 15% as the EU insisted a uniform target of 15% for other developed countries during the negotiation while allowing itself to share a big reduction in the former East Germany to meet the 15% goal for the entire EU. Also, emission levels of former Warsaw Pact countries who now are members of the EU have already been reduced as a result of their economic restructuring. This may mean that the region's 1990 baseline level is inflated compared to that of other developed countries, thus giving European economies a potential competitive advantage over the U.S.

Greece, however was excluded from the Kyoto Protocol on Earth Day (April 22, 2008) due to unfulfilled commitment of creating the adequate mechanisms of monitoring and reporting emissions, which is the minimum obligation, and delivering false reports by having no other data to report.

Position of Japan on Kyoto Protocol

Japan has played a very important role in the Kyoto Process. Japan’s decision to host the 1997 Kyoto Conference was an international sign of its commitment to the international effort. In Japan there was very strong public support for the Kyoto Protocol and an international image that needed to be upheld.

In the initial stages Japan's negotiating position was rather complex and more difficult to understand. When compared to other industrialized nations, Japan's per-capita domestic emissions are relatively low, as is its carbon intensity level (emissions per unit of GDP). Also, the status of the Japanese economy and Japan's traditional strong relations with the United States had a role. But it should be said that the structure of the Kyoto Protocol itself must also have played a part. Since Kyoto's reduction targets are based on proportional reductions from 1990 baselines, Japan's relatively more-efficient economy makes its reduction target somewhat tougher to achieve.

Japanese politicians have made a fair number of public statements about the importance of the Kyoto protocol, but they also played a negative role at COP6bis and COP 7, and did a great deal to weaken the final treaty rules by the insistence on deferring a decision on legally binding enforcement

Anyway, in the end, Japan chose to join the EU in pushing for Kyoto Protocol ratification (after winning many concessions from the Europeans on the use of flexible mechanisms in the agreement). Now Japan is in a similar position as discussions begin regarding a post-Kyoto international framework.

The target established by the Kyoto Protocol for reducing by 6 % the emissions is a tough target for Japan that has already achieved a high level of energy efficiency. GHG emissions have increased by 8% in 2004 from 1990 level, which even sum up to 14 % gap between the current emission level and the target.

A debate over environmental tax is stalled within a government-wide tax reform context, and the government is now preparing for introducing an emissions trading scheme. Although current policies in achieving the target are seemingly coordinated at a first glance, two divided views have been persisting ever since the US rejection of the Kyoto Protocol when it comes to perceptions on the future direction of climate regime. Those who concerned about economic competitiveness prefer less rigid target, whereas those who concerned about the environment and about the impact of climate change prefer continuing and enhancing the Kyoto. No consensus has yet emerged between the two blocks, and Japan has so far followed international initiatives on both sides, which are in effect complementary rather than conflicting.

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ROBUST MONETARY POLICY

Adam – Nelu ALTĂR – SAMUEL*

Abstract

While there is uncertainty about the data that enter into economic models and about the parameters that govern economic models, the fact that economists often approach macroeconomic data armed with different models of the economy suggests that uncertainty, or ambiguity, about the model could also be potentially important. A policy can be made "robust" to model uncertainty by designing it to perform well on average across all of the available fully specified models rather than to reign supreme in any particular model. In this paper we compare the implications of robust monetary policy versus non robust monetary policy for a model based on a new Keynesian model with two equations that represent the dynamics of inflation and the dynamics of the output gap. Using Matlab, we are able to approximate the solution to the linear–quadratic problem associated with the estimated model, thus obtaining the optimal monetary policy decision.

Keywords: monetary policy, uncertainty, optimal policy, economic models

Introduction

According to Alan Greenspan (2003), "Uncertainty is not just an important feature of the monetary policy landscape; it is the defining characteristic of that landscape". In fact, the recognition that all monetary policymakers must bow to the presence of uncertainty appears to underlie Greenspan's (2003) view that central banks are driven to a "risk management" approach to policy, whereby policymakers "need to reach a judgement about the probabilities, costs, and the benefits of the various possible outcomes under alternative choices for policy".

Uncertainty comes in many forms. One obvious form is simply ignorance about the shocks that will disturb the economy in the future (oil prices, for example). Other forms of uncertainty, perhaps more insidious can also have resounding implications on how policy should be conducted, three of which are data uncertainty, parameter uncertainty, and model uncertainty.

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The model

When solving robust control problems there are generally two distinct equilibria that are of interest. The first is the "worst-case" equilibrium, which is the equilibrium that pertains when the policymaker and private agents design policy and form expectations based on the worst-case misspecification and the worst-case misspecification is realized. The second is the "approximating" equilibrium, which is the equilibrium that pertains when the policymaker and private agents design policy and form expectations based on the worst-case misspecification, but the reference model transpires to be specified correctly.According to the state – space formulation, the economic environment is one in which the behavior of an $n \times 1$ vector of endogenous variables, z_t, consisting of n_1 predetermined variables, z_{1t}, and $n_2 (n_2 = n - n_1)$ non predetermined variables, z_{2t}, are governed by the reference model

$$z_{1t+1} = A_{11} z_{1t} + A_{12} z_{2t} + B_1 u_t + C_1 \varepsilon_{1t+1}, (1)$$

*

$$E_t z_{2t+1} = A_{21} z_{1t} + A_{22} z_{2t} + B_2 u_t, (2)$$

where u_t is a $p \times 1$ vector of control variables, $\varepsilon_{1t} \approx iid[0, I_s]$ is an $s \times 1$ vector, $s \le n_1$, of white – noise innovations, and E_t is the mathematical expectations operator conditional upon information available up to and including period t. The reference model is the model that private agents and the policy maker believe most accurately describes the data generating process. The matrices $A_{11}, A_{12}, A_{21}, A_{22}, B_1, B_2$ contain structural parameteres and are conformable with z_{1t}, z_{2t} and u_t as necessary. The matrix C_1 is determined to insure that ε_{1t} has the identity matrix as its variance – covariance matrix.

The policymaker's problem is to choose a sequence for its control variables, $\{u_t\}_0^\infty$, to minimize the objective function

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[z_t' R z_t + 2 z_t' U u_t + u_t' Q u_t \right], (3)$$

where $\beta \in (0,1)$ is the discount factor. The weighting matrices, $R, U,$ and Q reflect the policymaker's preferences; R and Q are assumed to be positive semidefinite and positive definite, respectively.

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Acknowledging that their reference model may be misspecified, private agents and the policymaker surround their reference model with a class of models of the form

$$z_{1t+1} = A_{11} z_{1t} + A_{12} z_{2t} + B_1 u_t + C_1 (v_{t+1} + \varepsilon_{1t+1}), \quad (4)$$

$$E_t z_{2t+1} = A_{21} z_{1t} + A_{22} z_{2t} + B_2 u_t, \quad (5)$$

where v_{t+1} is a vector of specification errors, to arrive at a "distorted" model. The specification errors are intertemporally constrained to satisfy

$$E_0 \sum_{t=0}^{\infty} \beta^t v'_{t+1} v_{t+1} \le \eta, \quad (6)$$

where $\eta \in [0, \overline{\eta}]$ represents the "budget" for misspecification.

Robust policymaking with commitment using state – space methods

In the commitment solution, both the policymaker and the evil agent are assumed to commit to a policy strategy and not succumb to incentives to renege on that strategy. Employing the definitions

$$\tilde{u}_t \equiv \begin{bmatrix} u_t \\ v_{t+1} \end{bmatrix}, \tilde{B} \equiv \begin{bmatrix} B & C_1 \end{bmatrix}, \quad (7)$$

$$\tilde{U} \equiv \begin{bmatrix} U & 0 \end{bmatrix}, \tilde{Q} \equiv \begin{bmatrix} Q & 0 \\ 0 & -\theta I \end{bmatrix} \quad (8)$$

the optimization problem can be written as

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[z'_t R z_t + 2 z'_t \tilde{U} \tilde{u}_t + \tilde{u}'_t \tilde{Q} \tilde{u}_t \right], \quad (9)$$

subject to

$$z_{t+1} = A z_t + \tilde{B} u_t + \tilde{C} \varepsilon_{t+1}, \quad (10)$$

which, because the first – order conditions for a maximum are the same as those for a minimum, has a form that can be solved using the methods developed by Backus and Drifill ([1]). Those methods involve formulating the problem as linear – quadratic, the value function has the form $V(z_t) = z'_t V z_t + d$ and the dynamic program can be written as

$$z'_t V z_t + d = \min_{u_t} \max_{v_{t+1}} [z'_t R z_t + 2 z'_t \tilde{U} \tilde{u}_t + \tilde{u}'_t \tilde{Q} \tilde{u}_t + \beta E_t (z'_{t+1} V z_{t+1} + d)]. \quad (11)$$

It is well known that the solution to this optimization problem takes the form

$$\begin{bmatrix} u_t \\ v_{t+1} \end{bmatrix} = -F T^{-1} \begin{bmatrix} z_{1t} \\ p_{2t} \end{bmatrix}, \quad (12)$$

$$z_{2t} = [V_{22}^{-1} V_{21} V_{22}^{-1}] \begin{bmatrix} z_{1t} \\ p_{2t} \end{bmatrix}, (13)$$

$$\begin{bmatrix} z_{1t+1} \\ p_{2t+1} \end{bmatrix} = T(A - \widetilde{B}F)T^{-1} \begin{bmatrix} z_{1t} \\ p_{2t} \end{bmatrix} + C\varepsilon_{1t+1} (14)$$

where p_{2t} is an $n_2 \times 1$ vector of shadow prices associated with the non predetermined variables, z_{2t}. The matrix T provides a mapping between the state variables, z_{1t} and p_{2t}, and z_t and is given by

$$T = \begin{bmatrix} I & 0 \\ V_{21} & V_{22} \end{bmatrix}, (15)$$

where V_{21} and V_{22} are submatrices of V. Finally, V and F are obtained by solving for the fix – point of

$$V = R - 2\widetilde{U}F + F'\widetilde{Q}F + \beta(A - \widetilde{B}F)'V(A - \widetilde{B}F), (16)$$

$$F = (\widetilde{Q} + \beta\widetilde{B}'V\widetilde{B})^{-1}(\widetilde{U}' + \beta\widetilde{B}'VA). (17)$$

When the worst case misspecification is realized, the economy behaves according to equations (16) – (18). While the worst case equilibrium is certainly interesting, it is also important to consider how the economy behaves when the reference model transpires to be specified correctly. Partitioning F into $[F_u' \quad F_v']'$ where F_u and F_v are conformable with u_t and v_{t+1}, respectively. The approximating equilibrium has the form

$$z_{1t+1} = (A_{11} + A_{12}H_{21} + B_1F_{z1}^u)z_{1t} + (A_{12}H_{22} + B_1F_{p2}^u)p_{2t} + C_1\varepsilon_{1t+1}, (18)$$

$$p_{2t+1} = M_{21}z_{1t} + M_{22}p_{2t}, (19)$$

$$z_{2t} = H_{21}z_{1t} + H_{22}p_{2t}, (20)$$

$$u_t = F_{z1}^u z_{1t} + F_{p2}^u p_{2t}, (21)$$

where $H_{21} \equiv V_{22}^{-1}V_{21}$, $H_{22} \equiv V_{22}^{-1}$, $[F_{z1}^u \quad F_{p2}^u] \equiv -F_uT^{-1}$, and

$$\begin{bmatrix} M_{11} & M_{12} \\ M_{21} & M_{22} \end{bmatrix} \equiv T(A - \widetilde{B}F)T^{-1}. (22)$$

Interestingly, the worst-case equilibrium and the approximating equilibrium share certain features. For instance, the worst-case equilibrium and the approximating equilibrium differ only with respect to the law of motion for the predetermined variables and, as a consequence, following innovations to the system the initial-period responses of the predetermined variables are the same for the approximating equilibrium as for the worst-case equilibrium. But since the decision rules for z_{2t} and u_t are also the same for the two equilibria, it follows

that the initial-period responses by the nonpredetermined variables and by the policy variables are also the same. With respect to impulse response functions, differences between the approximating equilibrium and the worst-case equilibrium then only occur one period after innovations occur.

Furthermore, because the coefficient matrix on the innovations is C_1, which scales the standard deviations of the innovations, it follows that adding noise to the innovations or changing their correlation structure is not part of the evil agent's strategy. Instead, the optimally designed misspecification has the effect of changing the law of motion for the predetermined variables. More precisely, since the specification errors enter only the stochastic component of z_{1t}, the evil agent's strategy is to change the conditional means of the shock processes but not their conditional volatility.

Robust policy in an empirical model

To illustrate the robust control approach, we study the model estimated by Rudebusch ([8]), which is based on a standard New Keynesian model and contains two equations that, conditional upon the short – term interest rate, i_t, summarize the dynamics of inflation, π_t, and the dynamics of the output gap, y_t:

$$\pi_t = \mu_\pi E_t \pi_{t+1} + (1-\mu_\pi)\pi_{t-1} + \alpha y_t + \varepsilon_{\pi,t}, \quad (23)$$

$$y_t = \mu_y E_t \pi_{t+1} + (1-\mu_y) y_{t-1} - \beta(i_t - E_t \pi_{t+1}) + \varepsilon_{y,t} \quad (24)$$

Equation (23) is a "New Keynesian Phillips curve" derived from the optimal pricesetting behavior of firms acting under monopolistic competition, but facing price rigidities. The presence of lagged inflation and the "supply shock" $\varepsilon_{\pi,t}$ can be motivated by indexing those prices that are not reoptimized in a given period and by a time-varying elasticity of substitution across goods, leading to time-varying markups. Equation (24) can be derived from the household consumption Euler equation, where habits in consumption imply that current decisions depend to some extent on past decisions. The "demand shock" $\varepsilon_{y,t}$ can be attributed to government spending shocks or to movements in the natural level of output.8 An empirical version of this model, suitable for quarterly data and similar to that estimated by Rudebusch ([9]), is given by

$$\pi_t = \mu_\pi E_{t-1} \bar{\pi}_{t+3} + (1-\mu_\pi) \sum_{j=1}^{4} \alpha_{\pi j} \pi_{t-j} + \alpha_y y_{t-1} + \varepsilon_{\pi,t}, \quad (25)$$

$$y_t = \mu_y E_{t-1} y_{t+1} + (1-\mu_y) \sum_{j=1}^{2} \beta_{yj} y_{t-j} - \beta_r (i_{t-1} - E_{t-1} \bar{\pi}_{t+3}) + \varepsilon_{y,t} \quad (26)$$

where $\bar{\pi}_t = 1/4\sum_{j=0}^{3}\pi_{t-j}$ is four – quarter inflation and i_t is the nominal federal funds rate (the policy instrument). We generalize the model slightly to include forward – looking behavior in the output gap equation, as in Rudebusch ([9]). The model's parameters estimates, shown in Table 1, are taken from Rudebusch ([8]) and are obtained using OLS (and survey expectations) on quarterly U.S. data from 1968:Q3 to 1996:Q4, except for the parameter μ_y, which is set to the average estimate.

Table 1 – Parameter Values

Inflation		Output		Monetary Policy	
μ_π	0.29	μ_y	0.20	β	0.99
$\alpha_{\pi 1}$	0.07	β_{y1}	1.15	λ	0.50
$\alpha_{\pi 2}$	-0.14	β_{y2}	-0.27	υ	0.10
$\alpha_{\pi 3}$	0.40	β_r	0.09		
$\alpha_{\pi 4}$	0.07	σ_y	0.833		
α_y	0.13				
σ_π	1.012				

The model's key features are that inflation and the output gap are highly persistent, that monetary policy affects the economy only with a lag, and that expectations are formed using period $t-1$ information. Notice, also, that the weights on expected future inflation and output. While consistent with much of the empirical literature, are small relative to many theory – based specifications.

The central bank's objective function is assumed to be

$$\min_{\{i_t\}} E_0 \sum_{t=0}^{\infty} \beta^t (\pi_t^2 + \lambda y_t^2 + \nu i_t^2), \quad (27)$$

where we $\beta = 0.99, \lambda = 0.5, \nu = 0.1$. Thus, the central bank sets monetary policy to avoid volatility in inflation around its target (normalized to zero) and in the output gap around zero (precluding any discretionary inflation bias). In addition, the central bank desires to limit volatility in the nominal interest rate around target (normalized to zero). The concern for misspecification, ϕ, is chosen so that the detection error probability is 0.1, given a sample of 200 observations. This implies that $\theta = 54.5$.

The model can be written in state – space form as follows:

$$z_{t+1} = Az_t + Bu_t + C\varepsilon_{t+1}, \quad (28)$$

$$\min_{u_t} E_0 \sum_{t=0}^{\infty} \beta^t [z_t' R z_t + u_t' Q u_t], \quad (29)$$

where $z_{1t} = \begin{pmatrix} \pi_t & \pi_{t-1} & \pi_{t-2} & \pi_{t-3} & y_t & y_{t-1} \end{pmatrix}'$,

$z_{2t} = \begin{pmatrix} E_t \pi_{t+1} & E_t \pi_{t+2} & E_t \pi_{t+3} & E_t y_{t+1} \end{pmatrix}'$,

$z = \begin{pmatrix} z_1 \\ z_2 \end{pmatrix}$,

$\varepsilon_t = \begin{pmatrix} \varepsilon_{\pi t} & \varepsilon_{yt} \end{pmatrix}'$,

$u_t = i_t$,

$$A = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ -6.56 & 1.37 & -3.92 & -0.69 & -1.79 & 0 & 1279 & -1 & -1 & 0 \\ 0.74 & -0.15 & 0.44 & 0.077 & -4.4 & 1.08 & -1.44 & 0 & 0 & 0 \end{pmatrix}$$

$$B = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0.45 \end{pmatrix}'$$

$$C = \begin{pmatrix} 1.012 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0.833 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$$R = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.5 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix},$$

$$Q = 0.1$$

We first solved the linear quadratic optimization problem in the nonrobust case. The matrix which gives the optimal feedback is

$$K = (20.1 \ -10.36 \ 3.54 \ 0.913 \ -6.947 \ 2.399 \ -41.088 \ 40.245 \ -16.047 \ -4.296) \quad (33)$$

and the optimal control is:

$$u_t = i_t = Fz_t = -Kz_t \ .(30)$$

Next, we solved the worst – case robust control problem. In this case,

$$u_t = \begin{pmatrix} i_t \\ v_{\pi,t+1} \\ v_{y,t+1} \end{pmatrix},$$

$$\overline{B} = \begin{pmatrix} 0 & 1.012 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0.833 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0.45 & 0 & 0 \end{pmatrix},$$

$$\overline{Q} = \begin{pmatrix} 0.1 & 0 & 0 \\ 0 & 54.5 & 0 \\ 0 & 0 & 54.5 \end{pmatrix}.$$

Matrices *A, C* and *R* are the same as in the nonrobust case.

Solving the linear quadratic optimisation problem, we obtained the optimal feedback matrix

$$\bar{K} = \begin{pmatrix} 1.6733 & 0.992 & -1.65 & -0.302 & -9.741 & 2.3038 & -0.99 & 1.22 & -3.38 & -0.22 \\ -1.4045 & 0.783 & -0.61 & -0.125 & -0.315 & -0.0005 & 3.26 & -1.97 & 0.055 & 0.216 \\ -1.4969 & 0.472 & -0.83 & -0.152 & -0.422 & -0.0008 & 2.99 & -0.62 & -0.33 & 0.206 \end{pmatrix}$$

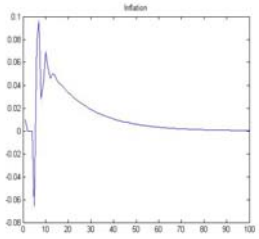
(31)

The optimal control is given by $\bar{u}_t = -\bar{K} z_t$, which means that the optimal policy rule and misspecification are given by:

Coefficient on

	π_t	π_{t-1}	π_{t-2}	π_{t-3}	y_t	y_{t-1}
Policy rule i_t	-1.67	-0.99	1.65	0.30	9.74	0.99
Misspeficiation						
$v_{\pi,t+1}$	1.4	-0.78	0.61	0.12	0.31	0.0005
$v_{y,t+1}$	1.49	-0.47	0.83	0.15	0.42	0.0008

In figures 1, 2, we plot impulse responses to unit – sized innovations to inflation ($\varepsilon_{\pi,t}$) under commitment using the state – space method, for the nonrobust and robust cases, respectively.



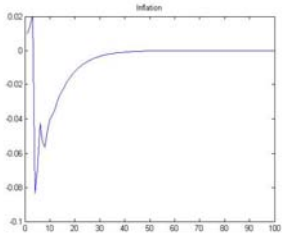


Figure 1 Figure 2

Conclusions

In formulating monetary policy, central banks must cope with substantial economic uncertainty.

Economic uncertainty can arise from different sources: the state of the economy, the nature of economic relationships, and the magnitude and persistence of ongoing shocks.

Robust control theory instructs decision makers to investigate the fragility of decision rules by conducting worst-case analyses.

In this paper we show how state space methods and structural-form solution methods can be applied to robust control problems, thereby making it easier to analyze complex models.

We illustrate the state space solution methods by applying them to an empirical New Keynesian business cycle model of the genre widely used to study monetary policy under rational expectations. A key finding from this exercise is that the strategically designed specification errors will tend to distort the Phillips curve in an effort to make inflation more persistent, and hence harder and more costly to stabilize. The optimal response to these distortions is for the central bank to become **more activist** in its response to shocks.

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Romanian Economic and Business Review – Vol. 3, No. 2

EQUAL PAY – THE TIME-BOMB UNDER PAY STRUCTURES IN ROMANIA

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Abstract

One of the major consequences of Romania joining the European Union is its obligation to implement European Directives with regard to employment protection. One aspect of that is likely to have major social and cost implications is the legislation regarding equal pay for men and women. The dimension of equal pay for work that is the same or broadly similar is relatively straightforward. The more complicated and more far reaching requirement is for equal pay for men and women for work of equal value.

In determining whether jobs are of equal value regard has to had in particular to effort, skill and decision making. Comparisons are valid with other jobs in the same organisation but not between organisations. In addition comparisons are only legally valid if they are on the basis that a person of the opposite sex is being paid more for work of equivalent value. Such comparisons are subjective and often very complicated. Job evaluation schemes can help in creating a framework for comparison but being inherently subjective are open to challenge. The situation is further complicated by the fact that comparisons can also be made on any one element of the remuneration package.

Experience in the U.K. and other member EU countries is that equal pay claims are very much on the rise, can take years to resolve and can be hugely expensive. Although legal costs can be significant the main costs are in settling group claims and the 'knock-on' effect on the rest of an organisation's pay structure. Whilst it may take time for this development to gather pace in Romania now is the time for organisations to review their pay structures and take preventative action to try and reduce the conflict that will inevitably occur.

Keywords: employment protection, equal pay, equal pay for work of equal value, pay structures

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Introduction

On joining the European Union Romania accepted a whole raft of legal obligations. These included European minimum standards of employment protection. A particularly important aspect of the European employment protection legislation is the requirement for employers to pay men and women equal pay for the same or similar work or work of equal value. This stems from the Treaty of Rome and the European Equal Pay Directive of 1975. Member countries are obliged to introduce domestic legislation to implement these obligations. The purpose of the requirement is to eliminate pay differences based on gender. Prior to this European wide requirement employers, for example sometimes had male and female rates for the same job. The legislation is linked to requirements for the equal treatment for men and women which means that employers cannot avoid their obligations by, for example, barring women from certain jobs unless there is a justified and General Occupational Qualification.(which has proved to be a narrowly based exception). A fundamental feature of EU law is that court decisions in any countries can have a binding effect on cases in other countries. Also cases can be pursued right up to the level of the European Court of Justice – the ultimate arbiter on decisions involving European law. This process is necessary to in order to maintain, amongst other things, minimum employment standards within the EU. If one member country were to avoid these minimum standards it would be seen as gaining an unfair competitive advantage over other member countries and to be engaged in 'social dumping'.

The payment of equal pay for jobs that are the same or broadly similar is a relatively straightforward concept – even if the cost implications may be considerable. The more far reaching requirement is to pay men and women the same pay and conditions of employment for work that is considered to be of equal value to an organisation. Establishing what is of equal value, however, can be a complicated and controversial process.

It is not intended that equal value claims should be allowed to form a basis for an attack on pay differentials in an organisation – for example a man claiming that he should be paid the same as another man doing a different, but in his view, equivalent job. Comparisons are also not valid if made between employees working for different organisations – though sometimes there can be a dispute about whether associated employers are part of the same organisation or not. A comparison can be made against any element of the pay package so it is not open to an employer to say that an inequality regarding one element can be offset by another compensating advantage. Whilst the great majority of cases are raised by women, in theory a claim can be made by a man citing a more advantaged female comparator.

In the rest of this article attention is given to the use of job evaluation as a means of avoiding sex discrimination in pay structures, experience in the UK, the preventative action that employers need to consider and what general conclusions can be drawn about the likely impact of the equal pay requirements.

In the event of an employer having a claim lodged against them for equal pay it will not be sufficient to say that the pay rates are collectively agreed. Especially in the case of the workforces that are predominantly male, or where the men dominate the key bargaining positions, it would not be surprising to find that a tribunal or court found that this had led to unequal pay between the sexes. Employers can argue that differences are accounted for by market scarcity but would have to demonstrate that this accounted for the whole of a difference and was not being applied in a way that discriminated against one sex. A standard way of employers seeking to avoid or defend equal pay claims, particularly those based on the concept of equal value, is to do so by way of a job evaluation scheme.

Job evaluation

Job evaluation schemes can help in providing a framework by which jobs can be compared with one another. However, even if there is a genuine attempt to eliminate pay discrimination based on gender there is always the potential for challenging the assumptions on which a job evaluation scheme is based and/or the way in which it is implemented.

There are two basic types of job evaluation scheme – non-analytical and analytical. The main non-analytical methods re job classification and job ranking. With job classification schemes jobs are looked at as a whole and then grouped into job grades. Basic descriptions may be given of the key requirements of a job grade. Job ranking involves classifying jobs by general comparisons with other jobs in an organisation. With analytical schemes the major factors in a job are identified and then evaluated. The most common type of analytical scheme is 'points rating'. This involves giving a range of points for each factor that is identified and establishing the value of a job by the total number of points scored. Whilst the analytical approach is more time consuming it has generally proved to provide a more adequate defence than non-analytical methods against equal pay claims One of the reasons for this is the need for equal value to be established by reference to individual factors such as effort, skill and decision-making.

To further complicate matters even where employers make a genuine attempt to eliminate sex discrimination in pay structures the whole process is inherently subjective and there will always be the potential for genuine disagreements.

However, systematically a job evaluation scheme is established for example there will always be scope for argument about what factors and weights have been used. There is also likely to be scope for argument about how fairly and

consistently a scheme has been applied. A common misunderstanding about job evaluation schemes is that there is an external set of factors and weights that can be imported into an organisation that will be universally acceptable. The reality is that factors and weights have to be developed within the circumstances of individual organisations. Although a number of factors may need to influence a pay structure, the essence of job evaluation is that it is a method for establishing what the employees w*ithin an organisation* feel provides a '*felt fair'* basis for pay differentials. This is done by systematically collecting information and making judgements about what those inside an organisation feel differentiates one job from another. This process though now has to be reconciled with the requirements of the Equal Pay Directive and associated case law.

U.K. experience

The extent to which female earnings were below male earnings in the U.K. was estimated as being 13 or 17% in 2005 (according to what measure of average was used). However, there were wide variations from the average according to factors such as occupation and age. In the Civil Service and teaching there has been a long tradition of equal pay. The average gap between the male and female hourly rate however was found to increase significantly with age (Office for National Statistics)

The number of equal pay claims proceeding to an Employment Tribunal for judgement in the U.K. in 2007/8 was only 45. However, such judgements can have important repercussive effects, both inside and outside the organisation concerned. In addition the number cases referred by the Tribunals to the Advisory Conciliation and Advisory Service (ACAS) for conciliation was 54,000. Furthermore many cases were put on hold pending judgement in test cases.

A particularly important development concerned the remuneration of local government employees such as school dinner ladies in comparison with male refuse collectors. The generally male refuse collectors received a pay bonus whilst the dinner ladies did not. The jobs were held to be comparable because of the social skills required by the dinner ladies. Developments such as these led to pay agreements with the trade unions that sought to eliminate pay discrimination based on gender. Arrangements also had to be made to make good loss of pay for up to six years because of sex discriminatory pay structures.

The magnitude of these developments was such that the settlements actually made affected 400,000 local authority employees. As a consequence central government had to provide emergency funding of £450 million just to help local governments meet the costs of the equal pay adjustments, including back dating (The Times 2008).

Another costly effect of equal pay legislation occurred in Britain in the National Health Service (NHS) – the largest single employer in Western Europe.

Partly as a means of combating potential equal pay claims a national system of job evaluation was introduced in the NHS in 2006. Unfortunately control of the exercise was weak and the salaries for General Practitioners rose by 30% for doing much the same work as before. There were also significant rises for hospital consultants for doing *less* work**.** A policy decision had been taken by the government to inject significantly more into the NHS but most of the extra money went to funding such pay increases. Such increases were not on a 'one-off' basis but are ongoing.(Rees and Porter 2008 p.160).

Although the most dramatic developments in the U.K. regarding equal pay have been in the public sector the private sector is also likely to be increasingly affected. The former chair of the Equal Opportunities Commission in the U.K. commented that:

The private sector was just as vulnerable to legal action. Companies with opaque mechanisms for handing out large bonuses and which do not have performance reviews were particularly at risk. The Times (2007).

Whilst trade unions may not generally welcome what they may see as an intrusion into their bargaining prerogatives, equal pay legislation can be a very effective means of them gaining important concessions from employers. This development has come at a time when union bargaining power has generally been much less that in former years. In addition whilst trade union leadership tends to be male dominated the work force contains an increasing proportion of women which is now approaching 50% This increases pressure on trade unions to pursue the issue of equal pay. Employment lawyers are also increasingly prepared to pursue equal pay claims on a no- win, no- fee basis. Unfortunately, however, the need for employers to find money to fund equal pay claims is gathering pace at a time at a time of increased economic difficulty for all sectors of the economy. One result of this is that there may be little or no money left over to fund general increases pay increases. This is despite increases in the cost of living, particularly for energy and food.

Claims in the U.K. have often taken several years to resolve and involved significant legal costs. Employers and trade unions have often been disposed to use appeal processes if they lose a case if there is a potential significant impact on pay structures. The complexity of some cases is that employment tribunals can use the services of a specialist independent expert to advise them on technical issues. However the impact of the legislation cannot be judged simply by the cases that go to a tribunal or which involve ACAS conciliation. Employers and unions are increasingly aware of the outcome of test cases which has an influence on their decisions and bargaining positions about pay structures. Further pressure is planned under the terms of the Equality Bill, which is due to become law in

2008 or 2009. Its provisions include a requirement that public sector employers carry out equal pay audits. In addition it is proposed to inject transparency about pay structures in all organisations..

Preventative action

The scale of the adjustment in pay structures caused by European equal pay law is great. The problem is all the more for countries, like Romania, who have only recently become members of the EU because they have not had the many years to adjust to the law that most other member countries have had. Although the law may have had limited impact in Romania to date, it is not going to go away and enforcement procedures will inevitably get more robust. Consequently, it is important for employers to face up to the issue rather than assume it can be ignored. Where domestic national law has not been introduced action can be taken against governments and employers on the basis that they have not complied with European law.

The first step that employers need to take is to assess any gap between their pay structures and European equal law requirements. It may not be practicable to try and close such a gap immediately but it is likely to be both realistic and necessary to develop a long term plan about how to close it. In the meantime employers will hope that they .are not the ones who have legal action taken against them. Any plan will need to impact on policy about pay structures and any collective bargaining that takes place.

As equal pay claims can be against any one element of the pay package, employers may want to consider the extent to which they wish to harmonise conditions of employment such as working hours, holidays and sickness benefit. They may also need to consider any differences such as the age of retirement, length of service increments and age .requirements regarding selection because of European Directives regarding sex and age discrimination. The composition of groups concerned with pay determination may also need to be reviewed. This can be particularly necessary with job evaluation panels involved in both the determination of pay schemes and their operation.

If job evaluation is used as a method of pay determination it is as well to remember that their basis is subjective. No amount of statistical analysis will provide a pay structure that cannot be challenged. It may be as well to have a relatively simple scheme that can still provide an analytical defence against equal pay claims compared with a complicated scheme that perhaps because of its very complexity may give plenty of scope for argument. Relatively simple schemes may involve creating job grades out of broad clusters of jobs with relatively few jobs at the margins of a grade. It may also be necessary to have generic job titles and a provision that the content of a particular job may need to vary within the

responsibility level of a particular grade. Employers may also need to be cautious about consultants offering to introduce their own complicated 'off the shelf' schemes that have not been designed with the needs of the organisation in which they propose to introduce such schemes. A further reason for needing to beware of complex schemes is that job evaluation schemes are static models and an accelerating pace of change means that they can quickly get out of date. The simpler the model, the easier it may be to adapt.

Conclusion

One may or may not agree with the provisions of the European Equal Pay Directive and the associated case law developments. However, there is no sign of it going away, on the contrary its impact is likely to become increasingly, if inconveniently, felt. To complicate matters its likely increasing impact coincides with a worsening economic situation which employers are likely to be under to contain costs, including pay costs. Added to this is the problem of border EU countries needing to contain their costs in order to remain competitive with organisations in neighbouring countries who do not have to comply with EU legislation. Admittedly there may be some off-setting gains caused by increases in the supply, productivity and retention of female workers, particularly if they are skilled – the problem though may be in funding such expenditure especially in the short term. However, it has to be remembered that the primary purpose of the legislation is to meet the social objective of reducing pay discrimination, not to make the labour market more effective. One of the consequences of this may be that some groups of women get paid above the market rate because their contribution to an organisation is judged to be of equal value to that of male comparators. However, the U.K. experience has been that despite the legislation a significant gap between male and female earnings has remained. This may be accounted for by the existence of other factors such as the impact on career aspirations and training opportunities caused by the conflict between domestic and work responsibilities for mothers.

Given the likely impact of equal pay law employers would be well advised to take preventative action rather than suddenly find they are on the wrong end of an important legal action. The logic is for employers to try and identify significant potential illegalities in their pay structures and develop policies for dealing with them. Trade unions also need to work out the likely impact of the law. It may cause internal differences if it means that much of whatever money is available has to go to eliminating sex discriminatory pay practices with little or no funding left for general pay increases. However, unions may be more than grateful to have a means of forcing concessions from employers for at least some of their employees, particularly if their bargaining position weakens even further.

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Romanian Economic and Business Review – Vol. 3, No. 2

DEMATERIALIZED MONIES – NEW MEANS OF PAYMENT

Alexandru Pîrjan and Dana - Mihaela Petroşanu [*]

Abstract

In this paper, we will outline the financial context in which the main means of payment dematerialization occurs. We will present the main characteristics of these new types of dematerialized monies: electronic money, virtual money, digital money, private money, purses and holders

Keywords*:*

Means of payment, dematerialized monies: electronic, virtual, digital, private, purses and holders.

Introduction

The first dematerialized currencies have appeared in the 1980s, due to an increased use of prepaid cards in telephony. We can perceive three types of dematerialized money: electronic money, virtual money and digital money.

The economic value of electronic money is measured in classical economic units (fiduciary) which must be stored in an electronic device accessible by the consumer. They represent actually scriptural money under binary form which is stored on a smartcard or on another portable device. The status of the issuer and the traceability of the transactions gives the scriptural character of the electronic monies. One can buy new units of payment either with classical money or through a bank account. The transactions are limited to the merchants who support them. Because electronic money does not represent legal tender or have discharging power, many experts consider that they do not have a straight existence.

Virtual money does not have tangible modes of payment, this being the main difference in respect to electronic money. Virtual monies are stored in software programs which allow transactions to be carried out on open network like the Internet. Virtual money can be regarded as a reference to a bank account. The status of the issuer and the traceability of the transactions give the scriptural character of the virtual money. In some cases virtual money can be also represented by virtual tokens or jetons, which are accepted only in a restricted commercial circuit. The jetons are issued only by trusted services providers and are tied with their banking accounts. A special case is when virtual money are

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issued by telephone companies under the form of prepaid cards whose value is meant for the payment of the company's services. In the future, telephone companies may have an intermediary role in e-commerce especially in the case of micropayments because they have developed to handle efficiently small payments and for settling accounts. In order for this to happen, a transition from 'virtual purse' to 'electronic purse' must take place so that the value stored in the prepaid card be recognized as a new universal type mean of payment. Another problem would be their regulation by the financial authorities.

In the case of digital money the value is stored under the form of algorithms on a hard disk, in a smartcard or in the memory of the user's computer and each piece is identified by an individual serial number. In order to achieve an efficient dematerialization of money, digital money must have a monetary sign, an authentic economic discharging power that will be accepted by most economic agents, the exchanging of values taking place over a network in real time by means of coded digital coins and their clearance and settlement may be achieved in real or non-real time. After having being verified their authentication, against a centralized or distributed authentication database, the digital money can be exchanged in physical money at different banks. Digital money allow a complete anonymous transaction by separating the payment from the user's identity, but it also has a major drawback, that of creating new universal monies, which are independent from current monetary system. For this reason, digital money has had a lot of technical an legal obstacles. An international digital currency would perturb existing economy and interfere with regional and local currencies. Delicate problems regarding national sovereignty could make their implementation almost impossible to achieve.

Electronic purses

An electronic purse consists of a rechargeable multipurpose prepaid card which can be used either for face-to-face payments or for retailing ones. Electronic purses are actually a substitute for other types of money. They represent portable electronic stores containing a precharged value, containing the funds owned by the cardholder. One of the most important security aspects of the electronic purses is that they are impossible to fake. Their use depends on legal regulations and on the identity of the issuer. In order for banking networks to be considered 'opened', the electronic money has to correspond to a legal currency. This is the reason why a purse which has been issued by a non-bank can only contain jetons and can only be used in restricted circles. Jeton holders are designed for use in certain closed situations just like private means of payments (prepaid telephone cards), which can be used to pay for telecommunication services. The banks find these electronic purses very appealing as they allow for a reduction of the transaction's cost and can even replace classical coins, notes and

cheques when small amounts are involved. Electronic purses have proved their usefulness in both face-to-face commerce and when making payments using automatic machines. Traditional payment cards are not suited to face-to-face commerce and miocropayments because the cost of the transaction may exceed the actual amount.

Characteristic	Electronic Purse	Electronic Jeton Holder
Expression of purchasing power	Legal tender	Consumption unit
Unit of payment	Universal: can settle any payment in a defined territory	Specific to transactions involving the issuer
Guarantor of purchasing power	Bank	Service provider
Charging of value	By a bank or its agent	Unregulated
Circuit of financial services	Open	Closed

Figure 1. Comparison between electronic purses and electronic jeton holders.

An interesting approach would be the use of both electronic purses and jeton holders in a multipurpose card. In Figure 1 you can see the main financial and legal differences between electronic purses and electronic jeton holders.

Virtual purses

One can see a virtual purse as a precharged account with units of legal money and stored at a non-bank entity. The client can access online the virtual purse using special software installed on a personal computer. Services providers open more subaccounts in their banks and inside their own accounts. The clients or the merchants subscribe to one of these subaccounts. Because the stored value is physically intangible, the purse is "virtual", but its payment units represent legal tender. The virtual purse is linked to the subaccount and it contains the purchasing power of the client. All clients have a copy of the balance on their personal computer and specific files that are used in cryptographic algorithms necessary for security reasons. Even in the case of a computer failure the assets of the clients are protected. The virtual purse of the client is debited while the merchant's one is credited with the value of the transaction minus the commission which goes to the

operator. The transaction's cost in the case of micropayments is greatly diminguished by the grouping of payments before the clearing.

The properties of transactions which use dematerialized currencies

All the transactions which use dematerialized currencies must respect several properties:

1. Atomicity: in order to have consequences a transaction has to complete all its states. If this doesn't happen, the previous transaction's state has to be restored.
2. Consistency: the critical aspect of the exchange must be accepted by all parties involved in the transaction.
3. Isolation: there mustn't be any interference among transactions.
4. Durability: if a breakdown do occurs, the system must return to its previous state.
5. Anonymity: revealing the buyer's identity is not mandatory when settling the obligations. On the other hand, personalization supposes that the identity of the buyer is known in order to be able to customize the offer.
6. Non-traceability: besides anonymity, this property means that one shouldn't be able to link two payments made by the same person.

Transactional properties of different means of payment is depicted in figure 2.

Property	Cash	Cheques	Credit transfer	Direct debit
Atomicity	Yes	Yes	Yes	Yes
Consistency	Yes	Yes	Yes	Yes
Isolation	Yes	No	Yes	Yes
Durability	Yes	Yes	Yes	Yes
Anonymity	Yes	No	No	No
Traceability	No	Yes	Yes	Yes
Property	**Debit card**	**Credit card**	**Electronic purse**	**Virtual purse**
Atomicity	Yes	No	Yes	Yes
Consistency	Yes	Yes	Yes	Yes
Isolation	Yes	Yes	Yes	Yes
Durability	Yes	Yes	Yes	Yes
Anonymity	No	No	Maybe	Maybe
Traceability	Yes	Yes	Maybe	Maybe

Figure 2. Transactional properties of different means of payment.

Because there are a lot of payment instruments, not all of them are suited to all the applications. This is an aspect which must be considered carefully when implementing new payment instruments in different societies. In order to obtain cash, cheques are used very often and in order to recharge a checking account cash is most often used. In contrast, besides cash, an electronic purse can be recharged from a checking account and even through a bank card, but the monies

can't be discharged in any of this forms. In figure 3 we present the money flow between an electronic purse and other means of payment.

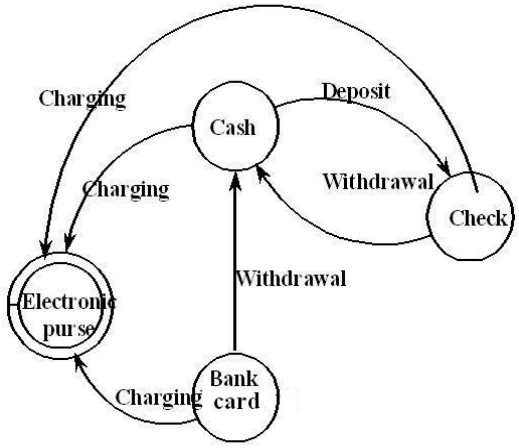

Figure 3. Monetary flow among payment instruments.

The various means of payments have different domains where they can be used. Cash is usually used in face-to-face payments, cheques are used in all cases of payments: face-to-face, remote and business-to-business, credit transfer is used in remote payment and business to business, while direct debit and interbank transfer are suited only in remote payments. Bank card can be used both in business to business and face-to-face payments but a card reader is required in this case.

Type of Money	Nature of Money	Support (the container)	Value Store
Fiduciary	Concrete, material	Paper, piece of metal	Safe, wallet, purse
Scriptural	Immaterial (maintained by a credit institution)	Magnetic, optical, electronic	Account maintained by a credit institution
		Integrated circuit card	Electronic purse
		Computer	Virtual purse (memory allocated by an intermediary)
Type of Money	Value Representation	Mode of Payment	Means of Payments (Instrument)
Fiduciary	Bank notes, coins	Face-to-face transaction	Bank notes, coins
Scriptural	Numerical value	Remote, face-to-face (retail automatic machines)	Check, debit card, credit card, credit transfer
			Electronic fund transfer

Figure 4. Comparison of monies.

Electronic or virtual purse is used with a card reader in face-to-face payments and it might also be used in remote and business to business payments.

Various properties of money and a comparison between them is depicted in figure 4. This evaluation is made by taking into account several criteria : the nature of money, their support, the way how the value is stored and represented, the mode and the means of payment.

The financial and control flow between participants in a system of dematerialized money is presented in figure 5.

The operator is responsible for charging the purse with electronic monetary units and he has an interface with the client presented in relation 1. The operator must verify the financial status of the holder or the validity of payments made by using classical means of payment. After having verified the electronic or virtual purse, the operator puts up-to-date their stored value.

If the charging operator is not a bank, there must be a connection between him and the issuing bank, as presented in figure 5 as relation 2.

The issuing bank must also communicate to the acquiring bank (the merchant's bank), respecting the necessary regulations. This is marked as relation 3.

Relation 4 shows that in order to acquire the merchant's credit, the acquiring operator exchanges information with the acquiring bank.

The corresponding values of the electronic transactions are collected and compensated for crediting the merchant's account, just like it is presented in relation 5.

Relation 6 shows that the transfer of electronic value from the client to the merchant's account is done simultaneously during a purchase.

The charging protocol represents a set of procedures for processes regarding authorization and transfer of electronic value to the owner's purse corresponding to a payment accepted by the charging operator. Protocols must assure a reliable security so that they will resist to outside attacks. The messages should be available only to the participants, a third party which is not a participant should not be able to access, manipulate or to modify these messages.

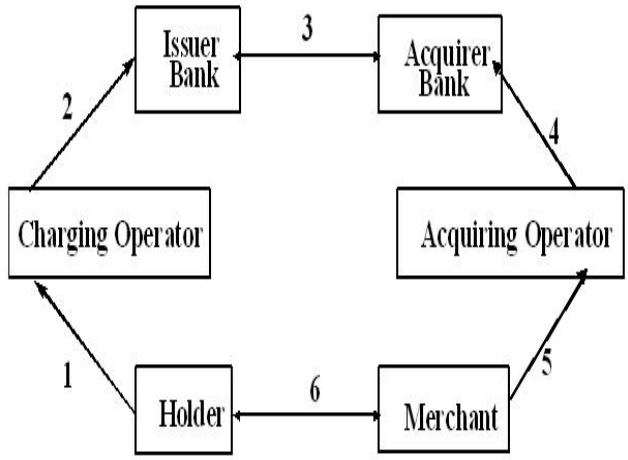

Figure 5. Flows in a transaction by dematerialized money.

The protocols must assure that the charges are authentic and they should prevent a false server from debiting a purse, the recharge of an unidentified purse, recharging with a different amount, other then the one requested, should prevent replay a tax (such as a previous authenticated value be recharged more times) and it should also be able to prevent the repudiation of a charge which has been correctly executed or a payment which has been made. The protocols should offer the possibility to return to the previous state in case a transmission error occurs.

The case of direct payments made to the merchant

If the payment is directly made to the merchant, the clients have to send the details of their accounts. In order to assure the security of the banking network from the Internet traffic, a payment gateway must be used when making payments from the client's computers by means of a purse or a bank card.

The gateway will get and handle the client's request, and so the gateway operator can be seen as a trusted third party. In order for the gateway operator to be a charging operator, it must be certified by a credit institution. In figure 6 one can observe a location of the payment gateway in electronic commerce.

Due to the large number of projects for electronic purses implemented around the world, a lot of incompatibility problems have emerged.

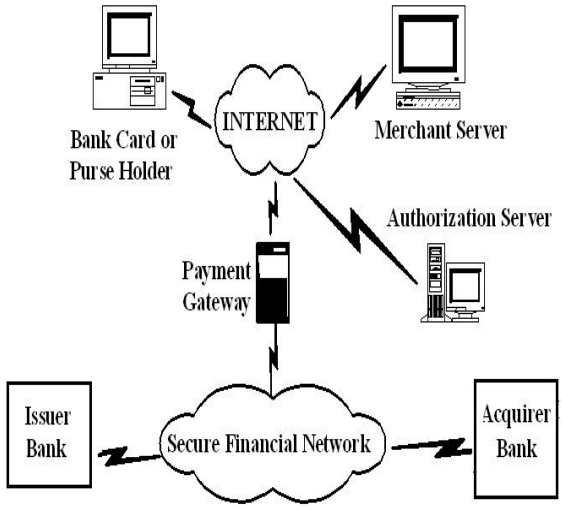

Figure 6. Payment gateways in electronic commerce

An important step in consolidating an unique payment interface is the Electronic Commerce Modeling Language (ECML), described in IETF RFC 3106, which defines how the exchanges between applications and the merchant's site should take place. A digital wallet is a software that manages the details of an online order.

A major disadvantage of the direct payments is that the merchant and the cardholder have to come upon all the details of the protocol which they use, and this represents an impediment for open exchanges. Most of the payment schemes that could be used must be supported by the merchant's site. For each currency the customer would have to own a purse and due to its cost these could be a serious inconvenience. One solution for overcoming some of these drawbacks is the payment be mediated by intermediaries.

Payments through an intermediary

In figure 7 we present the position of the payment intermediary in the e-commerce circuit.

The intermediary levels the differences among the various purse schemes in regard with the participants, allowing them to overcome the burden of having specific software for different systems of payment. In order to access the intermediary's gateway, the client must subscribe to this service.

There are two cases: one when the payment will be done by bank card or electronic purse and another when the payment is done through a virtual purse.

In the first case the intermediary usually knows the client's details as they have been previously send through a secure channel. Using this information, the intermediary instructs the banking authorities to debit the buyer's account for the purchases he has made and to credit the supplier with the respective amounts. The holder uses an identifier (that could be encrypted with a secret key) in order to establish a connection.

In the second case the intermediary opens more subaccounts in it's own bank for the users and merchants which subscribe to its services. By means of direct credit or by a bank card the users prepaid their subaccounts. The transactions are grouped and are settled periodically with the banking network after having withdrawn their commission.

The are many services which an intermediary can offer such as: the management of a virtual mall and the payment instrument for the merchant, can take care of exchange rates, import and export taxes, shipping of physical goods, etc. The intermediary has to manage the generation, distribution, archiving and revocation of the encryption keys, the subscriptions of merchants and clients, and must also updates the directories and the black list or revocation list. A nonrepudiation service which timestamps the exchanges can also be implemented.

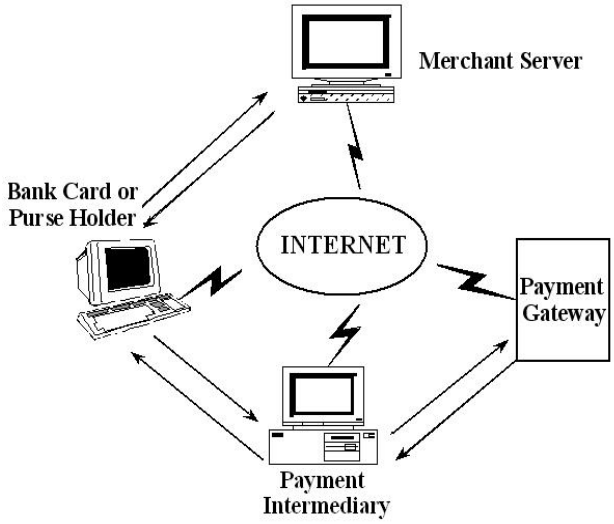

Figure 7. Payment intermediaries in electronic commerce

If the intermediary is a telephone company, we can see the telephone unit as a virtual money unit, which is used between the supplier and the client in micropayments. This can be very useful if the two parties involved are not from the same country.

Important administrative functions could be also fulfilled by intermediary for example the paying of taxes in France, where the DGI (Direction Générale des

Impôts – General Taxation Directorate) certifies certain service providers to act as a relaying organization that can send fiscal data according to the law. The intermediary gives its clients the possibility of signing electronic documents. Using the RSA algorithm the public DGI's key is used to encrypt the digest of the document and the symmetric key. Starting from 2000 a fiscal declaration can be send to the fiscal institutions only by EDI partners, according to EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) .

Clearing and settlement

The process in which banks are settling the accounts by exchanging money is referred as "clearing and settlement". The respective values are analyzed, compared and the accounts are settled in a special clearing house every working day. When talking about electronic and clearing settlement the process is done over computer network.

Several different models for clearance and settlement systems exist in Europe, but differ from country to country in respect with the unique evolution of the financial circuits, different views over security issues, and the diversity of standards from each of these countries.

We can make a classification of the settlement networks taking into account several criteria like:

1. The dimension of the processing: there can be large value systems and mass systems that process many transaction of relatively small values on a daily bases.

2. The ownership of the managed network: the owner of the network can be the central bank in the case of a public network or more members of a group of banks in the case of a private network.

3. How the settlement is done: the settlement can take place in real time in the same day. In order to avoid the charges for settling the payment, grouping is used whenever the parties involved are from the same group of companies.

Conclusions

Many technical, political and social factors are involved in acceptance of a payment system. The existing architecture of the payment systems must be taken into account when a worldwide e-commerce solution has to be implemented.

Especially in the case of micropayments, intermediaries should be used for assuring a cost effective transaction's billing and collection of monies. These intermediaries should be able to act as a single proxy interface independent of the underlying scheme of the system's payment. The differences in currencies and the fluctuations of the exchange rates are important issues which must be dealt with in

the case of micropayments as they pose additional financial risk to all the participants.

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Romanian Economic and Business Review – Vol. 3, No. 2

ONLINE ASSESSMENT OF INTEREST RATE RISK

Alexandra Coman*

Abstract

In addition to being of great importance to bank managers (due to the particular significance of Interest Rate to banking institutions: its fluctuation is, at the same time, a premise for success AND potentially fatal in case of inadequate management), ***Interest Rate Risk*** *is of concern to any individual who possesses a financial portfolio (made up of loans, deposits, various investments, etc.), as any such portfolio may be endangered when exposed to fickle Interest Rates. Members of this latter category, however, are grossly neglected when it comes to availability of both information about and affordable or, better yet, free methods of protection against Interest Rate Risk.*

Approaches to Interest-Rate-Risk assessment, from the traditional, time-honored methods (maturity and repricing schedules) to the more complex and experimental ones, are at least partially suited for software implementation. Using the Internet as medium, fairly simple, yet effective methods of Interest-Rate-Risk assessment can be made available to a vast audience, including current and potential bank employees involved in risk management, individuals whose interest in the matter is academic or, quite simply, members of the general public aware of the implications of Interest-Rate variation upon their financial investments.

Keywords: Computerized Risk Management, Banking Risk, Interest Rate Risk, Gap Analysis, Duration Gap Analysis

Introduction

The field of Banking and Finance, characterized, as it is, by a particularly stringent necessity for opportune decisions to be taken and acted upon at the right time, is relying more and more on compu-terized decision-support systems to provide it with the assessments, prognoses and increasingly complex interpretations it needs to devise its plans and policies and to defend its stability (a stability which depends, to a certain degree, on that of every individual institution in the financial system).

In Romania, a country, which, having only recently joined the European Union, is still undergoing the EU integration process, perhaps the most significant

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priority regarding the banking system is the implementation of Basel II guidelines on banking risk and its management.

This paper proposes a computerized banking-risk assessment solution, available through a website.

The chosen type of risk is **Interest Rate Risk**, which is of a particular significance to banking institutions: Interest Rate variation on the market is a premise for the successful operation of banking institutions as financial intermediaries, but this variation can come to be an equally genuine source of danger in case of inadequate management.

By combining complementary risk-assessment methods, the proposed software product can offer one a relevant idea on the sensitivity of a financial portfolio to Interest Rate variation.

Risk analysis has been implemented within a website in order to ensure accessibility for as many users as possible, given that Interest Rate Risk has, alongside its significance to banks, another characteristic that should be taken into account: it is of interest not only to employees of financial institutions, but to a larger audience: any individual who has taken out a loan and made a deposit is the owner of a "portfolio" potentially threatened by Interest Rate Risk.

Interest Rate Risk: Sources, Implications, Assessment Methods

Banking risk is the probability of occurrence of an event with unfavorable consequences for a banking institution. **Exposure** to such risk is the present value of losses which would be incurred by the institution in question if such an event were to occur [3].

Appropriate risk management within the banking institution is essential in order to avoid its bankruptcy, which (due to the systemic[1] nature of banking risk) may pose a direct threat to the stability of the banking system as a whole, at national and international level.

Interest Rate Risk represents the possibility of occurrence of unfavorable changes in interest-based earnings and/or interest-related expenses or in the value of interest-earning assets and interest-bearing liabilities, as a result of unplanned changes in Interest Rates.

The Basel Committee defines Interest Rate Risk as being "the exposure of a bank's financial condition to adverse movements in Interest Rates." [9, pg. 6].

In its paper "Principles for the Management of Interest Rate Risk" [9], the Committee draws attention to the following four sources of Interest Rate Risk: **repricing risk** (generated by assets, liabilities and off-balance-sheet positions

[1] Banking risk is deemed "systemic" due to the fact that the failure of a member institution of the banking system can set off a chain-reaction affecting the entire system. The classical example of such an occurrence is the bankruptcy of the Herstatt Bank (in 1974), an incident which, through its consequences, prompted the establishment of the Basel Committee for Banking Supervision [18].

maturing or repricing at different times), **yield curve risk** (arising from yield-curve shifts that have failed to be anticipated), **basis risk** (the result of inadequate correlation of Interest Rates attached to assets, liabilities and off-balance-sheet positions) and **optionality risk** (generated by the embedded options of assets, liabilities and off-balance-sheet portfolios).

Interest Rate Risk can affect portfolios in more ways than one: from the **earnings** point of view (through influence upon the Net Interest Income and, subsequently, upon the overall Net Income), as well as from the **economic value** point of view (when the present value of a portfolio is influenced adversely).

The Basel Committee sets forth no less than 11 principles for the management of this type of risk. It also enumerates and briefly describes available Interest-Rate-Risk assessment methods of varying complexity: **repricing schedules** ("Gap" and "Duration", the two methods implemented in the proposed software solution) and **simulation approaches** (static and dynamic).

Online Interest-Rate-Risk-Assessment Solution Proposal

The risk-analysis website proposed herein seeks to offer users an Interest-Rate-Risk assessment tool characterized by ease of use and included within a website available to any interested party.

In addition to simple evaluation, the site offers an export facility of analysis sheets to Excel format, allowing input data and results to be easily formatted, printed and put to uses such as risk-reporting or, simply, comfortable perusal.

The implementation of analysis methods within a website was chosen in order to ensure maximum accessibility for a vast audience.

At the time the present paper was being put together, the Internet held but little generally accessible information on Interest Rate Risk and its evaluation methods. Substantial compilation work was needed in order to achieve an accurate, satisfying perspective on the subject.

Furthermore, within banking institutions, risk evaluation takes place at high level and existing software solutions are, generally, inaccessible to the general public.

A serious study of the domain is, therefore, made difficult for "outsiders". Still, not only current employees of banking institutions have reasons to be concerned with Interest Rate Risk.

On envisioning and developing the Interest-Rate-Risk analysis website, possible and likely requirements of the following categories of potential users have been taken into account:

- **Employees of banking institutions (especially from the Risk-Management Committee)**: obviously, they make up the main group of individuals who might show interest in such a software solution, even if they are

already using an Interest-Rate-Risk evaluation system at the banking institution where they work.

Why? Firstly, because such a website would offer them the chance to experience the advantages of a risk-evaluation method other than the one used by them before: for example, if they are currently relying on Gap Analysis, they will become aware of the increased complexity, relevance and precision of results obtained by way of Duration Analysis.

Bank employees who still assess risk by way of "pen and paper" or Excel worksheets may come to appreciate the advantages of computerized evaluation methods, which, although not yet apt to completely substitute the input of specialists in the field, can, nevertheless, complement it successfully.

- **Individuals interested in the educational aspect of the website**: students of Finance or related fields, who do not have access to commercial risk-management software; potential bank employees who wish to train in the domain of Interest-Rate-Risk evaluation. By defining and explaining all concepts used in the evaluation methods, as well as by offering detailed interpretation of results, the website has an obvious educational character.
- **The general public**: not only a banking institutions have "portfolios" of the type analyzable by the proposed methods.

The present value and **future value** of our investments are of concern to all of us and they are exposed to Interest Rate Risk.

The proposed website offers users the following features:

- Interest Rate Risk assessment through two methods ("Duration Gap Analysis" and "Gap Analysis")
- results accompanied by interpretations
- various graphs
- export of worksheets to .xls format.

In order to gain access to the functionality of the website, users would be required to create online user accounts. After creating such an account, one would be allowed to define financial portfolios which can be then subjected to assessment and saved for later reference and adjustment.

Implemented Risk-Assessment Methods

The two approaches to Interest-Rate-Risk assessment implemented in the proposed website are Duration Gap Analysis and simple Gap Analysis. They are to be conducted according to the algorithms described in the following two subchapters.

Duration Gap Analysis

Duration is the Weighted Average Maturity of cash flows attached to portfolio components. The value of Duration indicates the percentage change in

the Market Value of the portfolio/portfolio component brought about by a 1% variation in Interest Rate on the market [2].

This particularly relevant temporal indicator provides the basis for the main Interest-Rate-Risk evaluation method implemented through the proposed software solution.

Duration is not calculated solely for the entire fixed-income financial portfolio, but also for each Interest-Rate-earning asset and Interest-Rate-bearing liability within it.

The Duration of portfolios which include such assets and liabilities does not exceed 12-13 years, although portfolio components may have an average maturity of as much as 25-30 years [16].

At elementary level, the significance of Duration value may be interpreted thus: the higher the Duration, the higher the price changes for any give change in Interest Rates. The higher the coupon[2] of the portfolio component for which Duration is computed, the lower the Duration and, subsequently, the price change for any given change in Interest Rates [14 ,pg. 4].

The greater the Duration of a portfolio, the greater the Interest Rate Risk to which the portfolio in question is exposed!

The general calculation formula of **Duration** for an entire portfolio is [2]:

$$Duration = \frac{\sum_{i}^{n} (maturity \times PV)}{\sum_{i}^{n} PV}$$

where **n** is the number of cash flows and **PV** the present value of one such cash flow.

Duration can be computed in more than one way: Macaulay Duration, on the calculation of which one assumes interest to be continuously compounded and **Modified Duration,** more appropriately adapted to real-life market conditions. When calculating Modified Duration, one takes into account the com- pounding frequency of the Interest Rate [18].

In the context of actual Interest-Rate-Risk management, Duration is put to use during the process of bank-portfolio immunization.

The **immunization** of a banking institution to Interest-Rate-Risk variation on the market involves the structuring of assets and liabilities in such a way as to ensure the stability of the interest spread and its relative independence of Interest-Rate variation on the market.

In practice, immunization is achieved by way of an opposite portfolio component/portfolio (where assets are considered to be the opposite of liabilities

[2] Fixed periodic interest payment [18].

and vice versa) of the same Duration and present value as the portfolio component/portfolio which is to be protected [2, pg. 204,205].

Duration Analysis is the Interest-Rate-Risk assessment method based on Duration and there are several versions of it in use, as variations of the method can be applied either to sensitive assets and liabilities or to the gaps between them [6]. "Duration Gap Analysis" is the version implemented within the proposed software solution.

This risk-assessment algorithm consists of the following steps [14, pg. 3]:

- The Market Value of those assets and liabilities which are sensitive to the variation of Interest Rates is estimated and Market Value of Equity is determined.
- Duration is calculated for each class of assets and liabilities within the on-balance-sheet portfolio.
- The Weighted Average Duration of Assets and the Weighted Average Duration of Liabilities are determined.
- The **Duration Gap** is calculated by subtracting the Weighted Average Duration of Liabilities from that of Assets.
- The variation of the Market Value of Equity caused by a given variation of Interest Rates is estimated. One must take into account Interest-Rate variations by several different percentages.

Duration will be determined by way of the following formula[3]:

$$D = \frac{\sum_{t=1}^{n} \frac{CF_t(t)}{(1+y)^t}}{\sum_{t=1}^{n} \frac{CF_t}{(1+y)^t}} (*)$$

where **CFt** is the cash flow at time **t**, **t** the number of periods of time until the cash flow reaches maturity, **y** the yield to maturity of the asset or liability generating the cash flow and **n** the number of cash flows.

In order to calculate Duration Gap, one must first determine the Weighted Average Duration of Assets, as well as the Weighted Average Duration of Liabilities.

The Weighted Average Duration of Assets ("DA") is determined by way of the formula:

$$\sum_{a}^{n} W_a D_a \ (*)$$

where $\mathbf{W_a}$ is the market value of asset **a** divided by the market value of all assets in the portfolio, $\mathbf{D_a}$ the Duration of asset **a** and **n** the number of assets.

The Weighted Average Duration of Liabilities ("DL") is determined by way of the formula:

[3] The source of the formulas marked (*) is the paper "Guidelines on Stress Testing", by the State Bank of Pakistan [14].

$$\sum_{l}^{m} W_l D_l \ (*)$$

where $\mathbf{W_l}$ is the market value of liability **l** divided by the market value of all liabilities in the portfolio, $\mathbf{D_l}$ the Duration of liability **l** and **m** the number of liabilities.

Duration Gap is calculated by way of the following formula:

$$DGAP = DA - \frac{MVL}{MVA} \times DL \ (*)$$

where **DA** is the Weighted Average Duration of Assets, **DL** the Weighted Average Duration of Liabilities, **MVA** the Market Value of Assets and **MVL** the Market Value of Liabilities.

Market Value of Equity is also of interest in the context of Duration Gap Analysis, as, based on Duration Gap, one can estimate the effect of possible Interest-Rate variation upon this value.

MVE is calculated by way of the following formula:

$$\Delta MVE \cong (-DGAP) \times \frac{\Delta i}{1+y} \times TotalAssets \ (*)$$

where DGAP is the Duration Gap of the portfolio, $\mathbf{\Delta i}$ the interest-rate change and **y** the yield to maturity of all assets.

Based on analysis results, one can draw one of the following possible conclusions:

If the Weighted Average Duration of assets is greater than that of liabilities, Duration Gap is positive, hence assets are more sensitive to Interest Rate Risk than liabilities and, if Interest Rates increase, the value of assets will decrease by a greater proportion than that of liabilities, while MVE (Market Value of Equity) will decrease; if Interest Rates decrease, the value of assets will decrease by a smaller proportion than that of liabilities, while MVE will increase.

If the opposite occurs (the Weighted Average Duration of assets is smaller than that of liabilities), Duration Gap is negative and the conclusions to be drawn are the opposite ones: liabilities are more sensitive to Interest Rate Risk than assets and, if Interest Rates increase, the value of assets will decrease by a smaller proportion that that of liabilities, while MVE will increase; if Interest Rates decrease, the value of assets will decrease by a greater proportion than that of liabilities, while MVE will decrease [4, Cap. 4].

In order to better assess the degree of risk to which the banking institution is exposed in the case of Interest Rate variation on the market, the following additional indicators can also be calculated:

Average Rate on Interest-Earning Assets [4]:

$$(\sum_{i=1}^{n} y_i * MV_i) / MVA \quad (**)$$

where **n** is the number of interest-earning assets, $\mathbf{y_i}$ the yield to maturity of asset **i**, $\mathbf{MV_i}$ the Market Value of asset **i** and **MVA** the Market Value of Assets.

Average Rate on Interest-Bearing Liabilities

$$(\sum_{i=1}^{n} y_i * MV_i) / MVL \quad (**)$$

where **n** is the number of interest-bearing liabilities, $\mathbf{y_i}$ the yield to maturity of liability **i**, $\mathbf{MV_i}$ the Market Value of liability **i** and **MVL** the Market Value of Liabilities.

Approximate Change in Market Value of Interest-Earning Assets:

$$(-DA) * \frac{r\%}{1 + r_a\%} * MVA \quad \mathbf{(**)}$$

where **DA** is the Weighted Average Duration of Assets, r% the Interest-Rate change, r_a% the average rate of interest-earning assets and **MVA** the Market Value of Assets.

Approximate Change in Market Value of Interest-Bearing Liabilities:

$$(-DL) * \frac{r\%}{1 + r_l\%} * MVL \quad \mathbf{(**)}$$

where **DL is** the Weighted Average Duration of Liabilities, r% the Interest-Rate change, $\mathbf{r_l\%}$ the average rate of interest-bearing liabilities and MVL the Market Value of Liabilities.

Approximate Change in Market Value of Equity **can be calculated as the difference between** Approximate Change in Market Value of Interest-Earning Assets **and the** Approximate Change in Market Value of Interest-Bearing Liabilities**:**

$$(\Delta MVA - \Delta MVL) \quad \mathbf{(**)}$$

Alternatively, Approximate Change in Market Value of Equity **can be calculated by the Duration GAP method, using a more complex formula:**

[4] The source of formulas marked (**) is a calculation example attached to the electronic version of Chapter 4 ("Mana-ging Interest Rate Risk: Duration GAP and Market Value of Equity") of the work "Bank Management" by Timothy Koch and Scott McDonald [4].

$$(-DGAP) * \frac{r\%}{1 + r_a\%} * MVA \quad \textbf{(**)}$$

where **DGAP** is the Duration Gap of the portfolio, **r% the** Interest-Rate change, $\mathbf{r_a\%}$ the average rate of interest-bearing assets and **MVA** the Market Value of Assets.

Gap Analysis" [10]

Gap Analysis is an Interest-Rate-Risk evaluation method which can successfully complement Duration Gap Analysis, offering an impression of the situation of a banking institution from the point of view of exposure to Interest Rate Risk, by comparing the values of assets and liabilities which reach maturity or are repriced within different time frames.

The GAP analysis method can be used to determine the way in which changes in Interest Rate influence the Net Interest Income and, as a result, the overall Net Income of the banking institution in question.

However, given its limitations (it cannot measure risk generated by options, basis risk or yield curve risk), it is recommended that GAP analysis be used in conjunction with a more powerful risk assessment method.

A "Gap" between assets and liabilities over a certain period of time is the difference between the value of the assets and that of the liabilities which reach maturity or are repriced within that time period. If this difference is substantial, then changes in Interest Rate will have a strong influence upon Net Interest Income.

The **Gap** indicator is calculated by way of the formula:

GAP = VA-VL,

where VA is the value of assets sensitive to Interest-Rate variation within a given time-period, while VL is the value of liabilities sensitive to Interest-Rate variation within that same period.

If the Gap is positive (the value of sensitive assets is greater than that of sensitive liabilities), then Net Interest Income will vary in the same direction as the Interest Rates: if Interest Rates rise, income will rise; if Interest Rates decrease, income will also decrease.

If the Gap is negative (the value of sensitive liabilities is greater than that of sensitive assets), then Net Interest Income will vary in the opposite direction to Interest Rates: if Interest Rates increase, income will decrease; if Interest Rates decrease, income will increase.

In the case of most banking institutions, the short-term Gap is negative, as such institutions usually rely on short-term deposits to finance long-term loans.

The Gap report (the worksheet used for performing Gap Analysis), is made up of maturity and repricing schedules for all portfolio assets and liabilities which earn/bear interest.

A series of time frames (less than a month, several months or several years) should be taken into account in order to assess portfolio-sensitivity to Interest Rate Risk both short-term and long-term.

The exposure of portfolio earnings to Interest Rate Risk over each such time frame can be determined by computing the Asset/Liability Gap for the time frame in question.

If assets are repriced sooner than liabilities, an increase in Interest Rates will influence interest-based income sooner than it does interest-related expense, causing earnings to increase short-term.

If liabilities are repriced sooner than assets (the more common situation), an increase in Interest Rates will influence interest-related expense sooner than it does interest-based income, causing earnings to decrease.

Development Technologies

When seeking to offer *online* alternatives to preexistent *offline* solutions already familiar to users, it is crucial to provide, by way of these alternatives, the same level of usability that these users have been accustomed to.

A certain initial skepticism is to be expected and will have to be overcome: usually, the interfaces of websites incorporate a less varied and complex functionality than that of "traditional" applications. The reloading, for instance, of entire web pages each time a calculation takes place would be un-thinkable in a truly serviceable and efficient financial-analysis application.

The proposed risk-analysis solution has been developed with the server-side PHP programming language for dynamic websites, the client-side JavaScript scripting language and the MySQL Server data-base management system.

A further technical characteristic of the website that is worth mentioning is its exploration of the possibilities offered by AJAX technologies. AJAX is a flexible set of technologies which has become quite popular with dynamic-website developers who are looking to provide users with a high degree of interactivity (an example of a website that achieves this is Google Maps). Websites based on these techno-logies are becoming more and more similar to offline applications, interface-wise.

AJAX technologies have been incorporated by way of the Prototype library [17], developed by Sam Stephenson. Ensuring, among others, compatibility with several browsers, Prototype is becoming the choice of more and more web-application developers who seek to take advantage of the benefits of AJAX.

The graphs associated to analysis models are generated by way of the **JpGraph** library, while the export of worksheets to Excel format, as well as their formatting, takes place via the **Spread-sheet_Excel_Writer** library, a component of the **PEAR** ("PHP Extension and Application Reposi-tory") package, a collection of reusable PHP modules.

Conclusions

The issue of banking risk management is of particular present interest, given the necessity of the implementation, within the Romanian banking system, of Basel II policies, agreed upon by the Basel Committee for Banking Supervision.

Out of all types of banking risk, Interest Rate Risk is set apart by its special significance to banking institutions and by the fact that it is not only of concern to the employees of these, but to a larger audience.

Within the current article, I have argued for the necessity for software solutions dedicated to the evaluation of Interest Rate Risk to be made available to any interested user, irrespective of whether they are already actively involved in the field of banking or not. Such software solutions should be accompanied by extensive information on the evaluation of banking risk, information which proves, at present, less easily accessible to the general public.

In addition, it is of utmost importance that Interest Rate Risk be evaluated by way of complementary analysis methods, which can highlight different sources of risk exposure.

A first step in this direction is the proposed risk-analysis solution, which, being incorporated in a website, is intended for and could be made available to, a wide range of users.

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Romanian Economic and Business Review – Vol. 3, No. 2

THE OUTPUT EFFECT OF STOPPING INFLATION WHEN VELOCITY IS TIME VARYING

Lynne Evans and Anamaria Nicolae*

Abstract

This paper explores the role of time varying velocity on output responses to policies for reducing/stopping inflation. We study a dynamic general equilibrium model with sticky prices in which we introduce time varying velocity. Specifically, nonstationary velocity is endogenised in the model developed by Ireland (1997) for analysing optimal disinflation. The non-linear solution method reveals that, depending on velocity, the 'disinflationary boom' found by Ball (1994) may disappear and that early output losses may be much larger than previously thought. Indeed, we find that a gradual disinflation from a low inflation may even be undesirable given its overall negative impact on the economy

Keywords: price stability, velocity, disinflation, output boom, optimal speed of disinflation.

Introduction

This paper explores the output response to a disinflationary monetary policy when velocity is time varying. The analysis takes place in an environment where the supply-side of the economy is characterized by monopolistically competitive firms and where there is rigidity in the setting of prices. The monetary policymakers are committed to price stability in the strict sense of achieving and maintaining a constant price level. This environment is familiar from recent research on monetary contractions (Ball (1994), Ireland (1997), King and Wolman (1999), and Khan, King and Wolman (2003)).

Amongst the important insights this research has provided is that, following a monetary contraction, real output initially declines below its new long run equilibrium level. Furthermore, and much more striking, is the result that a gradual disinflation may bring about a temporary output boom after the initial decline - because output may rise above its new steady state level (the so-called `disinflationary boom'). These output booms are not only counterintuitive but also are rarely observed in the data. Since the output effects of monetary contractions are of first order policy importance, it is not surprising that there is interest in

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exploring the robustness of these results to relaxation of key assumptions. Nicolae and Nolan (2006) relax the assumption of perfect credibility and demonstrate that the disinflationary boom may disappear in an environment characterized by imperfect credibility, depending on the speed of learning relative to the speed of disinflation. Also, Burstein (2006) allows for inflation inertia (by implementing sticky plans) and finds no disinflationary booms and, depending on the initial inflation rate, finds that early output losses may be small[5].

A feature of the aforementioned new Keynesian literature is the hypothesis of constant unitary velocity essentially because money demand is not formally modelled but is postulated. Unitary velocity implies that the policymaker chooses a time path of the money supply which just supports nominal GDP while making strong assumptions about money demand behaviour. Yet, it is well known that velocity is not a constant.

As long ago as the mid 1960s, Mundell (1965) wrote that: "[t]he simplest hypothesis that velocity is constant, is clearly inadmissible when different rates of inflation are involved". More recently, the potential importance of allowing for changing velocity is being recognised in policy oriented research (see for example Orphanides and Porter (1998)) and there is ongoing research trying to construct models which can capture the variability in velocity seen in the data (see for example Hodrick et. al. (1991) and Wang and Shi (2006)). It seems that the need to appreciate and understand the implications of velocity not being constant is becoming increasingly recognised. In this paper, we specifically focus on examining the behaviour of output during disinflationary periods in a setup which allows for time varying velocity. To do this we develop a dynamic general equilibrium model with sticky prices in which we introduce time varying velocity. Given the current consensus that velocity displays nonstationary behaviour (Gould and Nelson (1974) and Friedman and Kuttner (1992), Ireland (1995)), the specific form of the relationship employed in this paper captures velocity as a nonstationary variable and nests constant velocity as a special case. We employ a non linear solution method which allows us both to explore output responses to a range of disinflationary monetary policies and to go on, by extending the solution method, to explore output responses when velocity is time varying.

The next section of this paper presents the model and the parameter values used in model calibration. Section 3 presents benchmark results familiar from the existing literature showing the output response to immediate and gradual disinflations when velocity is constant. Section 4 analyses the output responses to

[5]Burstein (2006) analyses the impact of immediate disinflation only (and does not analyse gradual disinflation policies). In Ireland (1997) and Nicolae and Nolan (2006), immediate disinflation policies also yield no output boom - the booms arise only in the context of gradual disinflation. It might also be noted that whilst the models employed in Ireland (1997) and Nicolae and Nolan (2006) have both time and state dependent strategies, Burstein's model only has a state dependent strategy.

immediate and gradual disinflations when velocity is time varying. Section 5 concludes the paper.

The model

The framework employed for this analysis extends the model developed in Ireland (1997), the component parts of which are now familiar in the literature.

The representative agent each period makes plans for consumption and leisure/labour to maximize the expected present discounted utility:

$$\sum_{t=0}^{\infty} \beta^t \left\{ \frac{C_t^{1-\alpha} - 1}{1-\alpha} - \gamma N_t \right\} \quad \alpha, \gamma > 0, (1)$$

which is separable in consumption and labour supply. $\beta \in (0,1)$ is a discount factor and γ is the disutility of work. Consumption, C_t is defined over a continuum of goods

$$C_t = \left[\int_0^1 c_t(i)^{\frac{b-1}{b}} di \right]^{\frac{b}{b-1}} \quad b > 0,$$

where $c_t(i)$ is, in equilibrium, the number of units of each good *i* from firm *i* that the representative agent consumes and b is the price elasticity of demand. Labour supply, N_t, is

$$N_t = \int_0^1 n_t(i) di,$$

where $n_t(i)$ denotes the quantity of labour supplied by the household to each firm i, at the nominal wage W_t, during each period.

Households face an aggregate price level, P_t, given by:

$$P_t = \left[\int_0^1 p_t(i)^{1-b} di \right]^{\frac{1}{1-b}} \quad b > 0,$$

where $p_t(i)$ is the nominal price at which firm i must sell output on demand during time t. Households supply a portion of labour to all firms which, together

with the budget constraint below (equation (2)), ensures that the marginal utility of wealth equalizes across agents.

Each period the representative household faces a budget constraint where expenditure (on non-durable consumption plus financial investment) must be less than or equal to income (financial plus labour). Each household owns an equal share of all the firms. At the beginning of each period t the household trades a number of shares, $s_{t-1}(i)$, at the nominal price $Q_t(i)$. At the end of each period t it receives the nominal dividend $D_t(i)$ and buys new shares. Under market clearing, $s_{t-1}(i)=1, \forall i \in [0,1]$, in each period.

$$\int_0^1 [p_t(i)c_t(i) + Q_t(i)s_t(i)]di \leq \leq \int_0^1 [Q_t(i)s_{t-1}(i) + D_t(i)s_t(i) + W_t(i)n_t(i)]di \quad (2)$$

The household chooses $c_t(i)$, $n_t(i)$, $s_t(i)$ so as to maximize (1) subject to the constraint (2) and the relevant initial and transversality conditions. Additionally, its optimal allocation across differentiated goods $c_t(i)$ must satisfy:

$$c_t(i) = C_t\left(\frac{p_t(i)}{P_t}\right)^{-b}. \quad (3)$$

In Ireland (1997), the aggregate equilibrium nominal magnitudes are determined by a quantity-theory type relation:

$$M_t V_t = \int_0^1 p_t(i)c_t(i)di = P_t C_t,$$

where V_t (= 1) is the velocity of circulation. In the model used here we relax the simplifying assumption of a constant velocity of circulation. Specifically, we introduce velocity as:

$$V_t = \Omega C_t^{\delta}, \quad \delta \in [0,1) \quad (4)$$

where δ different values of the parameter δ capture different degrees of time varying velocity and Ireland's case of a constant velocity is nested as a special case (for $\delta = 0$)[6]. For any value of $\delta \in (0,1)$ velocity is time varying. Equation (4)

[6] For simplicity Ω is here set equal to unity.

describes the consumption velocity of money. This reflects empirical evidence from the money demand literature that aggregate consumption is the preferred proxy for the scale variable (Mankiw and Summers (1986)) and is consistent with the focus of the more recent search model approach to the velocity of money (Wang and Shi (2006)). We also draw on evidence that consumption, like velocity, displays nonstationary behaviour (Mehra (1988a), Mehra and Prescott (1984, 1985, 1988)) and the specific functional form adopted here has empirical as well as theoretical support (Basu and Dua (1996) and Basu and Salyer (2001))[7].

Importantly, velocity is now nonstationary and endogenous to the model. The quantity theory relation can now be written:

$$M_t = P_t C_t^{1-\delta} .(5)$$

The agent solves the maximization problem yielding the following first order conditions:

$$C_t^{-\alpha} = \lambda_t P_t; (6)$$

$$\gamma = \lambda_t W_t; (7)$$

(from (6) and (7))

$$W_t = \gamma P_t C_t^{\alpha} . (8)$$

And for all *i*

$$Q_t(i) = D_t(i) + \beta(\lambda_{t+1}/\lambda_t)\, Q_{t+1}(i), (9)$$

where λ_t is an unknown multiplier associated with the budget constraint (2).

For the corporate sector, the supply-side of the economy consists of monopolistically competitive firms and there is price rigidity. A continuum of firms indexed by *i* over the unit interval, each produces a different, perishable consumption good, indexed by $i \in [0,1]$, where firm *i* produces good *i*. Each firm *i* sells shares, at the beginning of each period t, at the nominal price $Q_t(i)$, and pays, at the end of the period, the nominal dividend $D_t(i)$.

[7] A full explanation of the microfundations of this velocity function is an interesting exercise in its own right but is beyond the scope of the current paper. The approach taken here is consistent with the usual assumption that velocity shocks are measured as i.i.d. shocks to an AR(1) process. C_t is autocorrelated in this model, therefore $V_t = \rho V_{t-1} + \varepsilon_t$.

We assume a simple linear production technology $y_t(i)=l_t(i)$, where $y_t(i)$ and $l_t(i)$ are the output of firm i and the labour used to produce it, respectively. Y_t is aggregate output. Equilibrium returns to shareholders at time t for firm i are given by:

$$D_t(i) = [p_t(i) - W_t(i)]\left(\frac{p_t(i)}{M_t}\right)^{-b} C_t^{1-b(1-\delta)} - \\ - I_t(i)W_t(i)k, \tag{10}$$

where

$$I_t(i) = \begin{cases} 1, \textit{if the firm pays the cost of price} \\ \qquad \textit{adjustment } k; \\ 0, \textit{if the firm does not pay the cost } k. \end{cases}$$

Costly price adjustment is central to this model in which time-dependant and state-dependant strategies are both present. Firms are divided into two categories, such that at time t, firms from the first category can freely change their prices, $p_{1,t}(i)$, while firms belonging to the second category must sell output at the same price set a period before, $p_{2,t}(i) = p_{2,t-1}(i)$, unless they pay the fixed cost $k > 0$, measured in terms of labour. At time $t + 1$, the roles are reversed and the first category of firms keeps prices unchanged, $p_{1,t+1}(i) = p_{1,t}(i)$ unless they are willing to pay the fixed cost k, while the second category of firms can freely set new prices.

Firms are constantly re-evaluating their pricing strategy, weighing the benefits of holding prices fixed versus the alternative of changing prices and incurring the fixed penalty. At moment t the firms that can freely change price are able to choose between two strategies, depending on whether the inflation rate is moderate or high. At moderate rates of inflation, they are more likely to keep their prices constant for two periods and hence avoid the cost k (single price strategy). On the other hand, in the case of a high inflation, or in the face of sharp changes in the monetary stance, firms are more likely to choose a new price and pay the cost k (two price strategy). The price-setting decision at time t maximises the return to shareholders.

The equilibrium in the model is given by the market clearance conditions for the three markets present in this model (goods market, labour market and asset market). Clearance in two markets assures clearance in the third. From the market clearance conditions for the goods and labour markets we have:

$$C_t = Y_t = L_t. \tag{11}$$

The clearance condition for the asset market is $s_{t-1}(i) = 1, \forall i \in [0,1]$, in each period.

Under the single price strategy, firm i chooses the price $p_t(i)$ to maximize the expression:

$$\Pi_t(i) = D_t(i) + \beta(\lambda_{t+1}/\lambda_t)\, D_{t+1}(i), \tag{12}$$

which follows from (9) and implies that prices are set to maximize market value. Substituting (5) and (8) into (10), and then this into equation (12), yields the price firm *i* will use for two consecutive time periods:

$$p_t(i) = \frac{b}{b-1}\gamma \frac{M_t^{\,b} Y_t^{1-b(1-\delta)} + \beta M_{t+1}^{\,b} Y_{t+1}^{1-b(1-\delta)}}{M_t^{\,b-1} Y_t^{2-b(1-\delta)-\alpha-\delta} + \beta M_{t+1}^{\,b-1} Y_{t+1}^{2-b(1-\delta)-\alpha-\delta}} \tag{13}$$

This equation, familiar from the New Keynesian economics literature, shows that the optimal price is a function of current and future anticipated demand and cost conditions; and that, in steady state, price is a fixed mark-up over marginal costs. As is familiar in models of monopolistic competition, the markup is constant and determined by the elasticity of demand (that is, it is tied down via the preference side of the model): the lower the elasticity, the higher the mark-up.

Under the two price strategy, firm i chooses the price $p_t(i)$ to maximise the expression:

$$\Pi_t(i) = D_t(i) \tag{14}$$

and now the optimising price is:

$$p_t(i) = \frac{b}{b-1}\gamma \frac{M_t}{Y_t^{1-\alpha-\delta}} \tag{15}$$

Again, prices are a mark-up, but now only current period demand and cost conditions are relevant since only current dividend matters.

Monetary Policy

The disinflationary policy employed in this paper follows the approach adopted by Ball (1994), Ireland (1997) and Nicolae and Nolan (2006). The monetary policy is designed to bring money growth to zero over some time horizon. Specifically, at period 0, the authorities make a surprise announcement

about the path for the money supply, $\{M_t\}_{t=0}^{T}$, such that by time period T inflation will be zero. This announced path for the money supply, implies a decrease in the growth rate of the money supply.

Let

$$\theta_t = \frac{M_t}{M_{t-1}}$$

denote the gross rate at which the money supply increases at time *t*. We adopt a disinflationary process of the following sort:

$$\theta_t = \theta_{t-1} - \varphi^{T-1}(\pi_i - \pi^*), \quad \varphi \in (0,1),$$

where π_i is the initial rate of inflation from which the disinflation process starts, π^* is the final (target) inflation to be set here at $\pi^* = 1$ and $\theta_{t>T} = 1$, for any value of t from 0 to $T - 1$.

An horizon of time $T = 1$ entails immediate disinflation, while for $T > 1$ the policymakers engineer a more gradual path towards price stability. To facilitate comparison with the existing literature we employ a linear disinflationary policy following Ireland (1997) and Nicolae and Nolan (2006) which we obtain for $\varphi = \left(\frac{1}{T}\right)^{\frac{1}{T*1}}$.

Model Calibration

This section presents the calibration of the model. To facilitate comparison with the existing literature, we employ parameter values drawn from the wider literature, as used in Nicolae and Nolan (2006). For ease of reference, Table 1 sets out the parameter values used in the calibration. We allow the newly introduced parameter δ to take a number of different values in order to explore the effect of time varying velocity on output (Ireland's case (δ =0) is a special case of the work carried out here).

Parameter	Value	Description
α	0.1	intertemporal elasticity of substitution; (value as in Ball, Mankiw and Romer, 1988)
b	6	price elasticity of demand; (value as in Rotemberg and Woodford, 1992)
k	0.1075	cost of price adjustment; (value as in Ireland, 1997)

β	0.97	discount factor; each interval of time corresponds to 6 months; (value as in Ball and Mankiw, 1994)
γ	1	degree of disutility from work; (value as in Nicolae and Nolan, 2006)
δ	[0,1)	degree of time varying velocity;

Table 1. Parameter values used in the model calibration.

In the following section, we present benchmark results from the existing literature. These describe the behaviour of output during immediate and gradual disinflations starting from both low and high initial inflation rates, where velocity is assumed constant. The subsequent section presents the behaviour of output for all of these same cases but when velocity is assumed to be time varying.

Benchmark results

This section presents results familiar from the literature for the specific case where velocity is assumed constant.

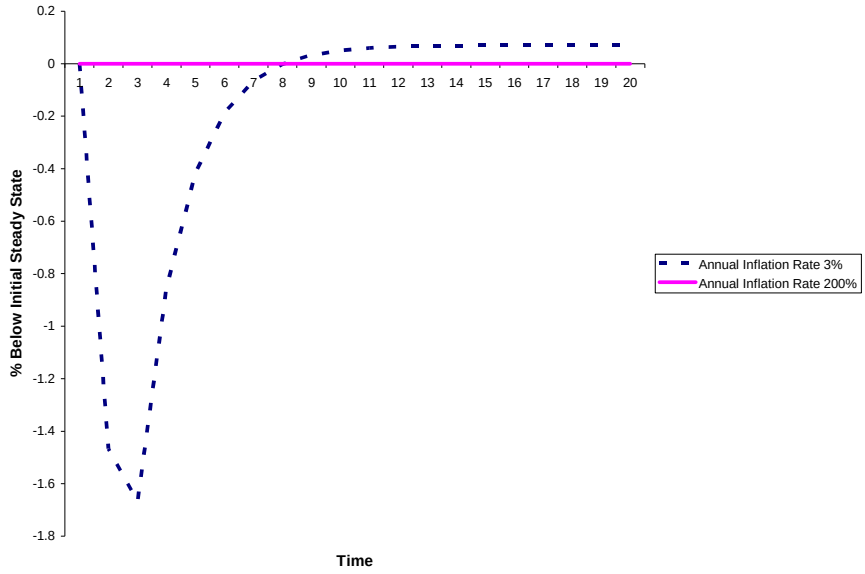

Figure 1. Benchmark Result (Ireland, 1997): Output effect of immediate disinflation of a `small' (3%) and a `big' (200%) initial annual inflation rate.

Figure 1. shows two key results: i) that immediate ($T = 1$) disinflation from a low (3%) inflation rate brings about a significant early output loss (some 1.47% in the first period and 1.67% in the second period) before reaching its new steady

state level; and ii) that immediate disinflation from a high (200%) inflation has no output effect.

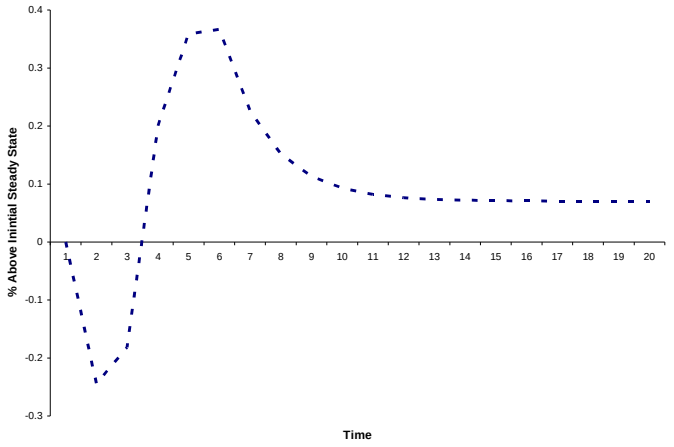

Figure 2. Benchmark Result (Ireland, 1997): Output effect of a gradual disinflation from a `small' (3%) initial annual inflation rate.

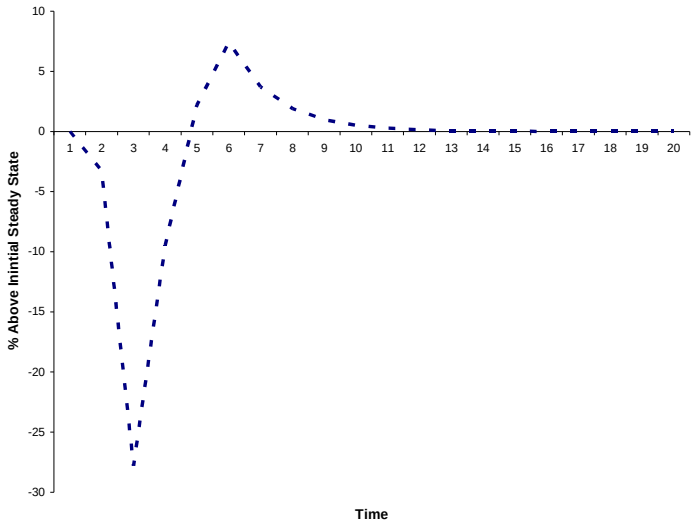

Figure 3. Benchmark Result (Ireland, 1997): Output effect of a gradual disinflation from a `big' (200%) initial annual inflation rate.

Figure 2 sets out the case where disinflation is gradual ($T = 6$) and focuses on disinflating from a low (3%) initial inflation rate. There are two important features to note: i) the early output loss is less than that under the immediate disinflation

(now 0.2% in the first period); and ii) after the early fall in output, there is a substantive (compensatory) output boom before a new steady state is reached[8].

Figure 3 presents the output effect of disinflating gradually (T = 6) from a high (200%) initial inflation rate. There is now a substantive early output loss (27% below the initial steady state); and again an output boom, but only part compensatory, before reaching the new steady state.

These benchmark images underlie the now well known policy conclusion that high inflations are best ended abruptly and low inflations are best ended gradually. The key issue is the impact on the real economy. Three elements are important here: (1) the extent of output losses in the early periods after a monetary contraction; (2) the existence (or otherwise) of a temporary output boom (defined as output rising above the new steady state); and (3) whether early output losses are compensated over some reasonable time horizon.

This paper explores these issues when the model assumption of constant velocity is relaxed. In order to do this, the nonlinear solution method is extended to incorporate time varying velocity. We will see that introducing time varying velocity to the modelling framework prompts us to modify our stance on some of these issues.

Output effects of immediate and gradual disinflation with time varying velocity

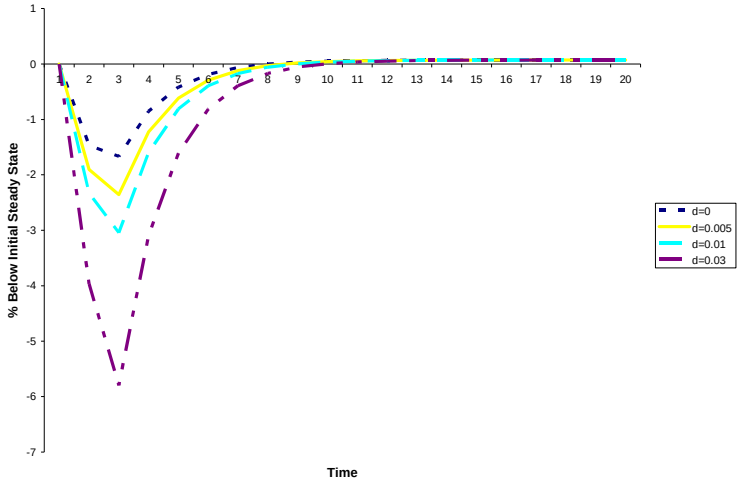

Figure 4. Time Varying Velocity Result: Output effect of immediate disinflation from a low initial annual inflation rate (3%).

[8] Such disinflationary booms are typically understood as follows. Under perfect credibility, agents respond in advance of the change in policy by lowering their prices, knowing that, inflation is going to be lower in the future. Because agents set prices for two periods, and because inflation will be lower in the future, they set lower prices today, inducing a boom (Ball (1994)).

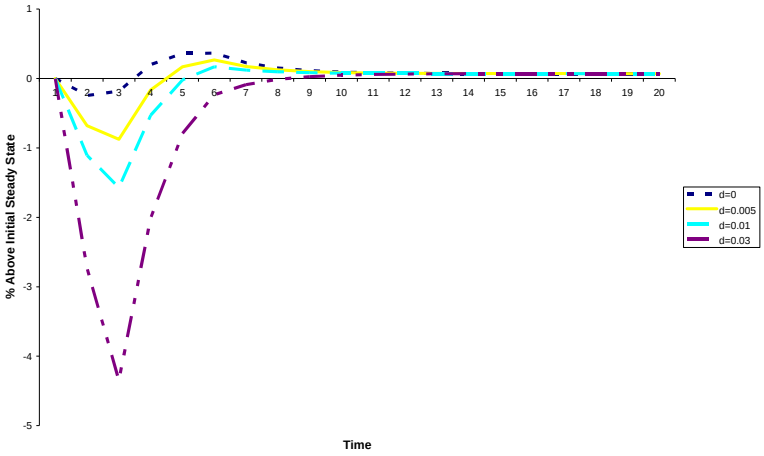

Figure5. Time Varying Velocity Result: Output effect of gradual disinflation from a low initial annual inflation rate (3%).

Figure 4 sets out the output effect of an immediate disinflation ($T = 1$) from a low (3%) initial annual inflation rate. Different values for δ capture different degrees of time varying velocity (δ = 0 reflects the benchmark case set out in the previous section and the (dashed) output path corresponds to that seen in Figure 1. Higher values of δ reflect higher degrees of time varying velocity. It can be seen that the effect of introducing varying velocity is to increase the early output loss. To see why this comes about, we refer to the price setting strategies set out in equations (13) and (15). The time varying velocity parameter δ enters the price setting strategies for both types of firms augmenting the overall output effect. This process is discussed in more detail, after considering the output response to a gradual ($T = 6$) disinflation from a low initial 3% inflation rate.

In Figure 5, again, the dashed line reflects the benchmark case when velocity is constant (δ = 0), as seen in Figure 2. As in the previous case of immediate disinflation, we see that introducing time varying velocity to the model has induced greater output losses: the higher the value of δ, the lower the output falls below its initial steady-state level in the early period. However, in this case, velocity seems to have one additional effect. In the benchmark case of gradual disinflation with constant velocity, we saw that, after the initial fall, output not only picked up but also rose above its new steady state level, staying above for some time before returning to its new steady-state equilibrium (the output boom). However, for velocity variability characterized by $\delta^* \in (0.01, 0.02)$ we see that, after the initial fall, output recovers but never rises above the new steady state level. Moreover, this is so for all yet higher values of δ. For any $\delta > \delta^*$, output fails to reach any level above the new steady-state. Although output reaches its new steady-state at about the same time (4-5 years) regardless of the velocity parameter value (δ), the higher is velocity the greater is the output loss and the

greater is the possibility that there is no output boom. This raises a key question about whether gradual disinflation is beneficial. With greater output losses for some values of δ, there is the possibility that they might not be compensated through a disinflationary boom.

To explore this issue further, we construct a crude measure of the overall impact on output by projecting forward over a 30 year time horizon and calculating the net output gain. Table 2 sets out the value of the area between the `output path' and the x axis for a range of δ values. The area below the axis gives the output loss, and above the axis gives the output gain. The absolute size of the overall impact is noted in the final column and defined to be the net output gain. We can see that for sufficiently high values of δ the overall impact on output is negative. (If we were to calculate present values, overall net losses would arise at even lower levels of δ).

Δ	**Loss**	**Gain**	**Net Output Gain**
0	0.42	4.97	4.55
0.001	0.65	4.82	4.17
0.005	1.72	4.38	2.66
0.01	3.22	4.00	0.77
0.02	6.60	3.61	2.99
0.03	10.22	3.49	6.73
0.05	17.56	3.40	14.15

Table 2. Overall impact on real output of a gradual disinflation from a 3% initial annual inflation rate for different values of the velocity parameter (δ).

In the light of these results, Ireland's (1997) conclusion that small inflations are best ended gradually may need to be qualified: it seems that even disinflating a low inflation gradually may be undesirable since the net 'overall impact' on the real economy may be negative. This shift in potential policy conclusion is solely attributable to the introduction of time varying velocity so it is helpful to discuss its role in the (behavioural) context of the model. After the disinflation is announced at $t = 0$, at $t = 1$ the firms that changed price last period now keep their price fixed, but the other set of firms respond by adjusting their prices. When they solve their optimization problem to maximize their profits , firms take the the nominal money supply M_t, the aggregate general level of prices P_t and $V_t = \Omega C_t^{\delta}$ as given. In equilibrium, we know that $\left(\frac{M_t}{P_t}\right)^{\frac{1}{1-\delta}}$ has to be consistent with the individual firm choice. Thus, each price $p_t(i)$, must be optimal such that C_t must

equal $\left(\frac{M_t}{P_t}\right)^{\frac{1}{1-\delta}}$ (see equation (5)). For $\delta > 0$ real money balances ration household demand, prices must rise for firms to maximise profits. From a simple manipulation of (5), we can get some feel for the role of δ and how this affects consumption's response to the disinflation. Taking logs one gets:

$$\ln C_t = \frac{1}{1-\delta}\ (\ln M_t - \ln P_t).$$

Partially differentiating with respect to M_t, yields

$$\frac{d \ln C_t}{d \ln M_t} = \frac{1}{1-\delta} > 0,$$

which shows that when $\delta>0$, a change in M_t induces an even greater change in C_t than when $\delta = 0$. Giving the equilibrium condition (11), this explains the extra real cost imposed by time varying velocity following a monetary contraction. This also explains the higher fall in output following immediately after the announcement of disinflation when time varying velocity is present. Following the announcement of the change in policy, the economy moves from the initial steady state to the disinflationary policy path whereby the announced decrease in M_t induces a proportionally higher decrease in output.

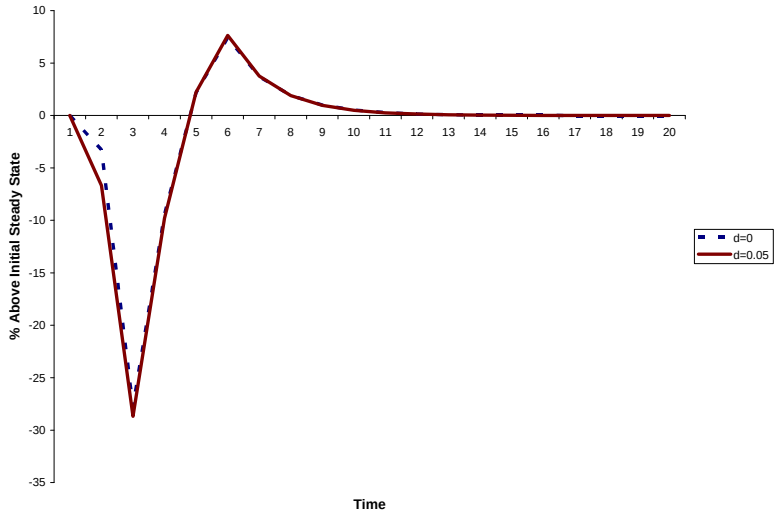

Figure 6. Time Varying Velocity Result: Output effect of immediate and gradual disinflation from a high initial annual inflation rate (200%).

We now turn to consider the case where disinflation is from a high (200%) initial inflation rate. Figure 6 sets out the output path resulting from each of an immediate disinflation and a gradual disinflation. There is no impact of time varying velocity in the case of an immediate disinflation ($\delta = 0$ and $\delta = 0.05$ shown). At very high inflation rates, both sets of firms are following the two price strategy because the costs of adjustment are outweighed by the benefits. Not only is inflation ended abruptly but also, adjustment is so fast that there is no scope for velocity to have an impact.

More interesting is the case of gradual disinflation. In Figure 6, the output path with time varying velocity ($\delta = 0.05$) looks very similar to the benchmark case ($\delta = 0$). However, in the first period, the output loss is more marked. The reason for this is akin to the output effect we have seen when disinflation was carried out gradually from a low initial inflation rate. We have seen that when disinflation is gradual, δ has a role to play and its role is to reduce output more. This result seems to reinforce Ireland's conclusion that gradual disinflation from a high initial rate is not to be recommended. We therefore turn our attention to consider gradual disinflation from a range of lower inflation rates in more detail. Specifically, we seek to establish the impact of time varying velocity on the optimal speed of disinflation from a range of initial inflation rates.

Discussion and conclusions

Perhaps the most dramatic finding from recent research on monetary contractions is that a gradual disinflation may bring about a 'disinflationary output boom'. These disinflationary output booms were first recorded in the much cited paper by Ball (1994); and more recent literature (in which firms are monopolistically competitive and there is rigidity in prices) consistently finds such booms (see for example, Ireland (1997), King and Wolman (1999), Khan, King and Wolman (2003)). Ball (1994) attributes the disinflationary boom to the assumption of perfect credibility. Nicolae and Nolan (2006) relax the assumption of perfect credibility and find that, whilst imperfect credibility may make these booms disappear, it is not a sufficient condition: their (dis)appearance depends on the speed of learning relative to the speed of disinflation. In this paper, we relax another assumption common in this literature, that of constant velocity. We find that even with perfect foresight the disinflationary booms may disappear, but now this is a result of time varying velocity. We find that output boom (dis)appearance depends on velocity.

This is not the only effect of relaxing the constant velocity assumption. Firstly, we find that the early output loss that follows a disinflationary policy announcement is considerably larger when time varying velocity is introduced to the model; and this output loss may not be compensated by later output gains. As

a result, we find that we cannot unconditionally endorse Ireland's policy recommendation that small inflations are best disinflated gradually. We find that a gradual disinflation from a small inflation may result in an overall output loss, bringing into question the desirability of any disinflationary policy action in some cases. It seems that some of the familiar results and policy implications from influential work on stopping inflations are not robust to some modifications of the modelling framework. Given the practical importance of the underlying policy issue, further research on model specification would seem warranted.

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Romanian Economic and Business Review – Vol. 3, No. 2

CREDIT CREATION OF MONEY AS A FAILURE OF COMMERCIAL BANKS´ INCENTIVES

Ivana Ryvolová*

Abstract

This paper focuses on the mechanism of money creation in the fractional-reserve banking system. *The aim of this paper is to enlighten the origin of money supply, or more precisely to analyse incentives of the institutions participating in the process of money creation of the whole money stock. Following from this, the paper refers to commercial banks as the most serious destabilizing factor of purchasing power of money in the several last decades. Attention is given to factors which influence commercial bank to supply credit and also to the factors, which create demand for this credit. In its second part the study focuses on the failure of incentives resulting from commercial banks actions, which are responsible for the continuous decrease of purchasing power of money. The paper concludes with alternative proposal of monetary system based on free banking, which is capable of preventing the aforementioned incentives' failure of commercial banks.*

Keywords:
Inflation, inside money, free banking, fiduciary money, fractional reserve system, failure of incentives

Introduction

In the free-market framework, money constitutes a common tool that doesn't serve any single particular objective but continually satisfies an evolving set of individual objectives. To fulfil this role efficiently, the value of money must be stable or at least predictable.

It is merely the central bank that is presented by most of the mainstream economic studies concerning monetary policy as *"the forth pillar of government authority, which strives after designing reliable stabilizing framework for the development of purchasing power of national monetary unit"*[9]. Although in the

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[9] Krejčí, 1998, p. 1

most developed countries central monetary authorities have privilege and legal monopoly to issue notes, the sovereign power over money supply is a subject to discussion. Actually, the contemporary monetary arrangements aren't (obviously) based on metallic reserve standard. It follows that not only notes created by the central monetary authority generate money supply, but instead, most of it is the so-called *inside money*, which is issued by private (even if rigidly regulated) commercial banks.

The aim of this paper is to enlighten the origin of money supply, or more precisely, to analyse incentives of the institutions accountable for creation of the whole money stock, and in this connection to refer to commercial banks as to the actual destabilizing factor of purchasing power of money in the several last decades. The first chapter enlightens creation of money supply in the past two centuries. In this period, significant disturbances of purchasing power of money were caused by issuing activity of central banks, which more or less obligatorily redeemed governmental securities in order to provide fiscal revenues to governments to reimburse war expenditures, and thus caused significant fluctuations in purchasing power of money. The second chapter is dedicated to particular types of banking operations that result into creation of inside money and also focuses on problems of legal inconsistency resulting from these operations. The third chapter explains mechanism of money creation through credit activities of commercial banks. It targets principally the determinants driving banks either to grant or refuse the provision of credit and also focuses on factors that support demand for credit. The last chapter is dedicated to the failure of incentives resulting from actions of commercial banks that are responsible for chronic reduction of purchasing power of money. The paper concludes with alternative proposal of monetary system based on free banking being capable of preventing the aforementioned failure of commercial banks´ incentives.

Inflation as a way of reimbursing war expenditures

Money inflation as an economic phenomenon by which the purchasing power of money decreases is the subject of study of all significant economic schools. As it follows from the prekeynesian neoclassical quantitative theory of money, decrease in purchasing power of money can be caused by an increase in money stock, by a decrease in trustworthiness of the currency or by a decrease in economic product on the territory in which the currency is used.

While governmental authorities may influence the shift in trustworthiness of the currency or growth rate of economic product only very indirectly, the size of money stock is much more a straight result of the policy of financial institutions,[10] in particular of the central bank. Therefore, it is not surprising that chronic

[10] That means official monetary institutions and commercial banks.

decrease in purchasing power of money, which typically prevailed in the second half of the nineteenth and the first half of the twentieth century, is ascribed chiefly to the policies of central monetary institutions. In particular, the periods of war and post-war eras of disintegrated countries provide a clear example of direct connection between governmental policy and instability of purchasing power of money. Money inflation, pursued by government through sale of governmental securities to the central bank is actually a far less obvious way of financing extraordinary expenditures than straightforward increase in taxes imposed on economic subjects.[11] At the same time, it is vital for pelting government to disguise the real height of war costs because it is possible to consume formerly accumulated country wealth for war purposes (without evoking public convulsions) only under condition of keeping-up the labour effort and morale of the nation.[12]

Credit and deposit financial services

Typical current monetary systems in developed countries are characterized by a legal monopoly of the central bank regarding to the currency, which isn't by any way backed by a stock of precious metals (or other scarce resources) kept by this authority. These central banks issue monetary base (that means final money), which are used as means of circulation or which create commercial banks´ reserve.

Fractional reserves of commercial banks are another special feature of today's monetary systems. This means that monetary base in itself doesn't represent the whole money supply and often not even its majority. In these systems, the rate of inside money is a decisive aspect, which is determined by the rate of so-called excess reserves, which banks offer to third parties in the form of bank credit.

Discussing creation of inside money, it is important to split bank services into those of credit type and those of deposit type. From the point of view of money creation, credit operations aren't relevant because these are the situations when the original owner of some amount of money gives up right of disposal with this financial sum for the stipulated period. This means that the amount of money given available to the bank by the original owner has merely one single owner at any moment. However, the situation is completely different in the case of deposit operations, when the owner of the amount of money entrusts the bank with his financial sum only in order to a custody, so he reserves his right of disposal to the

[11] Without question, one of the last significant monetary expansions in virtue of war conflict is policy of US FED at the end of sixties, when Johnston's administration tried to finance Vietnam War by means of this expansion. Break up of Breton Wood monetary system was one of the direct consequences of this policy. Glasner, 1989

[12] Salerno, 1995

full extent. Thus, regardless of this situation, commercial bank treats this deposit as excess reserves, and its general majority in the form of credit makes over to third party.[13] Hereby from now on, two "owners" have the right of disposal with one financial sum, or more precisely, each of these bank contractual clients treats the same money to the full extent as if he would be its exclusive owner. This confidential obligation brings inside money into existence, and this constitutes outstanding debt of banking sector. There exists a category of "claim to inside money", which means that each balance of account is mirrored by a financial commitment.[14]

It is evident that from the legal point of view, this makes for a radical discrepancy because the existence of full and exclusive proprietary is the fundamental presumption for concluding valid (and meaningful) contract. If in terms of deposit operation the bank deals with some part of the deposit as being its owner, even if all the time the rights of disposal belong to depositor of this money, then this creates a legal conflict.

> **"***One of the contract's definition resulting from fundamental ownership is impossibility to assign more than one exclusive privilege of the same thing. The essence of ownership is its exclusive control. It is logical that only one person can do that exclusive control over one thing. As soon as the same right would be declared to someone other, the exclusiveness couldn't be preserved. Even that is why a contract, which would determine, that two parties will at the same time be exclusive owner of the same thing is invalid from the beginning."*[15]

This discrepancy becomes fully evident in the case of a bank run on the bank[16]. The commercial bank provided credit to the third party, thus the credit exceeds the pool of available excess reserves (received deposits) of this bank, and therefore the bank can never pay out all issued certificates for the underlying asset. It follows that for its owner, inside money is always connected with some risk.

Creation of inside money

As we mentioned above, if commercial banks aren't obliged by law to keep 100 % of deposited money as reserves in their vaults, they treat much of this financial asset as excess reserves. Accordingly, bank lends these (up to now

[13] Hülsmann, 2000

[14] Accordingly, the category of claim to inside money divides all subjects into creditors and debtors, whereas these positions are not incompatible of course.

[15] Havel, 2005, p. 10

[16] That means the situation, when more depositors would decide to withdraw their deposits in cash.

unproductive) funds to its clients in the form of credit paying interest. This brings significant savings in resource costs of money and therefore substantially increases competitiveness of this commercial bank.

From the institutional point of view, inside money issue (which of course decreases purchasing power of money) is in the most of the developed countries limited only by the set of required reserves ratio (RRR)[17]. Because of the low level of RRR (generally under 10 %)[18], for commercial banks the solvency and credibility of their clients to pay for credits is the only binding limit of money creation. Thus, if the commercial bank concludes that the expected return on project or its security for a debt (quality of banker's collaterals) covers the associated incremental costs, there is nothing to hinder the bank in its credit (and issuing) activity.

In politically and economically stable environment, commercial banks will strive for steady rate of deposits reserves. Applying the law of large numbers, banks will try to keep dynamics of new credits equal to the dynamics of paying for previous credits.[19] In a consequence to this, inside money creation is a direct reflection of nominal demand for cash by non-financial institutions and households, which itself is a function of credibility of the banking system.

In addition, this process of money creation works multiplicatively (originally uncovered deposits become credits and their new owners will deposit them to bank, which will again provide part of them as a credit on the financial market) and significantly contributes to instability of purchasing power of money. However, this cashless means constitute claim on public (not private) money, and that is why the commercial banks have no incentive not to go to the verge of acceptable risk in providing credit. Even if in (recent) history the purchasing power of the currency decreased because of this policy of commercial banks, paradoxically the credibility of any of these banks wasn´t undermined.

Failure of incentives

In the free-market, a success in competition process is the question of innovations and effectiveness. To reach maximum efficiency, the entrepreneur must be able to minimize all costs. However, incentives to cut costs diminish when the government in such a way regulates the market subject that profitability is not the entrepreneurial action, or in the case when this subject doesn't bear all

[17] Required reserves of commercial banks are mandatory minimum deposits to central bank, which can't be used by the bank for credit provision. Its size is given by percent rates of primary deposits in both domestic and foreign currency.

[18] In many developed economies (Australia, Canada, Denmark, Switzerland) this instrument has been completely cancelled.

[19] Krejčí, 1998

costs and risks the consequences of its actions.[20] The second one is just the case of commercial banks that don't bear responsibility for damaged purchasing power of money caused by their excessive issuing activity.

As it follows from above-mentioned, reasons of this incentives' failure must be seen in the institutional framework of the economics, dealing with this problem. Even when speaking about developed countries, the analyses of institutional aspect of their particular sectors usually conclude that long-term inefficiency can only be caused by stiff governmental regulation of these sectors. The same accounts for banking system.

A suitable framework which prevents from this incentives failure is the system of free banking, or more precisely, framework of open competition of currencies issued by individual commercial banks.[21] Under the constraints of this competitive environment, the profit driven banks would in their self-interest keep the purchasing power of its currency stable or at least predictable in order to provide a desirable product (that is the private currency) to its customers. The decision-making process about the issuance of inside money wouldn't be only the question of risk assessment and security for a debt of certain project, but only the stability of purchasing power of bank's private currency would be pivotal. If the bank increased fiduciary money issuance above the level justified by market-driven demand for its currency, in the long-run this would result into distrust and the bank would risk that its clients start to get rid of this private currency certificates – partly in the form of additional demand for goods and services, partly in the form of direct withdrawal of deposits (run on a bank). Bank's private currency would become traded with discount and subsequently would subside to fulfil the role of money, and this would lead to reduction of shareholders value of issuing bank.[22]

Reconciliation of good reputation and confidence is an uneasy lengthy process. If the bank wanted to recover its market share, it would have to cut the amount of issued notes below the level of damaged demand for this currency. This would lead to a significant decrease in earnings, and consequently penalize bank for its previous excessive issuance.

Contrary to apprehensions of many statists, it is hardly possible that under the system of free banking a persistent excessive issuance of notes and thus a continuing fluctuation of money stock would take place. A mechanism of

[20] Mises, 1949

[21] In its broadest definition, free banking is the system of one-stage banking settlement, in which no bank would be restricted in its entrepreneurial activity and, at the same time, no bank would be privileged by government authority. In other words, this concerns system of banking competition without any government interventions, i.e. without a central bank, banking supervision, compulsory insurance of deposits and even without any restrictions and regulations of provided banking services. This means that banks would be liable to the same legislative norms as all the others business branches. Hayek, 1990

[22] Selgin, White, 1994

sanctions to those banks that would determine to issue more money than its demanded amount works here. If some of the private banks don't respect these market boundaries of money expansion, they run a risk of worse (because of increased costs of liquidity) or even runs failure. Similarly, the bank that issues too little banknotes, reaches lower then maximum profit, and is thus motivated to increase the issue.[23]

Conclusion

Assets in the form of final money are crucial part of money supply in a majority of developed monetary systems. Even if a central bank of the particular country has an exclusive right to issue money, it is able to influence the whole money stock only very indirectly, by means of redistribution processes. The most used tool of money supply regulation is discount rate, which, however, presumes high demand elasticity for money against interest rate.[24] Increase in money supply is then caused by the mechanism of money creation, whereas this increase is endogenous to a great extent.

Even if today the biggest part of money supply is created just by inside money, it doesn't change the fact that the strict note issuing monopoly (concerning money basis) limits free action of individuals, and mainly causes failure of incentives of commercial banks. The inside issuance of money that isn't absorbed by increased demand for money devaluates the existing purchasing power of money, without undermining confidence to the bank that actually made this issue.

The possibility of elimination of this failure can be seen in the free banking system, or more precisely, in such a monetary settlement where there is a chance for every bank to issue its own private currency. In this competitive environment every bank would have to consider its issuance activity, so that the additional increase of fiduciary funds denominated in its currency doesn't undermine its´ clients confidence. Total monetary supply of banking institutions would then directly reflect a decision of optimising individuals (clients of these banks) to keep cash, and would not be subject to incentives failure in a credit creation of money.

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Romanian Economic and Business Review – Vol. 3, No. 2

RISK AND INOVATION IN E-BANKING

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Abstract

Banks should provide their customers with convenience, meaning offering service through several distribution channels (ATM, Internet, physical branches) and have more functions available online. Other benefits are expanded product offerings and extended geographic reach. This means that banks can offer a wider range and newer services online to even more customers than possible before.

The benefit which is driving most of the banks toward e-banking is the reduction of overall costs. With e-banking banks can reduce their overall costs in two ways: cost of processing transactions is minimized and the numbers of branches that are required to service an equivalent number of customers are reduced.

Keywords: e-banking, risk, innovation

Introduction

One of the issues currently being addressed is the impact of e-banking on traditional banking players. After all, if there are risks inherent in going into e-banking there are other risks in not doing so. It is too early to have a firm view on this yet. Even to practitioners the future of e-banking and its implications are unclear. It might be convenient nevertheless to outline briefly two views that are prevalent in the market.

The view that the Internet is a revolution that will sweep away the old order holds much sway. Arguments in favour are as follows:

- E-banking transactions are much cheaper than branch or even phone transactions. This could turn yesterday's competitive advantage - a large branch network, into a comparative disadvantage, allowing e-banks to undercut bricks-and-mortar banks. This is commonly known as the "beached dinosaur" theory.

- E-banks are easy to set up so lots of new entrants will arrive. 'Old-world' systems, cultures and structures will not encumber these new entrants. Instead,

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they will be adaptable and responsive. E-banking gives consumers much more choice. Consumers will be less inclined to remain loyal.

- E-banking will lead to an erosion of the 'endowment effect' currently enjoyed by the major UK banks. Deposits will go elsewhere with the consequence that these banks will have to fight to regain and retain their customer base. This will increase their cost of funds, possibly making their business less viable. Lost revenue may even result in these banks taking more risks to breach the gap.

Portal providers, are likely to attract the most significant share of banking profits. Indeed banks could become glorified marriage brokers. They would simply bring two parties together – eg buyer and seller, payer and payee.

The products will be provided by monolines, experts in their field. Traditional banks may simply be left with payment and settlement business – even this could be cast into doubt.

Traditional banks will find it difficult to evolve. Not only will they be unable to make acquisitions for cash as opposed to being able to offer shares, they will be unable to obtain additional capital from the stock market. This is in contrast to the situation for Internet firms for whom it seems relatively easy to attract investment.

There is of course another view which sees e-banking more as an evolution than a revolution.

E-banking is just banking offered via a new delivery channel. It simply gives consumers another service (just as ATMs did).

Like ATMs, e-banking will impact on the nature of branches but will not remove their value.

Traditional banks are starting to fight back

The start-up costs of an e-bank are high. Establishing a trusted brand is very costly as it requires significant advertising expenditure in addition to the purchase of expensive technology (as security and privacy are key to gaining customer approval).

E-banks have already found that retail banking only becomes profitable once a large critical mass is achieved. Consequently many e-banks are limiting themselves to providing a tailored service to the better off.

Risks

Strategic Risk - A financial institution's board and management should understand the risks associated with e-banking services and evaluate the resulting risk management costs against the potential return on investment prior to offering e-banking services. Poor e-banking planning and investment decisions can increase a financial institution's strategic risk. On strategic risk E-banking is

relatively new and, as a result, there can be a lack of understanding among senior management about its potential and implications. People with technological, but not banking, skills can end up driving the initiatives. E-initiatives can spring up in an incoherent and piecemeal manner in firms. They can be expensive and can fail to recoup their cost. Furthermore, they are often positioned as loss leaders (to capture market share), but may not attract the types of customers that banks want or expect and may have unexpected implications on existing business lines.

Banks should respond to these risks by having a clear strategy driven from the top and should ensure that this strategy takes account of the effects of e-banking, wherever relevant. Such a strategy should be clearly disseminated across the business, and supported by a clear business plan with an effective means of monitoring performance against it.

Business risks - Business risks are also significant. Given the newness of e-banking, nobody knows much about whether e-banking customers will have different characteristics from the traditional banking customers. They may well have different characteristics. This could render existing score card models inappropriate, this resulting in either higher rejection rates or inappropriate pricing to cover the risk. Banks may not be able to assess credit quality at a distance as effectively as they do in face to face circumstances. It could be more difficult to assess the nature and quality of collateral offered at a distance, especially if it is located in an area the bank is unfamiliar with (particularly if this is overseas). Furthermore as it is difficult to predict customer volumes and the stickiness of e-deposits (things which could lead either to rapid flows in or out of the bank) it could be very difficult to manage liquidity.

Of course, these are old risks with which banks and supervisors have considerable experience but they need to be watchful of old risks in new guises. In particular risk models and even processes designed for traditional banking may not be appropriate.

Transaction/operations risk - Transaction/Operations risk arises from fraud, processing errors, system disruptions, or other unanticipated events resulting in the institution's inability to deliver products or services. This risk exists in each product and service offered. The level of transaction risk is affected by the structure of the institution's processing environment, including the types of services offered and the complexity of the processes and supporting technology.

In most instances, e-banking activities will increase the complexity of the institution's activities and the quantity of its transaction/operations risk, especially if the institution is offering innovative services that have not been standardized. Since customers expect e-banking services to be available 24 hours a day, 7 days a week, financial institutions should ensure their e-banking infrastructures contain sufficient capacity and redundancy to ensure reliable service availability. Even

institutions that do not consider e-banking a critical financial service due to the availability of alternate processing channels, should carefully consider customer expectations and the potential impact of service disruptions on customer satisfaction and loyalty.

The key to controlling transaction risk lies in adapting effective polices, procedures, and controls to meet the new risk exposures introduced by e-banking. Basic internal controls including segregation of duties, dual controls, and reconcilements remain important. Information security controls, in particular, become more significant requiring additional processes, tools, expertise, and testing. Institutions should determine the appropriate level of security controls based on their assessment of the sensitivity of the information to the customer and to the institution and on the institution's established risk tolerance level.

Credit risk - Generally, a financial institution's credit risk is not increased by the mere fact that a loan is originated through an e-banking channel. However, management should consider additional precautions when originating and approving loans electronically, including assuring management information systems effectively track the performance of portfolios originated through e-banking channels. The following aspects of on-line loan origination and approval tend to make risk management of the lending process more challenging. If not properly managed, these aspects can significantly increase credit risk.

- Verifying the customer's identity for on-line credit applications and executing an enforceable contract;
- Monitoring and controlling the growth, pricing, underwriting standards, and ongoing credit quality of loans originated through e-banking channels;
- Monitoring and oversight of third-parties doing business as agents or on behalf of the financial institution (for example, an Internet loan origination site or electronic payments processor);
- Valuing collateral and perfecting liens over a potentially wider geographic area;
- Collecting loans from individuals over a potentially wider geographic area;
- Monitoring any increased volume of, and possible concentration in, out-of-area lending.

Liquidity, interest rate, price/market risks - Funding and investment-related risks could increase with an institution's e-banking initiatives depending on the volatility and pricing of the acquired deposits. The Internet provides institutions with the ability to market their products and services globally. Internet-based advertising programs can effectively match yield-focused investors with potentially high-yielding deposits. But Internet-originated deposits have the potential to attract customers who focus exclusively on rates and may provide a funding source with risk characteristics similar to brokered deposits. An institution can control this potential volatility and expanded geographic reach

through its deposit contract and account opening practices, which might involve face-to-face meetings or the exchange of paper correspondence. The institution should modify its policies as necessary to address the following e-banking funding issues:

- Potential increase in dependence on brokered funds or other highly rate-sensitive deposits;
- Potential acquisition of funds from markets where the institution is not licensed to engage in banking, particularly if the institution does not establish, disclose, and enforce geographic restrictions;
- Potential impact of loan or deposit growth from an expanded Internet market, including the impact of such growth on capital ratios;
- Potential increase in volatility of funds should e-banking security problems negatively impact customer confidence or the market's perception of the institution.

Reputational risks - This is considerably heightened for banks using the Internet. For example the Internet allows for the rapid dissemination of information which means that any incident, either good or bad, is common knowledge within a short space of time. The speed of the Internet considerably cuts the optimal response times for both banks and regulators to any incident.

Any problems encountered by one firm in this new environment may affect the business of another, as it may affect confidence in the Internet as a whole. There is therefore a risk that one rogue e-bank could cause significant problems for all banks providing services via the Internet. This is a new type of systemic risk and is causing concern to e-banking providers. Overall, the Internet puts an emphasis on reputational risks. Banks need to be sure that customers' rights and information needs are adequately safeguarded and provided for.

Conclusion

In conclusion e-banking creates issues for banks and regulators alike. For their part, banks should:

- Have a clear and widely disseminated strategy that is driven from the top and takes into account the effects of e-banking, together with an effective process for measuring performance against it.
- Take into account the effect that e-provision will have upon their business risk exposures and manage these accordingly.
- Undertake market research, adopt systems with adequate capacity and scalability, undertake proportional advertising campaigns and ensure that they have adequate staff coverage and a suitable business continuity plan.
- Ensure they have adequate management information in a clear and comprehensible format.

- Take a strategic and proactive approach to information security, maintaining adequate staff expertise, building in best practice controls and testing and updating these as the market develops. Make active use of system based security management and monitoring tools.

- Ensure that crisis management processes are able to cope with Internet related incidents.

One of the benefits that banks experience when using e-banking is increased customer satisfaction. This due to that customers may access their accounts whenever, from anywhere, and they get involved more, this creating relationships with banks.

Banks should provide their customers with convenience, meaning offering service through several distribution channels (ATM, Internet, physical branches) and have more functions available online. Other benefits are expanded product offerings and extended geographic reach. This means that banks can offer a wider range and newer services online to even more customers than possible before.

The benefit which is driving most of the banks toward e-banking is the reduction of overall costs. With e-banking banks can reduce their overall costs in two ways: cost of processing transactions is minimized and the numbers of branches that are required to service an equivalent number of customers are reduced.

With all these benefits banks can obtain success on the financial market. But e-banking is a difficult business and banks face a lot of challenges.

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SOME CONSIDERATIONS ON ROMANIA'S CONTRIBUTION TO THE NEW EUROPEAN NEIGHBOURHOOD POLICY

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Abstract

Initiative supported by Romania even from its pre-accession years, the European Neighbourhood Policy (ENP) is now even more in the attention of the policy-makers. Being at the Eastern frontier of the European Union, Romania is confronted with higher responsibilities and also potential risks related to the challenges this region is confronted with. Romania intends to play a pro-active role in the ENP, being also a promoter of regional cooperation initiatives in the area. Supporting the projects aimed at creating and consolidating a stability and security area in the Eastern neighbourhood, pleading permanently for an increased attention not to overlap the different cooperation initiatives (either the ENP overall framework or the Black Sea Synergy, the Eastern Partnership and so on) Romania is also focusing on increasing the role of the civil society in the area. Romania should find ways to turn to good account the opportunities deriving from its potential of stability and security factor in the area, its aspiration to be a catalyst of regional cooperation in the area, by largely using the instruments offered by the European Neighbourhood Policy, also concentrating on its contribution to the constant adaptation of these instruments and to finding new solutions to deal with the challenges of this part of the EU neighbourhood.

Keywords:

European Neighbourhood Policy, Romania, Moldova, Black Sea Synergy, regional cooperation

Introduction

Once extended to the Central and Eastern part of Europe, the European Union registered a change of priorities in its external policy. The new economic and social opportunities, accompanied also by new challenges and risks at the

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Eastern frontier of the European Union have led to the necessity to adapt EU's relations with its new neighbouring states and even identify new policies, such as the European Neighbourhood Policy (ENP), for tackling these relations.

Romania's accession to EU, on January 1st 2007, has also imposed an adjustment of its relations with the neighbours, taking into account the new position as EU Member State, with increased responsibilities as country at the Eastern border of the Union.

Romania has undertaken a pro-active role in the Black Sea region, at the same time supporting constantly a common and unitary position of the European Union towards this area. The traditional relations with the Mediterranean countries have continued, Romania supporting the new initiative for the Mediterranean, proposed by President Sarkozy.

The military events in Georgia in the summer of 2008 have led to unfortunate consequences in South Osetia, with human losses, economic damage and trust breaking. Romania has promoted the dialogue in the area, constantly affirming the support for observing the international conventions and the territorial integrity principles.

Some elements of Romania's position/contribution towards these components of the new neighbourhood policy will be mentioned in this article. It is necessary to point out that several topics, such as Romania's relations with the South-Mediterranean states and a possible contribution to the development of the Southern dimension of the ENP will not be tackled this article. The intention is to focus on the Eastern dimension of the ENP - on Moldova, Ukraine and also on Black Sea projects.

Elements of Romania's position/contribution in/to the New European Neighbourhood Policy

Even from the emergence of the European Neighbourhood Policy in 2004, Romania has supported its objectives and principles, at first from the position of candidate state. Being a supporter of the inclusion of the Southern Caucasus countries in the ENP, Romania considered that the increased political cooperation, the financial support foreseen and the wide array of cooperation fields envisaged would only be some of the elements that would make the initiative of this policy attractive both to EU and to all the potential ENP partner states.

Starting with 2007, Romania has undertaken a pro-active role in the New European Neighbourhood Policy, as a full Member State, aware both of its responsibilities at the Eastern border of the Union and of the opportunities that might emerge from this strategic position.

Romania was among the states that requested the **reform**[25] of the ENP, in order to better answer to the needs of the partner states, as well as to the constantly growing challenges in the area. In this sense, even before November 2006, Romania transmitted to all the Member States a *non-paper* affirming its position towards ENP: supporting the intensification of the cooperation with the Eastern neighbours, while observing the fundamental principle of differentiation, of regional ownership; a stricter monitoring process of the progress achieved and an increased cooperation in energy security, democracy, rule of law etc.

At present, **Romania supports the consolidation of the ENP** as priority of EU's external relations, especially by increasing the positive conditionality and by rendering efficient the Action Plans, as main instruments of the policy. Romanian officials believe that the new Action Plans for Moldova and Ukraine should include more ambitious and detailed objectives and a much more precise calendar for their implementation.

Romania strongly supports the objective of building *an area of stability and security in its Eastern neighbourhood*. Therefore it salutes the initiatives that entail the consolidation of regional cooperation.

Romania is looking forward to the Commission's Communication, planned for the next spring, on the **Eastern Partnership**, the new initiative (May 23rd, 2008) of Poland and Sweden. Although at first regarded with a certain reserve by Romania and Bulgaria, countries that prefer to concentrate their efforts and to give more credit to the Black Sea Synergy project, the Eastern Partnership initiative will probably benefit of Romania's support, *if* this new framework is to be *complementary* to the ones already in place and will observe all the ENP principles, identifying additional financial sources. This initiative will concentrate upon deeper cooperation and integration with the Eastern partners, entailing visa facilitation, the creation of a free trade area for services and agriculture goods, increased cooperation in transport, environment and border control. This initiative is considered to be a good occasion to reform the ENP in the favour of the Eastern neighbouring partners, reducing the gap towards projects as the Nordic Dimension or the Black Sea Synergy[26].

This new initiative was supposed to counterbalance Sarkozy's project, of a "Barcelona Process: **Union for the Mediterranean**", launched at the Summit in Paris, on July 13th 2008. This Union is regarded as a multilateral partnership meant to increase the opportunities for the regional cohesion and integration. The

[25] Interview with a representative of the Romanian Ministry for Foreign Affairs, Bucharest, August 1st, 2008

[26] Cianciara K., Agnieska, „*Eastern partnership – opening a new chapter of Polish Eastern policy and the European Neighbourhood Policy?*", Analyses and Opinions, No. 4, June 2008, The Institute of Public Affairs, Warsaw, Poland, p. 13

focus is placed on a more balanced governing[27] (the introduction of a co-presidency: one EU member state and one partner state from the Mediterranean area), on concrete projects in transport, environment and energy. Having its own institutions, the new framework is supposed to attract additional funds for encouraging and promoting further regional programmes (from private sources, contributions of the Mediterranean partners, of the financial institutions, regional banks or from the Neighbourhood Investment Facility)[28]. Romania has supported this initiative from the beginning, considering three main areas of cooperation[29] as mainly important: energy, water resources and maritime/land highways. Romania considers this initiative as an opportunity for the Romanian firms to move again towards these markets where they had traditional business relations and important commercial flows.

Romania is in favour of a more concrete and active involvement of the European Union in the issue of *solving the frozen conflicts*, in all the negotiating formats regarding these conflicts. The recent events in Caucasus are merely a proof that there is still a need for an increased attention at international and European level to the cooperation and conflict solving for this particular region.

As for the *financial assistance,* Romania contributes with over 800 thousand euro in 2008 for its Eastern neighbourhood from the development aid funds, Republic of Moldova and Georgia being priorities on the agenda. Romania will also contribute with one million euro in 2008-2010 to the Neighbourhood Investment Facility, mainly for the support of transport, energy projects, social sector, small and medium enterprises.

Romania was and continues to be a **promoter of an EU strategy for the Black Sea**. The new EU cooperation initiative, the *Black Sea Synergy* [30](April 2007), has been endorsed and constantly promoted by Romania. Aiming at supporting the democratic principles, the rule of law and good governance, a better border management, improving the security climate through concrete measure to combat illegal migration or organised crime, also seeking to assure energy and infrastructure security, regional development and consolidated cross-

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[27] Keller-Noellet, Jacques and Andoura, Sami, „*Quel avenir pour la Politique europeenne de voisinage?*", European Affairs Program, Working Paper, 2008/03, EGMONT - Royal Institute for International Relations, Brussels

[28] European Commission, Communication from the Commission to the European Parliament and the Council *Barcelona Process: Union for the Mediterranean*, COM(2008) 319 (Final), Brussels, 20 May 2008, p. 8-9.
http://ec.europa.eu/external_relations/euromed/docs/com08_319_en.pdf

[29] Press statement of Romanian President Traian Băsescu, at the conclusion of the Paris Summit for the Mediterranean, July 13th, 2008 http://www.presidency.ro/pdf/date/10061_ro.pdf

[30] European Commission, Communication from the Commission to the Council and the European Parliament *Black Sea Synergy – A New Regional Cooperation Initiative*, COM(2007) 160 final, Brussels, 11 April 2007
http://ec.europa.eu/world/enp/pdf/com07_160_en.pdf

border cooperation, the initiative was meant to be a regional, unitary approach of the European Union towards the region. In June this year, the Commission issued a Communication on the *Report of the first year of implementation of the Black Sea Synergy*[31], stating once again that the Synergy is and should remain complementary to the ENP, based also on the co-financing principle. The joint operational programme for the Black Sea region that is about to be launched benefits of a total budget of 17.5 million euro (Romania contributing with 4 million euro) and aims at economic and social development, addressing common challenges, secure borders, financing "people-to-people" projects, the eligible area comprising regions from Romania, Bulgaria, Ukraine, Russia, Turkey and Greece and the territory of the Republic of Moldova, Georgia, Azerbaijan and Armenia. The importance of cross-border programmes has increased, also given the possibility of incorporation of a series of financial instruments (the European Neighbourhood and Partnership Instrument under the ENP, the European Regional Development Fund, the funds allocated by the European Investment Bank or by the Trade and Development Black Sea Bank etc).

The European Parliament has approved on January 17th 2008 a Report on a Black Sea regional policy approach, initiated by the Romanian MEP Roberta Anastase, report that supported and approved the *Romanian proposals*: a regional approach for the policy in the Black Sea, an active involvement of Russia and Turkey - as equal partners - in upholding the project, doubling the financial allocations through the European Neighbourhood and Partnership Instrument for the cross-border cooperation projects [32].

A Romanian initiative, the *Black Sea Forum for Dialogue and Partnership* envisages a platform for cooperation and commitment to develop a regional strategy and a common vision in the region, identifying concrete cooperation opportunities and creating viable partnership networks. At the first Summit (June 5th 2006), Romania expressed its option for accelerating cooperation in the Black Sea area, pleading for a regional umbrella that would offer a higher interaction among the partners. In the months that followed, Romania has proposed to its partners a series of projects of the Forum on the environment protection, involving the civil society in the region, know-how exchange between Nordic

[31] European Commission, Communication from the Commission to the Council and the European Parliament, *Report of the first year of implementation of the Black Sea Synergy*, Brussels, COM(2008) 391 final, 19 June 2008 http://ec.europa.eu/external_relations/blacksea/doc/com08_391_en.pdf

[32] European Parliament, *REPORT on a Black Sea Regional Policy Approach* (2007/2101(INI)), Committee of Foreign Affairs, Rapporteur: Roberta Alma Anastase http://ps.blacksea-commission.org/Documents/PublicDocuments/docs/News/EU%20Parliament%20Report%20on%20Black%20Sea%20Regional%20Policy%20Approach%20A6-0510-2007.pdf

cooperation and the Black Sea cooperation initiatives.[33] A number of international conferences and seminars have been envisaged since then, aiming at developing the capacity of the civil society to play an active role in the region, to connect to the European agenda and also to efficiently resort to European funds on specific projects.

An important element of Romania's strategy in the Black Sea area is the creation of a *Black Sea Euro region* (initiated in March 2006) that is due to be launched in September this year, with its Secretariat in Constanta and having as main goal to attract the local communities in the development of cooperation projects in the region.

With the support of the US German Marshall Fund, a *Black Sea Trust Fund for Regional Cooperation* is now based in Romania with the aim of supporting democracy consolidation, regional cooperation for civil society development, promoting good governance in the Black Sea region.

In this context, the main instruments for promoting Romania's interests in the Black Sea region remain the promotion of the Black Sea Forum for Dialogue and Partnership, the consolidation and reform of the Black Sea Economic Cooperation Organization, the promotion and consolidation of the Euro region, the support of the Black Sea Trust programmes and the promotion of the regional policy approach for the Black Sea within the ENP.

As regards the implication of Romania in strengthening the cooperation **relations with the Republic of Moldova**, under the European Neighbourhood Policy, the focus has been upon supporting the European vocation and perspective of Moldova, paying particular attention to the challenges of the frozen conflict in the area. Romania acknowledged the launch of the reflection process upon the new agreement EU-Republic of Moldova, since the Action Plan of 2005 expires this year, and is in favour of speeding up this reflection process. Romania was the initiator of the launch of a mobility partnership EU-Moldova, at the same time supporting a free trade agreement between EU and Moldova, depending on the economic capacity of the latter.

As a matter of fact, after Romania's accession to EU, some changes intervened in the relationship Romania-Republic of Moldova: the restrictions upon the free movement of persons increased, the access to free trade flows visibly diminished, Romania having to renounce to several facilities of a traditional and privileged relationship with Moldova, all this generating negative effects on the partner country.

At present, Romania supports the European perspective of the Republic of Moldova, pleading for introducing Moldova as soon as possible under the EU

[33] Interview with a representative of the Romanian Ministry for Foreign Affairs, Bucharest, August 5th, 2008

policy for the Western Balkans[34], idea that, although not supported with geographic arguments, aims at keeping a possible membership perspective for Moldova separate from Ukraine's, given the major differences, as dimension, potential and even support from the present EU member states. Also Romania favoured and encouraged Moldova's membership to relevant regional organizations, such as CEFTA, Central European Initiative, South-East cooperation process, constantly affirming its support for observing the integrity and sovereignty of the Republic of Moldova.

A more pro-active policy towards Moldova could still be put in place, through increased assistance for the implementation of the Action Plan EU-Moldova and for the future agreement that is about to be concluded, support for reducing the energy dependency of the Republic, more opportunities for the labour force in Moldova, promotion of an active attitude and involvement of EU in tackling the conflict in Transnistria and also attracting interested partner states for endorsing Romania's initiatives concerning Moldova, under the ENP.

In March 2007, negotiations began for a *New Enhanced Agreement* EU-Ukraine, as well as for a deeper free trade agreement. Within the ENP, **Romania supports the consolidation of EU-Ukraine relations**[35], based on the European values, on observing the regional and international commitments, under the aegis of the Action Plan and the future Enhanced Agreement. Romania supports the reforms undertaken by Ukraine in the fields of rule of law, justice and investment climate improvement, expecting that the constitutional reform remains a priority. At the same time, apart from the European Neighbourhood Policy projects that involve Ukraine (and the incessant development of the cross-border cooperation), Romania is dealing with the present action at law regarding the continental shore of the Black Sea, at the International Court of Justice in the Hague, following an endless series of bilateral negotiations (almost 34 rounds only between 1998 and 2004). In addition, it remains to be seen the evolution of the disagreement on Ukraine's construction of Bastroe Channel (in the Danube Delta).

As for the tragic events in **Georgia** this summer, Romania has had a rather cautious position towards this conflict. The diplomatic tour of the Romanian President in five countries in the Black Sea region (19-22 August, in Ukraine, Rep. Moldova, Rep. Azerbaijan, Georgia and Turkey) was meant to express a full support for Georgia, observing the territorial integrity and sovereignty principles, reaffirming the strong necessity to enhance cooperation in this area, through tangible projects. Romania has declared it would not recognize the independence of Abkhazia and South Osetia, consistent with the position towards Kosovo.

[34] Press statement, Press conference of President Traian Băsescu, Brussels, at the end of the Extraordinary European Council, September 1st, 2008 http://www.presidency.ro/pdf/date/10163_ro.pdf

[35] Interview with a representative of the Romanian Ministry for Foreign Affairs, Bucharest, August 1st, 2008

During the *Extraordinary European Council on Georgia*, on September 1st 2008, in Brussels, Romania has presented an analysis of the situation in the region, future perspectives, together with several solutions proposed for the stability and security in this region. Promoting the solidarity principle at EU level in dealing with Caucasus topics, Romania advocates for replacing the peace-keeping mechanisms in the frozen-conflicted regions, for increasing NATO's role in the Black Sea area, for speeding up the European energy projects, avoiding the isolation of Georgia and Azerbaijan[36]. The Conclusions of this European Council state the concern of the EU member states towards the disproportionate reaction of Russia and condemns the unilateral decision of Russia to acknowledge the independence of South Osetia and Abkhazia. An important conclusion of this Summit was also the acknowledgment of the urgent necessity to *enhance regional cooperation with the Eastern partners*, either through the Black Sea Synergy, or through the Eastern Partnership and other initiatives at EU level.

A partnership between EU and Azerbaijan is also strongly supported by Romania.

The future increased importance of the European Neighbourhood Policy also ensues from the *European Parliament resolution*[37] (September 3rd 2008), requesting a further development of the ENP, adapting it to the necessities of the Eastern partners, affirming the necessity to enhance cooperation with the Black Sea countries, even by creating a special institutional and multilateral mechanism, such as a *Union for the Black Sea*. It is also expected that the European Union engages itself politically, budgetary in the project Nabucco, given the alternative projects that have already appeared in the area (i.e. South Stream project). It is necessary to guide the future ENP towards the South and East having in mind the necessity of assuring a diversity of suppliers and safe transit routes. Therefore it would be useful to link in the future the ENP to an EU energy policy[38].

Conclusions

Priority of its foreign policy, the EU's Neighbourhood Policy was supported by Romania even from the pre-accession period. Later on, Romania has embarked on the way to consolidate the ENP, many of the initiatives leading to the reform of the ENP being strongly supported and endorsed by Romania.

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[36] Press statement of President Basescu, at the International Airport Henri Coandă, before leaving for the Extraordinary European Council in Brussels, September 1st 2008 http://www.presidency.ro/pdf/date/10161_ro.pdf

[37] http://www.europarl.europa.eu/news/expert/briefing_page/35768-245-09-36-20080901BRI35767-01-09-2008-2008/default_p001c002_ro.htm

[38] Longhurst, Kerry, „*Injecting more differentiation in European Neighbourhood Policy: what consequences for Ukraine*?", Russie.Nei.Visions no. 32, Russia/NIS Center, Paris, July 2008, p. 20

Aware of the potential risks at the Eastern frontier and of its greater responsibilities at the frontier of the Union, Romania has attempted to draw the attention of the European and international community both upon the economic opportunities and also on the risks, challenges and potential threats that this region is confronted with.

Romania strongly supports the projects aimed at creating and consolidating a stability and security area in the Eastern neighbourhood, pleading permanently for an increased attention not to overlap the different cooperation initiatives (either the ENP overall framework, the Black Sea Synergy, the Eastern Partnership and so on) and also for observing the principles of differentiation (upon own merits), co-financing and increasing the role of the civil society in the area.

The cross-border projects have acquired a greater significance within the ENP.

During the negotiations and also in the implementation phase of the Action plans, Romania can support countries like Moldova, Ukraine, Georgia, sharing its experience accumulated during the pre-accession period.

At the same time a supporter of the European perspective for Moldova, encouraging the European aspirations and reforms in Ukraine, Romania is focusing upon the development of a common, unitary and efficient EU strategy in the Black Sea area. Its initiatives and constant promotion of the Black Sea Synergy, together with consolidating the Black Sea Forum for Dialogue and Partnership and the Black Sea Trust projects are on the agenda of priorities as regards its external policy in this region.

Romania has given a clear signal of full support towards Georgia, reaffirming its commitment to the principles of territorial integrity, sovereignty and frontier inviolability.

The active participation in the European Neighbourhood Policy implies not only specific contributions to the development of EU's relations with the partner states or the bilateral relations between Romania and ENP partner states, but also facing challenges regarding the relatively unstable climate of the region (given the frozen conflicts, the illegal migration, the difficulties of securing the borders), also paying attention to avoiding the creation of new barriers at the borders of the Union.

Romania should find ways to turn to good account the opportunities deriving from its potential of stability and security factor in the area, catalyst of the regional cooperation initiatives in the area, by largely using the instruments offered by the European neighbourhood policy, also concentrating on its contribution to the constant adaptation of these instruments and the attainment of new solutions to deal with the challenges of this part of the EU neighbourhood.

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Romanian Economic and Business Review – Vol. 3, No. 2

THE QUANTITY THEORY OF MONEY AND FINANCIAL CRISES: EVIDENCE FROM THE 1997 ASIAN CRISIS

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Abstract

One of the most remarkable features of Asian Crisis is the fact that it has not been anticipated almost by anybody. This paper shows that using the prescription of the quantity theory of money, the crisis could have been forecasted well in advance. The root of Asian crisis is the monetary expansion initiated at the beginning of 1990s, which did not fueled a simple inflationary process, but generated an unsustainable expansion of production.

Keywords: quantity theory, monetary policy, asian crisis, unsustainable expansion of production

Introduction

The Southeast Asian financial crisis has several remarkable features. First, the crisis affected the economies with the strongest economic growth in the world, and subsequently induced the international community to provide the biggest financial assistance in the history. Secondly, it is the most important crisis that affected developing countries after the well known "debt crisis" in 1980s, and (allegedly) the most important crisis that affected the capitalist system after the Great Depression. Thirdly, the crash of Asian financial markets and the region's economic downturn have been almost completely unexpected.

This article shows that using the prescription of the quantity theory of money, the crisis could have been forecasted well in advance. The root of Asian crisis is the monetary expansion initiated at the beginning of 1990s, which did not fueled a simple inflationary process, but generated an unsustainable expansion of production.

Historical prelude

One of the most remarkable features of Asian Crisis is the fact that it has not been anticipated almost by anybody (Radelet and Sachs, 1998). To the extent that a financial crisis was expected, the rating of sovereign bond issues should have

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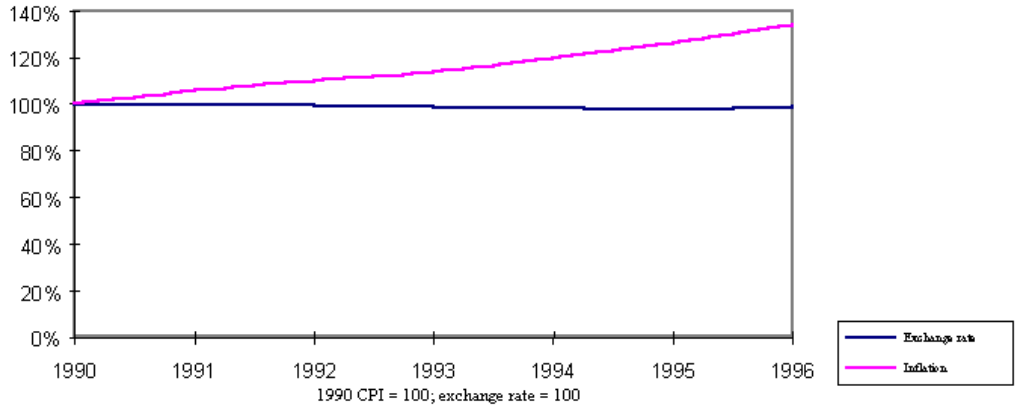
been decreased. Yet sovereign ratings remain unchanged until the summer of 1997, and southeast Asian countries have been downgraded only after the beginning of stock market and foreign exchange market crash.

The essential feature of Asian economic boom in 1990s is the fact that it has relied on a strong credit expansion which, in turn, has been fueled by foreign capital inflows. Domestic monetary authorities have adopted a passive attitude, accepting or even encouraging these flows.

Opening their capital accounts at the beginning of the 1990s, the east Asian states knew that only by attracting foreign investors they could hope to continue the strong economic growth, which had been achieved so far by an autonomous expansion of money supply to support an interventionist industrial development strategy.

The most important element east Asian governments used to attract foreign investors was the currency peg and the consequent elimination of foreign exchange risk. With a fixed exchange rate, an inflow of foreign currency leads automatically to an increase of domestic money supply.

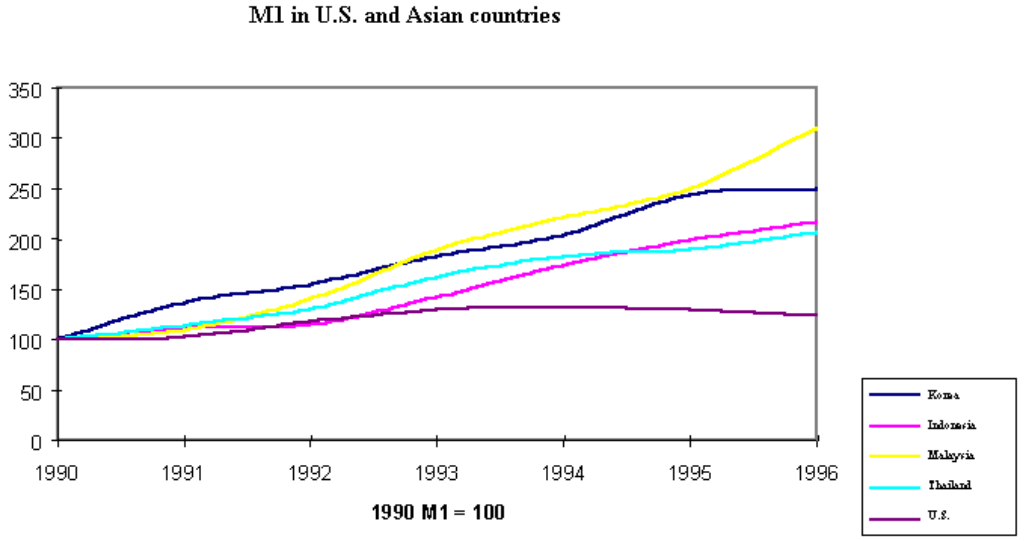
Thailand: inflation, the exchange rate and currency overvaluation



This is a highly problematic policy measure, however, as historical record seems to illustrate.[39] Monetary expansion, in turn, has a booming influence either on prices or on imports. In Asian countries, inflation continued to be a familiar phenomenon, although figures indicated a rather weak rise in prices. However, in time, the gap between the exchange rate (the external value of currency) and the purchasing power of money widened, indicating a significant currency

[39] See Meigs for a discussion of how fixed exchange rate policy contributed to the occurrence of Mexican Crisis.

overvaluation. Unlike the experience of Latin American hyperinflation in the 1980s, in Asian countries, the excessive quantity of money served to finance an increasing amount of imports. A chronic current account deficit could be seen in all South East Asian countries.



To keep the exchange rate unchanged, Asian monetary authorities had to multiply the money supply, between 1990 and 1997, by 1.7 times in Korea, 2 times in Thailand, 2.6 times in Indonesia and over 3 times in Malaysia. The currency pegging made the control of money supply much more difficult than it could have been if the exchange rate were free to fluctuate. If local currencies appreciated, exporters would have worried about their competitiveness, but on the other hand, domestic buyers could have get foreign commodities at a lower price.

At the middle of 1997, IMF reports were very optimistic. Despite some minor problems and several insignificant recommendations, the board of IMF was "impressed" by the macroeconomic achievements of Asian countries and congratulated their governments for the ability with which they have managed to mix economic boom and monetary stability. After the crash, western policymakers and analysts were unhappy about the how "the watchdog of the international monetary system" fulfilled its mission.

It should have been clear that the fall of Asian financial markets and the overall economic downturn has been not only a phenomenon that could have been forecasted well in advance, but also an unavoidable byproduct of the Asian development model. Retrospectively, the Asian crisis can be handled as a historical case the analytical content of which has been raised (and solved) decades ago. Is the economic boom anything but the manifestation of monetary

phenomenon? For those who understood the causes of the Great Depression – an economic downturn that followed a period of strong economic expansion and no inflation – Asian crisis has been just another example of how monetary mismanagement can drive the economy down.

Asian crisis and monetarist considerations

In what follows, I will show that Asian crisis could have been forecasted. Moreover, I will show that this prediction could be made using the insights of the quantity theory of money, a body of thought which represents the foundation of macroeconomic stabilization policies promoted by IMF.

Based on the equation of exchange

$$M \times V = P \times Q$$

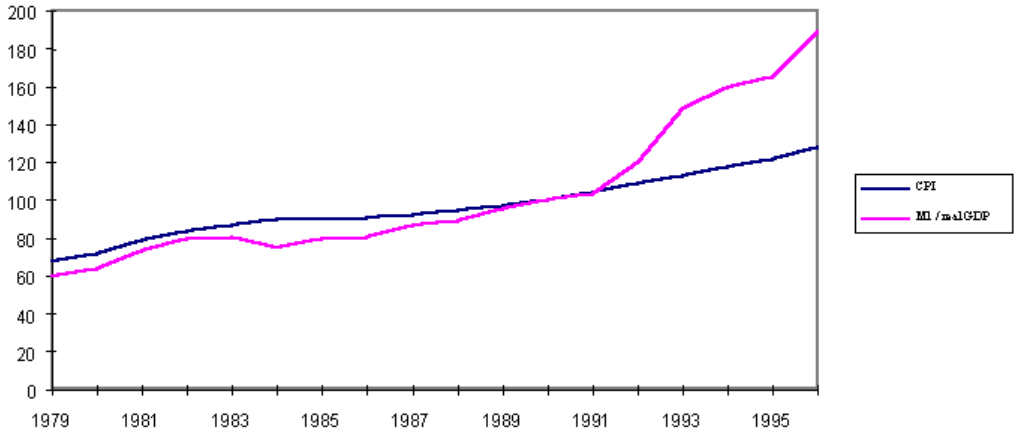
the quantity theory of money asserts that changes in money supply will have no influence on production ("money is neutral") and the velocity of money remains unchanged in the short run. Therefore, any increase (or decrease) in M will deliver a proportional increase (or decrease) in P.

In essence, my task is pretty simple. I have used a simple technique to analyze the relation between the quantity of money, GDP and inflation. This method is similar to that used by Milton Friedman in its classical book *Dollars and Deficits*. Before explaining the method and showing the results, a short clarification is needed. While Friedman used the technique to obtain an empirical confirmation of the quantity theory of money (in US, Great Britain, Germany and Japan), I will begin precisely from the hypothesis the quantity theory of money is true and show the serious imbalance that developed in Asian economies (Malaysia and Korea) after 1990.

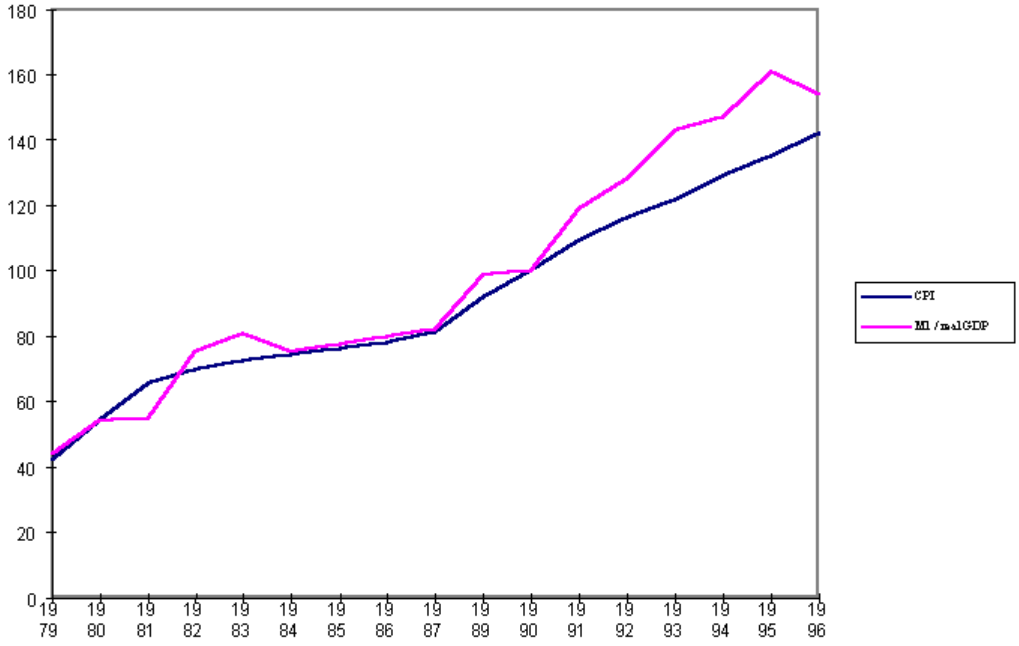
I have built two curves, one indicating the evolution of inflation, the other the evolution of the quantity of money per production unit. The inflation curve represents the evolution of the consumer price index, considering the reference point 1990 (when CPI is 100). For example, in 1987 in Malaysia the price level was 92.4% relative to 1990; that is prices were on average 7.6 percentage points lower than in 1990.

The second curve represents the evolution of the ratio between money supply as measured by M1 and real GDP (as measured in 1990 prices). More precisely, I have divided each year nominal GDP by the price index (current year/1990) and obtained the evolution of real GDP. For example, in Korea in 1993, GDP in 1990 prices is obtained by dividing nominal GDP (265 948 billion won) to 1990-based CPI and equals 218 528 billion won. Then I have divided each year M1 to the real GDP and represented the resulted ratios in the figures below.

MALAYSIA



KOREA



The monetarist idea is that any additional monetary unit will reflect eventually in prices, and thus the two curves should be identical or follow each other closely. When the quantity of money per unit of production increases, prices in increase also. This correlation is the main insight of the quantity theory of

money. Indeed, it can be noticed that by 1990, there seemed to be no serious monetary disequilibrium in the two economies. In 1980s, we can see a clear correlation between money and prices in both countries. After 1990, the money supply increases significantly, especially in Malaysia, while prices manifest some inertia. Thus, at the end of 1995 we can see an important gap between the quantity of money injected in the economy and its weak impact on prices. From a monetarist perspective, it should have been obvious that it was only a matter of time until the two curves will meet again. The higher the gap, the more important the necessary adjustment that had to come.

The difference of tens of percentage points reflected in the stock and foreign exchange market crash in the summer 1997 and, of course, in the subsequent exploding inflation rate.

In conclusion, the Asian crisis is a good case study for the students of the quantity theory of money.

Conclusions

The Asian crisis was largely unexpected by investors, analysts and public officials. This paper shows that the quantity of money is a useful tool for analyzing the crisis. Based on the hypothesis that any increase of the money supply will sooner or later reflect in the price level, Asian economies manifested a grave disequilibrium in the 1990s and a correcting crisis was unavoidable. Ex post, although the Asian crisis was, in its details, the result of a complex network of political, social and economic factors, it remains essentially a monetary phenomenon. It is very surprising then, why it has not been forecasted and prevented.

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